

Technical Documentation

Microphone Type 4191
for Hand-held Analyzer
Types 2250, 2250-L and 2270

Supplement to Instruction Manual BE 1712

Microphone Type 4191 for Hand-held Analyzer Types 2250, 2250-L and 2270

Type 2250, from Hardware Version 1.1
Type 2250-L, from Hardware Version 2.0
Type 2270, from Hardware Version 3.0

Supplement to Instruction Manual BE 1712

Safety Considerations

This apparatus has been designed and tested in accordance with IEC 61010-1 and EN 61010-1 *Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use*. This manual contains information and warnings which must be followed to ensure safe operation and to retain the apparatus in safe condition. Special note should be made of the following:

Safety Symbols



The apparatus will be marked with this symbol when it is important that you refer to the associated warning statements given in the manual.



Protective Earth Terminal



Hazardous Voltage

Explosion Hazard

The equipment is not designed to be used in potentially explosive environments. It should not be operated in the presence of flammable liquids or gases.

Warnings

- Switch off all power to equipment before connecting or disconnecting their digital interface. Failure to do so could damage the equipment.
- Whenever it is likely that the correct function or operating safety of the apparatus has been impaired, it must be made inoperative and be secured against unintended operation.
- Any adjustment, maintenance and repair of the open apparatus under voltage must be avoided as far as possible and, if unavoidable, must be carried out only by trained service personnel.



- Do not dispose of electronic equipment or batteries as unsorted municipal waste
- It is your responsibility to contribute to a clean and healthy environment by using the appropriate local return and collection systems
- Hazardous substances in electronic equipment or batteries may have detrimental effects on the environment and human health
- The symbol shown to the left indicates that separate collection systems must be used for any discarded equipment or batteries marked with that symbol
- Waste electrical and electronic equipment or batteries may be returned to your local Brüel & Kjær representative or to Brüel & Kjær Headquarters for disposal

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Chapter 1

Introduction

1.1 About This Supplement

This document is a supplement, to Instruction Manual for Hand-held Analyzer Types 2250, 2250-L and 2270 BE 1712. It provides the information relevant when Hand-held Analyzer Type 2250, 2250 L or 2270 is configured with Free-field ½" Condenser Microphone Type 4191.

The combination of Free-field ½" Condenser Microphone Type 4191 and the hand-held analyzer is intended for high sound pressure levels. This combination makes it possible to measure up to 155 dB Peak.

The numbering of chapters, sections, figures and tables in this supplement corresponds to Instruction Manual BE 1712. This supplement only contains content that is different from the instruction manual and is specific to this microphone configuration. The other chapters, sections, figures and tables should be read in Instruction Manual BE 1712.

Also see section 1.1 of the instruction manual.

1.2 System Overview

1.2.4 Hardware Setup

This section provides an overview of the additional hardware components used when the analyzers are configured with Microphone Type 4191. The other hardware components can be found in Instruction Manual BE 1712, section 1.2.4.

NOTE: Microphone Type 4191 is not specified together with Outdoor Microphone Kit UA-1404

Table 1.1
Additional hardware components needed for conformance testing of the analyzers configured with Type 4191

| Quantity* | Brüel & Kjær Type/Part Number | Description |
|-----------|-------------------------------|---|
| 1 or 2 | Type 4191 | Free-field ½" Condenser Microphone |
| 1 or 2 | WA-0302-C | Electrical Substitute for Microphone Type 4191, 18 pF |

*. Quantity depends on which analyzer is to be tested.

Chapter 2

Information Required by the Standards

2.1 Introduction

This chapter contains detailed information required by the standards to be described in the Instruction Manual.

No additional information is required in Chapter 2 when using Microphone Type 4191 together with the analyzer.

Chapter 3

Conformance Testing

3.1 Introduction

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

3.5 Electrical Substitute for Microphones

To obtain a BNC type electrical input, replace the microphone with a **WA-0302-C**, **18 pF**, fitted with a 10–32 UNF to BNC adaptor, UA-0245.

This Electrical Substitute for Microphones has a nominal attenuation of **0.55 dB**.

The electrical input obtained in this way has a maximum input level of $\pm 15.07 V_{\text{Peak}}$ and no damage will occur for signals up to $\pm 20 V_{\text{Peak}}$.

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

To calibrate the analyzer for the electrical conformances test with a calibration that corresponds to the calibration you would get if the analyzer were fitted with a microphone with the nominal Open Circuit Sensitivity do the following:

- 1) On the **Setup** display (*Full* tab):
 - Set *Input, Transd. Used* to the microphone that you intend to substitute
 - Set *Input, Input to Top Socket*
- 2) Calibrate the analyzer by typing in the nominal sensitivity as the *Sensitivity* on the **Calibration** display. For Microphone **Type 4191**, the nominal sensitivity is the microphone's Open Circuit Sensitivity (**12.50 mV/Pa**), attenuated by the Microphone Preamplifier ZC-0032's nominal attenuation (**0.20 dB**), which equates to **12.22 mV/Pa**. Do not press the **Start Calibration** button.
- 3) 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 LZF (or LCF) displays 94.00 dB in the **Calibration** display. This electrical amplitude is the 94.00 dB reference for the electrical tests. The amplitude will typically be **13.1 mV**. This is due to the attenuation of the Electrical Substitute for Microphones (nominally **0.55 dB**).

Chapter 4

Specifications

4.1 Specifications

Specifications are given for the configurations detailed in Chapter 1.

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

Note: The specifications given here for the Z-weighting, as defined in IEC 61672–1, are also valid for the Lin response, as defined in IEC 60651.

4.5 Microphone

Microphone **Type 4191** and Microphone Preamplifier ZC-0032:

Type: Free-field ½" Condenser Microphone

Polarization Voltage: External 200 V

Nominal Open Circuit Sensitivity: 12.5 mV/Pa, (corresponding to –38 dB re 1 V/Pa) ± 1.5 dB

Capacitance: 18 pF (at 250 Hz)

Nominal Preamplifier Attenuation: 0.2 dB

Extension Cables between Microphone Preamplifier ZC-0032 and the analyzer: Up to 100 m without degradation of the specifications. **Note:** EMC is only tested with a 10 m cable (AO-0697-D-100)

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

4.6.2 Typical Low-frequency Responses

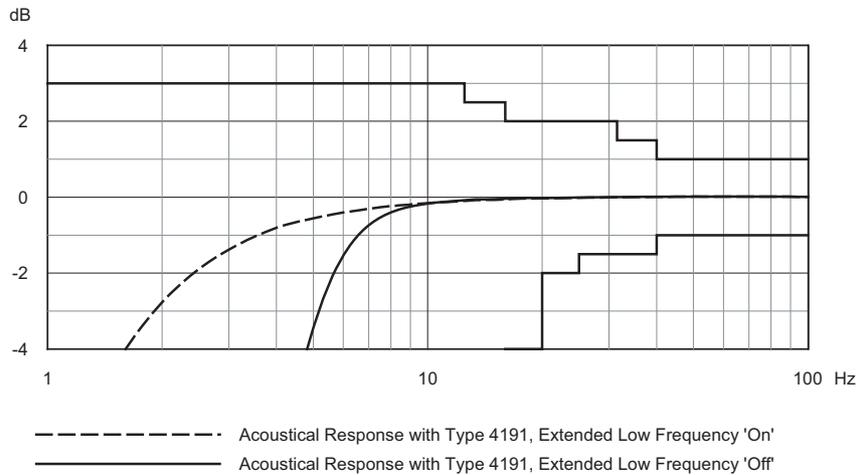
The typical Low-frequency Responses for Z-frequency weighting are given in Fig.4.2. **For the rear 'Input' socket Electrical Responses refer to section 4.6.2 in the Instruction Manual.** The Acoustical Responses include Microphone Type 4191 and Microphone Preamplifier ZC-0032.

The Low-frequency Responses depends on the state of the *Extended Low Frequency* parameter on the **Setup** display, under *Input*.

The Low-frequency Responses are not influenced by the microphone accessories described in section 1.2.4.

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 3.5) differs from the electrical responses in Fig.4.2 in the **Instruction Manual** because it also includes Microphone Preamplifier ZC-0032.

Fig.4.2 Typical low-frequency responses

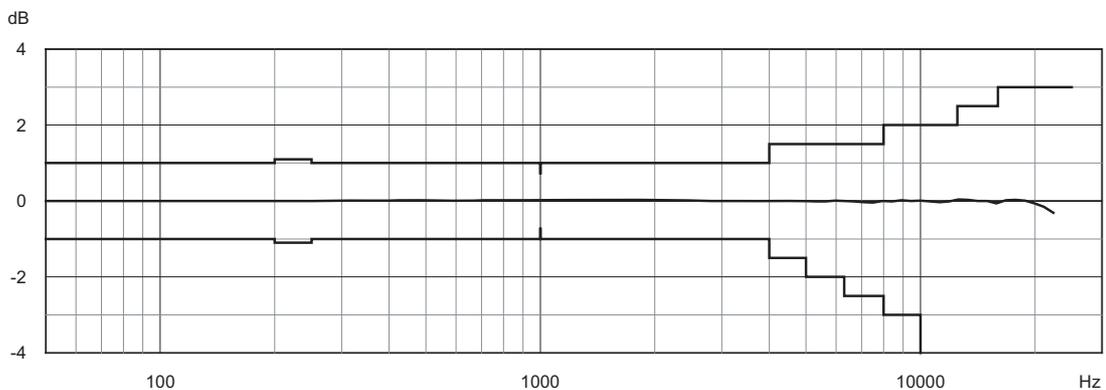


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4.6.5 Free-field Frequency Responses

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.4.7 and Table A.2 to Table A.5. The tables also provide the 'Expanded Uncertainties of Measurement' required by IEC 61672-1, see the start of section 4.6 in the **Instruction Manual**.

Fig.4.3 Free-field 0° frequency response for Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer's electrical response, with the Microphone Preamplifier connected to a microphone extension cable. Corresponds to the "Acoustical Response" column in Table A.2



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Fig. 4.4 Influence of the analyzer body on free-field 0° response, corresponds to the “Body Influence” column in Table A.3

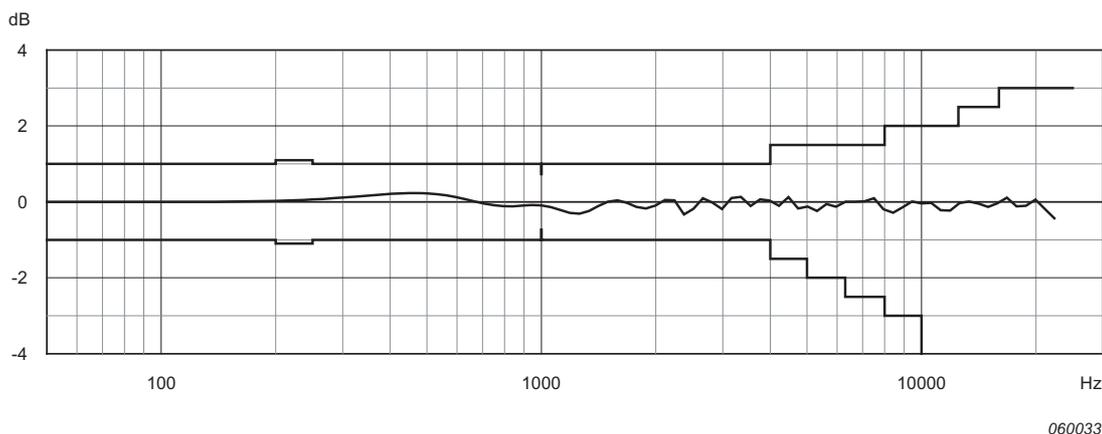


Fig. 4.5 Free-field 0° frequency response for Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer. Corresponds to the “Acoustical Response” column in Table A.3

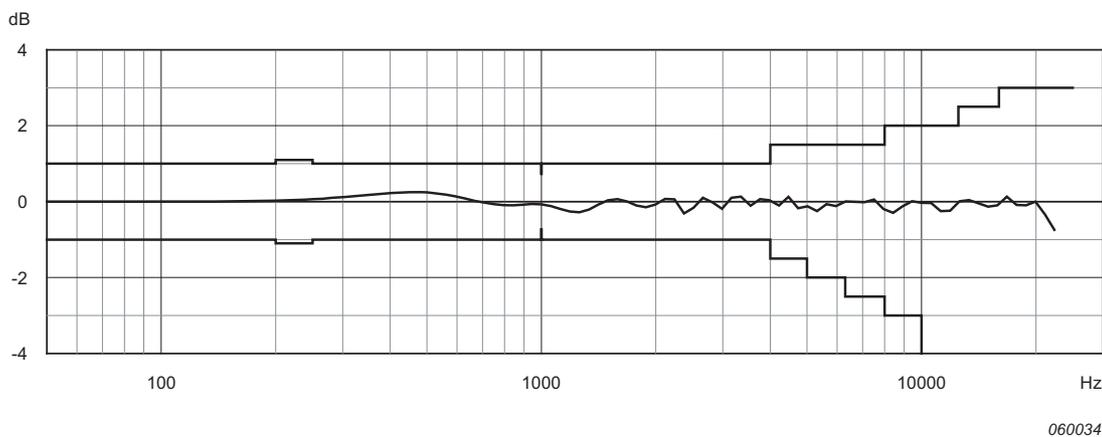


Fig. 4.6 Free-field 0° frequency response for Windscreen UA-1650, Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer’s electrical response, with the Microphone Preamplifier connected to a microphone extension cable. Corresponds to the “Acoustical Response” column in Table A.4

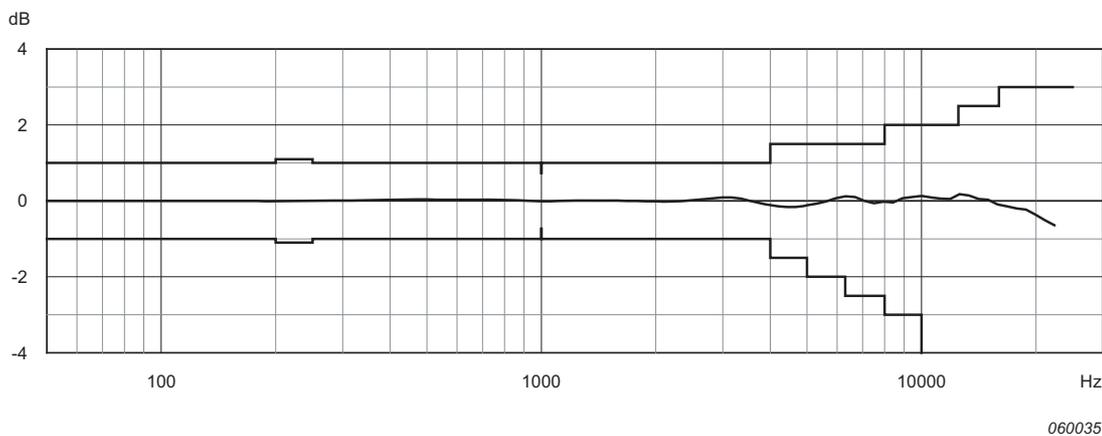


Fig. 4.7 Free-field 0° frequency response for Windscreen UA-1650, Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer. Corresponds to the “Acoustical Response” column in Table A.5

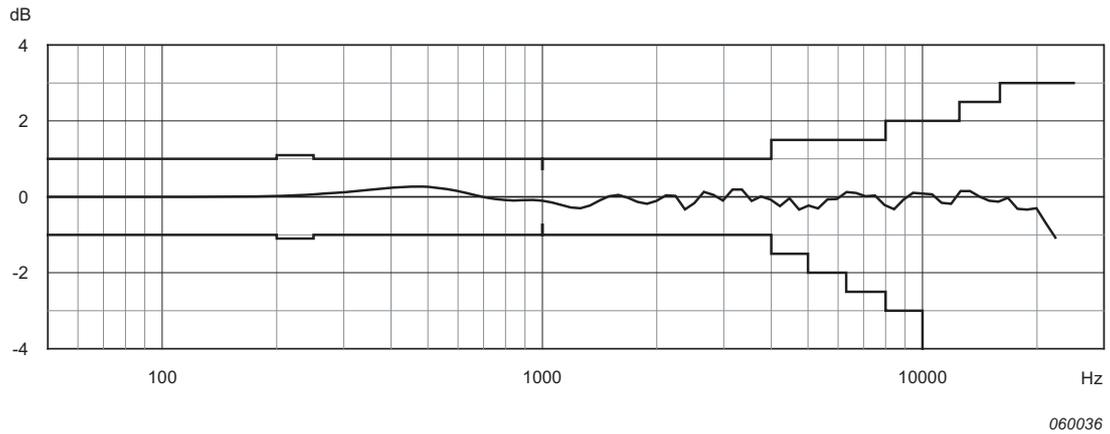


Fig. 4.8 Microphone Type 4191 is not specified together with Outdoor Microphone Kit UA-1404

4.6.6 Diffuse-field Frequency Responses

The diffuse-field frequency responses (also called random-incidence frequency responses) with Z-frequency-weighting are provided in Fig. 4.9 and Fig. 4.10, and Table A.7 and Table A.8.

The diffuse-field body influence of the analyzer is so small that the diffuse-field frequency responses are the same with and without the Microphone Preamplifier connected to the microphone extension cable.

Fig. 4.9 Diffuse-field frequency response for Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with or without the Microphone Preamplifier connected to a microphone extension cable. Corresponds to the “Acoustical Response” column in Table A.7

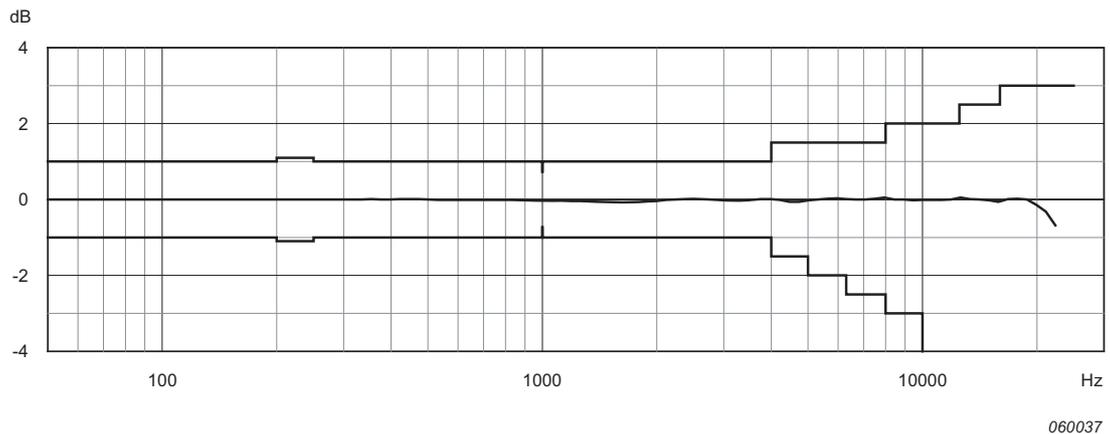


Fig. 4.10 Diffuse-field frequency response for Windscreen UA-1650, Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with or without the Microphone Preamplifier connected to a microphone extension cable. Corresponds to the “Acoustical Response” column in Table A.8

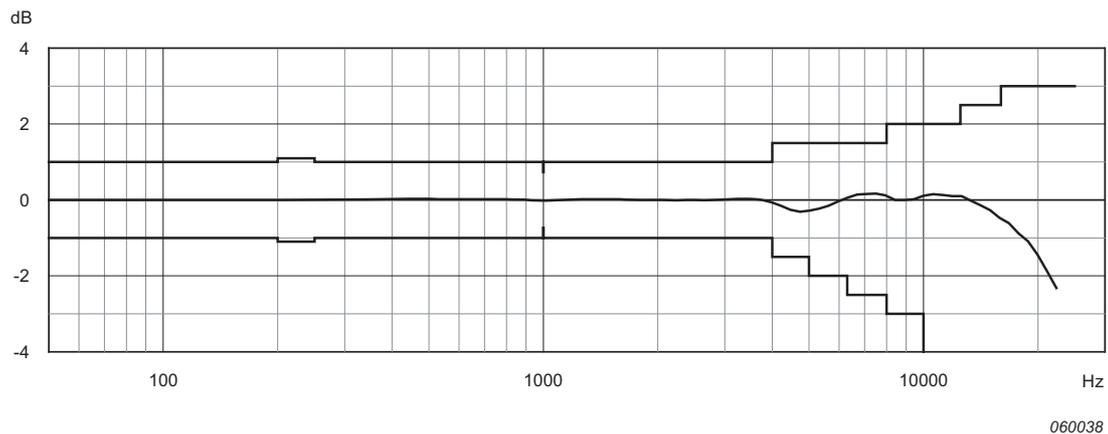


Fig. 4.11 Microphone Type 4191 is not specified together with Outdoor Microphone Kit UA-1404

4.7 Directional Responses

This section gives directional responses for plane progressive sinusoidal sound waves normalised to the response in the reference direction. Both influence of body and accessories, and the resulting directional responses are 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 Microphone Reference Point 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 limits, reduced by the ‘Maximum Expanded Uncertainties of Measurement’ from Appendix A of IEC 61672–1. The ‘Maximum Expanded Uncertainties of Measurement’ used here are the maximum uncertainties that a test organisation may have on its measurements when it performs conformance tests according to IEC 61672.

Fig. 4.12 Directional response for Microphone Type 4191 and Microphone Preamplifier ZC-0032 with the Microphone Preamplifier connected to a microphone extension cable. Corresponds to Table A.11 to Table A.13

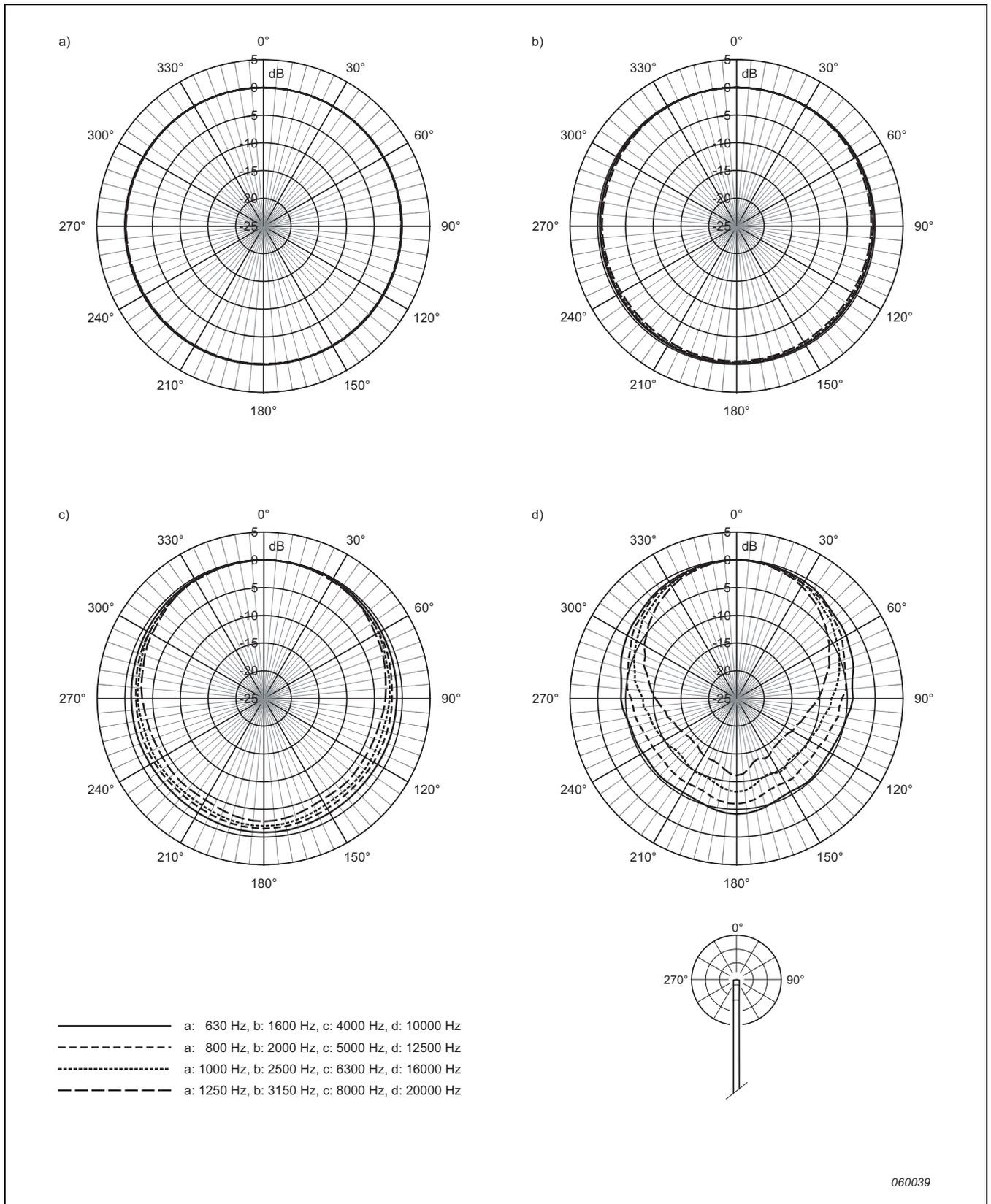
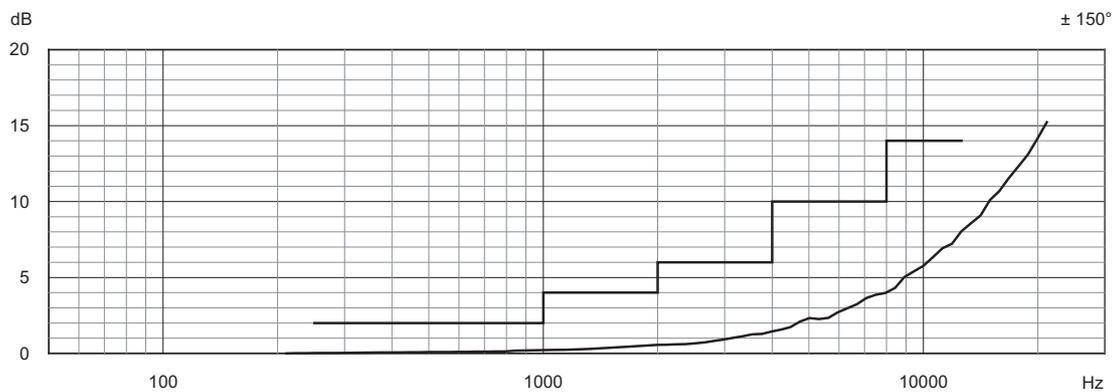
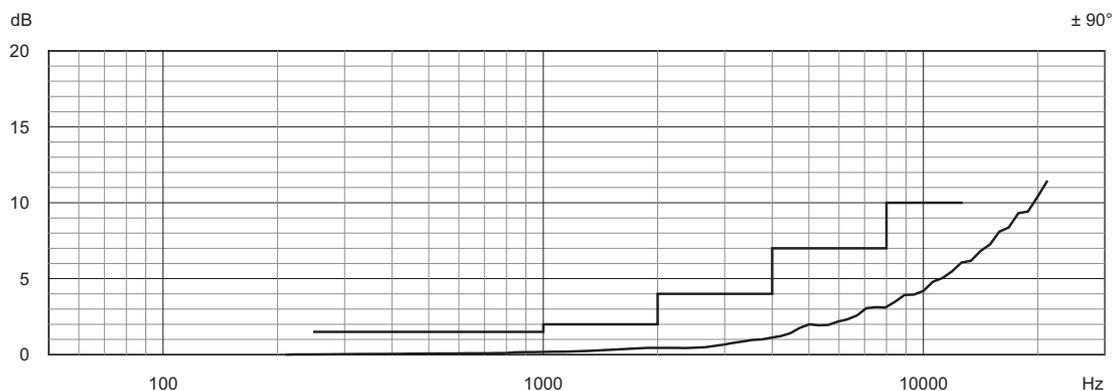
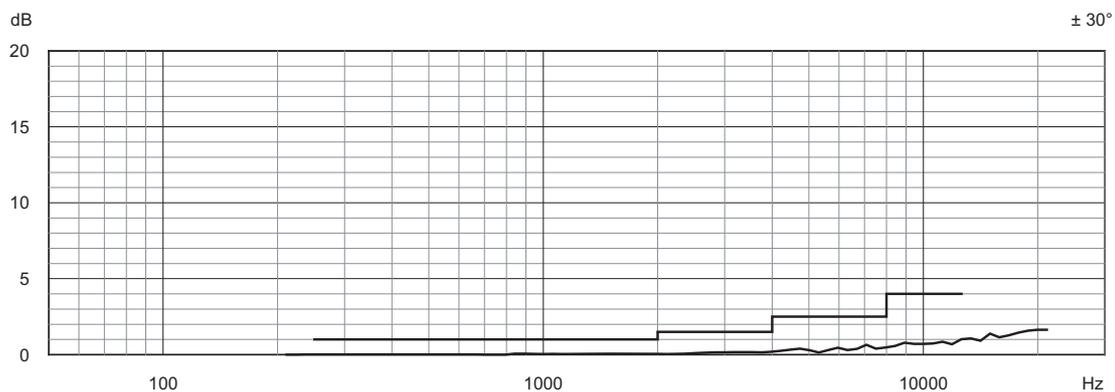


Fig. 4.13 Sensitivity variations for Microphone Type 4191 and Microphone Preamplifier ZC-0032 with the Microphone Preamplifier connected to a microphone extension cable, at sound incidence angles within $\pm\theta^\circ$ from the reference direction. Corresponds to Table A.14



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Fig. 4.14 Directional response for Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer, measured in a plane parallel to the display and along the microphone axis. Corresponds to Table A.21 to Table A.23

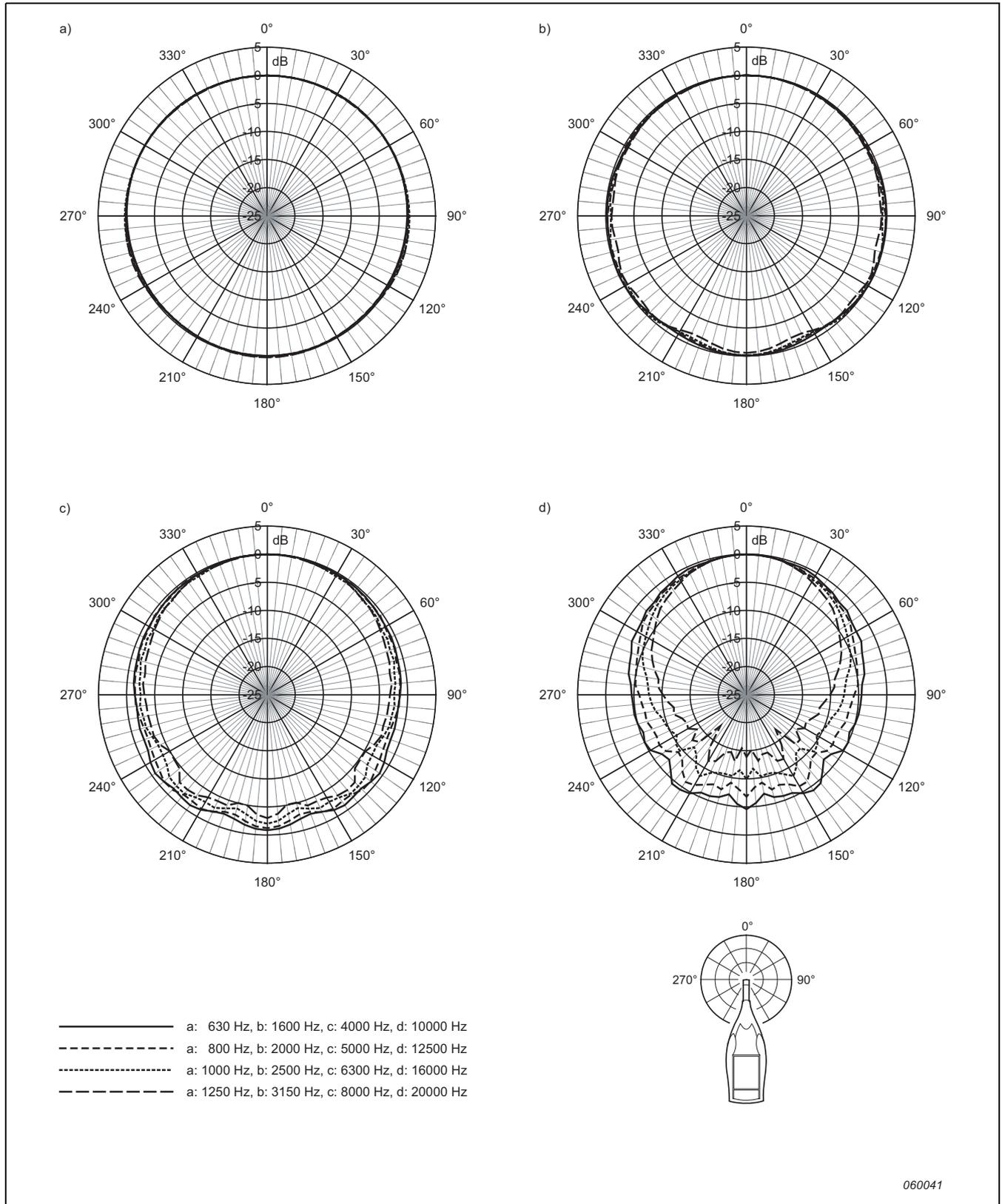


Fig. 4.15 Directional response for Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer, measured in a plane perpendicular to the display and along the microphone axis. Corresponds to Table A.24 to Table A.26

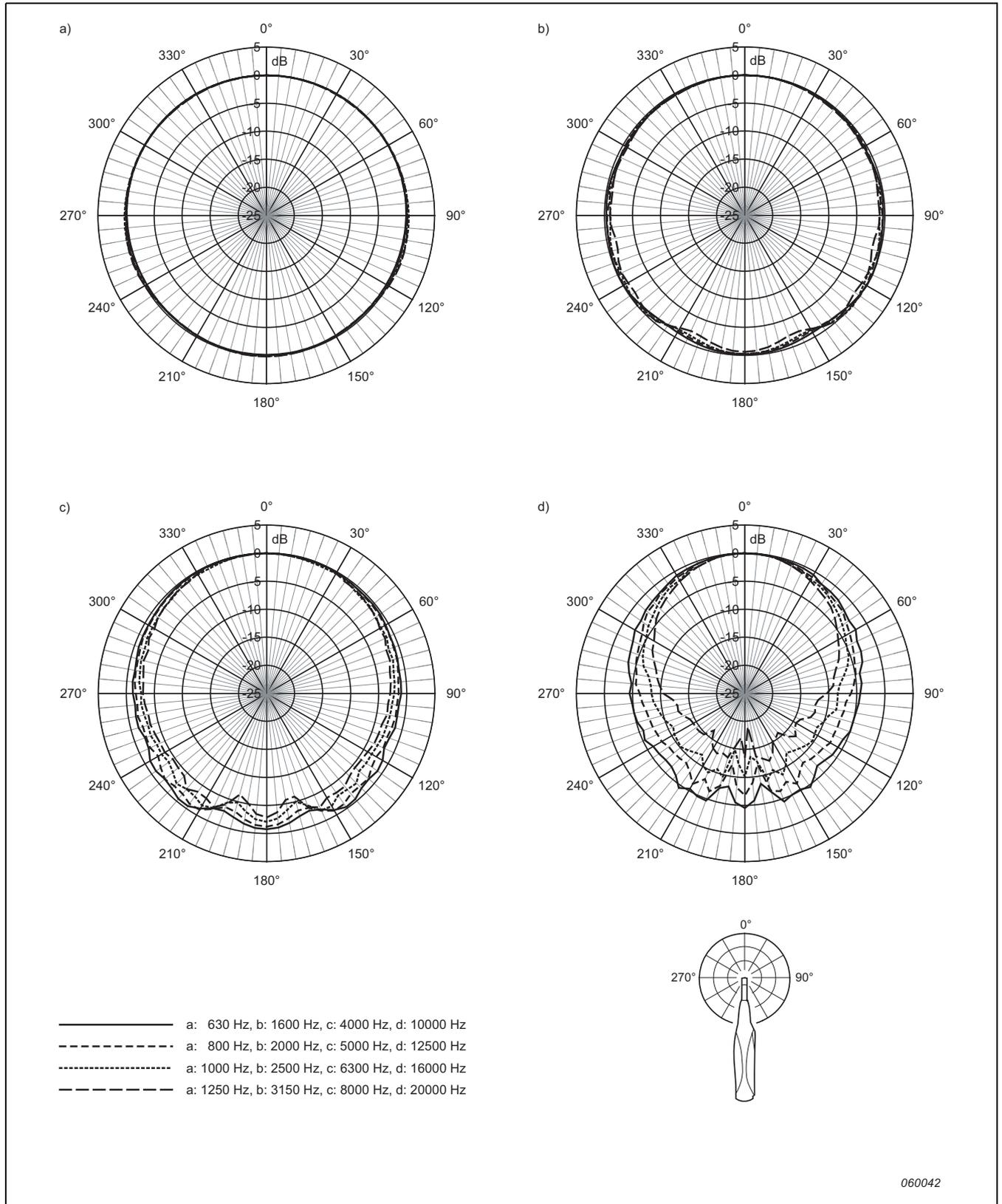


Fig. 4.16 Sensitivity variations of Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer, at sound incidence angles within $\pm\theta^\circ$ from the reference direction. Corresponds to Table A.27

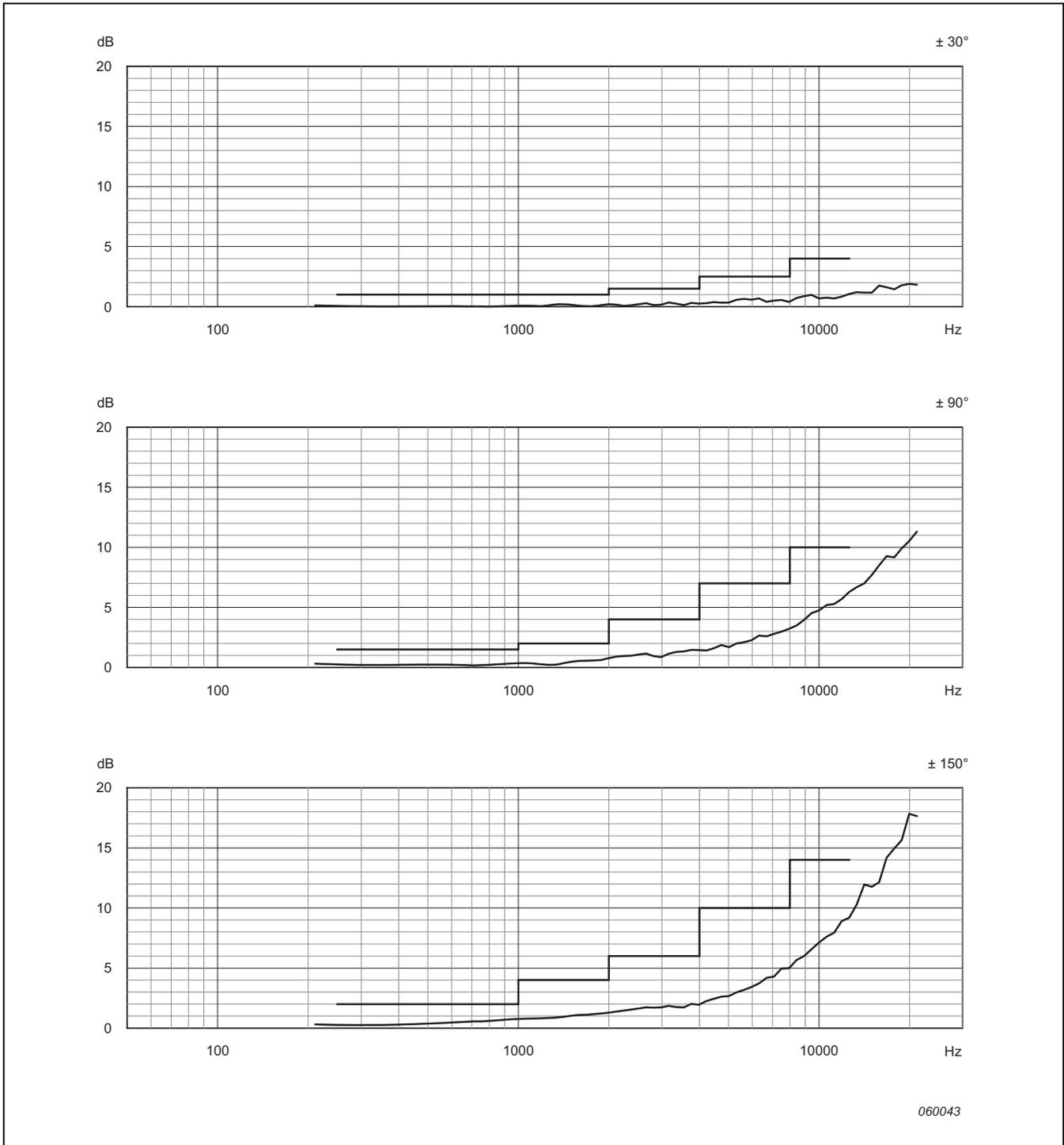


Fig. 4.17 Directional response for Windscreen UA-1650, Microphone Type 4191 and Microphone Preamplifier ZC-0032 with the Microphone Preamplifier connected to a microphone extension cable. Corresponds to Table A.31 to Table A.33

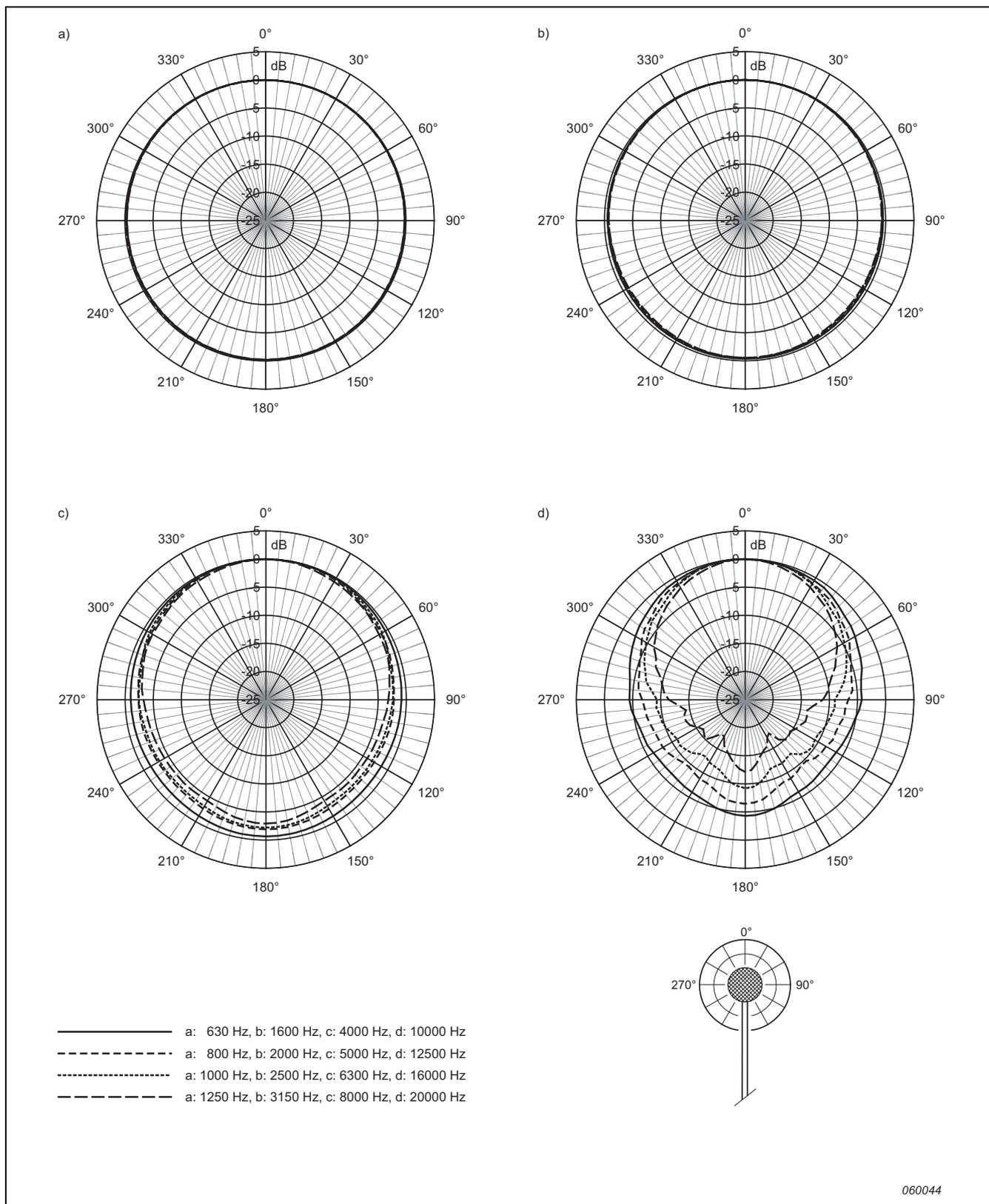


Fig. 4.18 Sensitivity variations for Windscreen UA-1650, Microphone Type 4191 and Microphone Preamplifier ZC-0032 with the Microphone Preamplifier connected to a microphone extension cable, at sound incidence angles within $\pm\theta^\circ$ from the reference direction. Corresponds to Table A.34

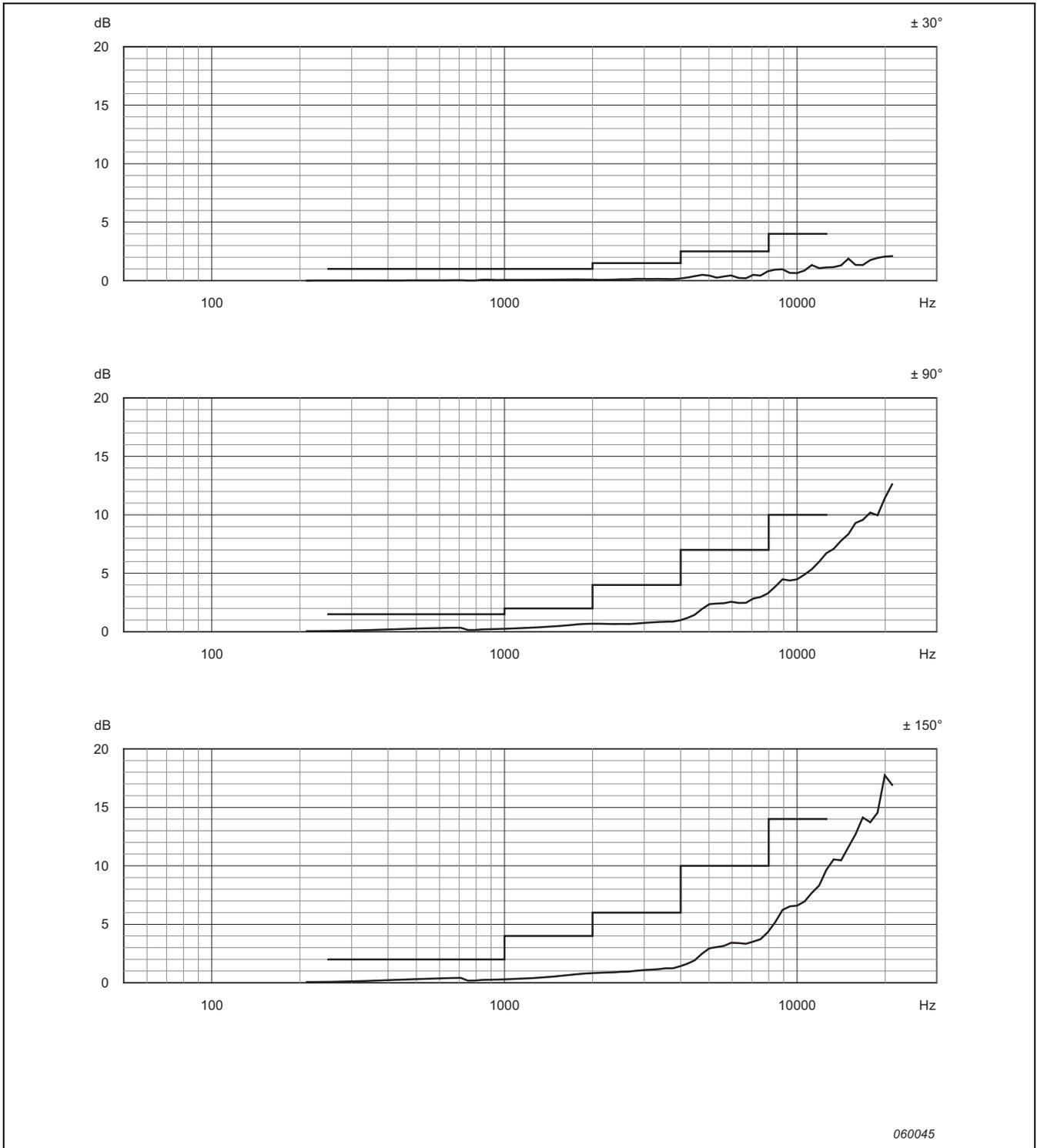


Fig. 4.19 Directional response for Windscreen UA-1650, Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer, measured in a plane parallel to the display and along the microphone axis. Corresponds to Table A.35 to Table A.37

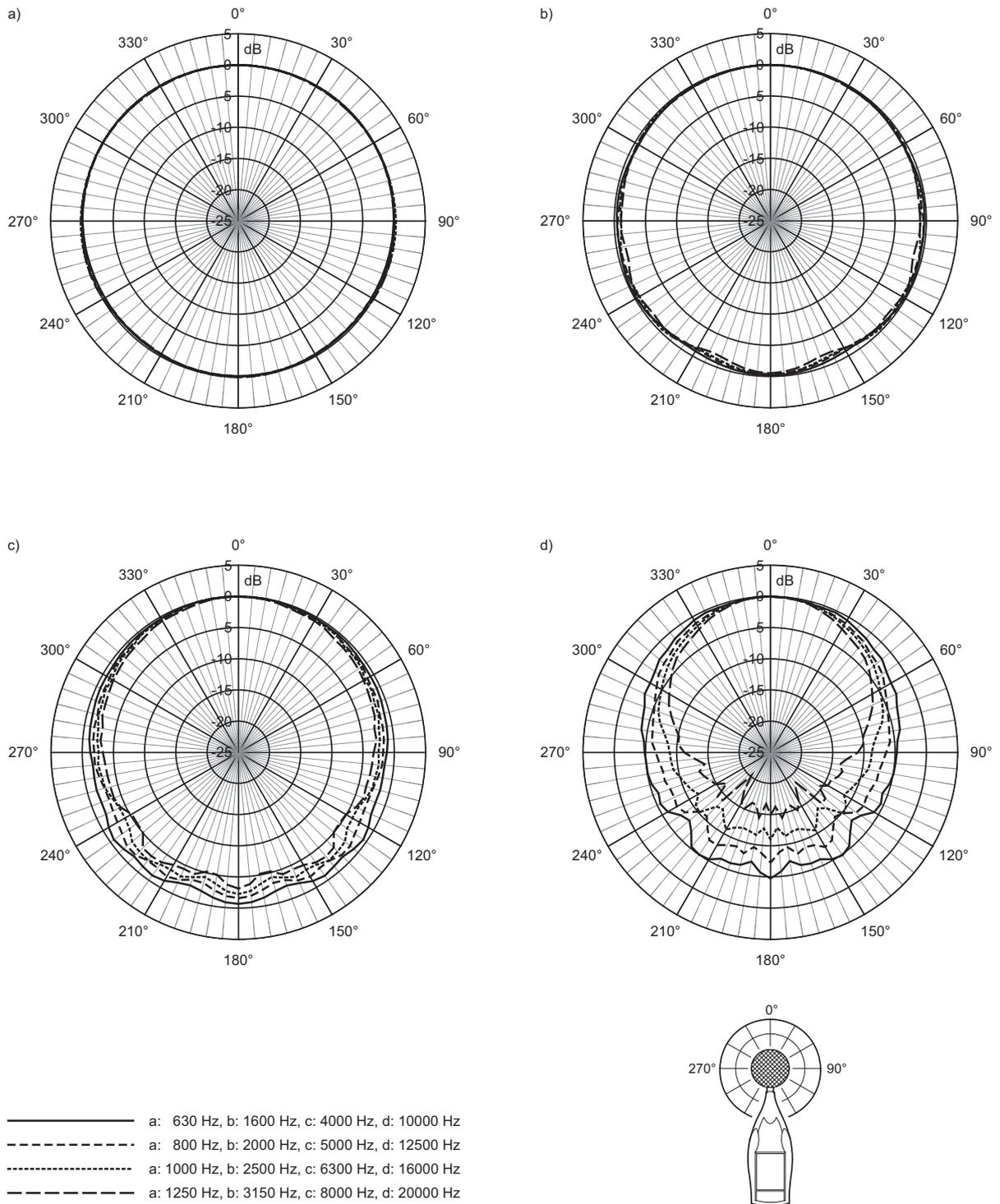


Fig. 4.20 Directional response for Windscreen UA-1650, Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer, measured in a plane perpendicular to the display and along the microphone axis. Corresponds to Table A.38 to Table A.40

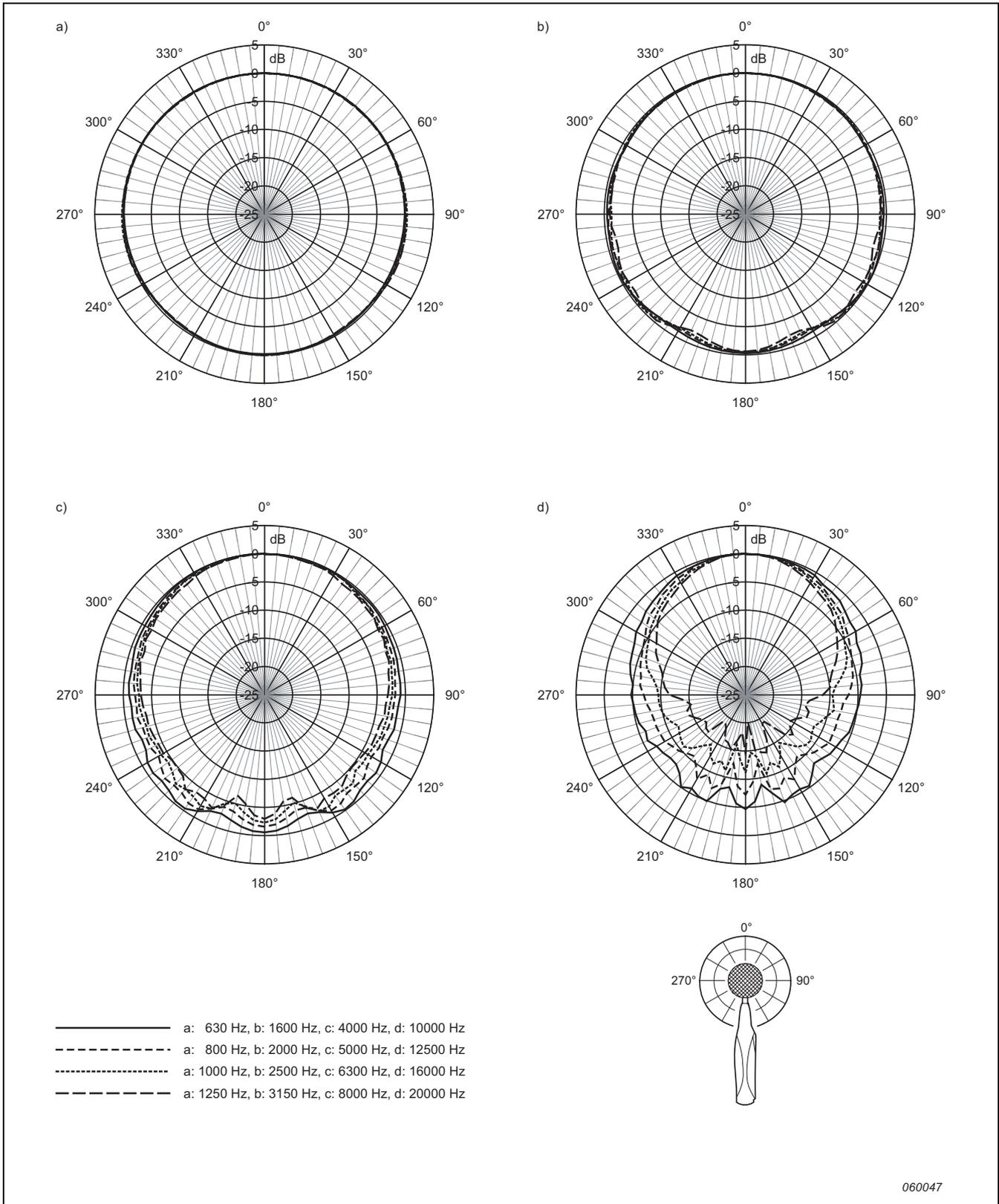


Fig. 4.21 Sensitivity variations of Windscreen UA-1650, Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer, at sound incidence angles within $\pm\theta^\circ$ from the reference direction. Corresponds to Table A.41

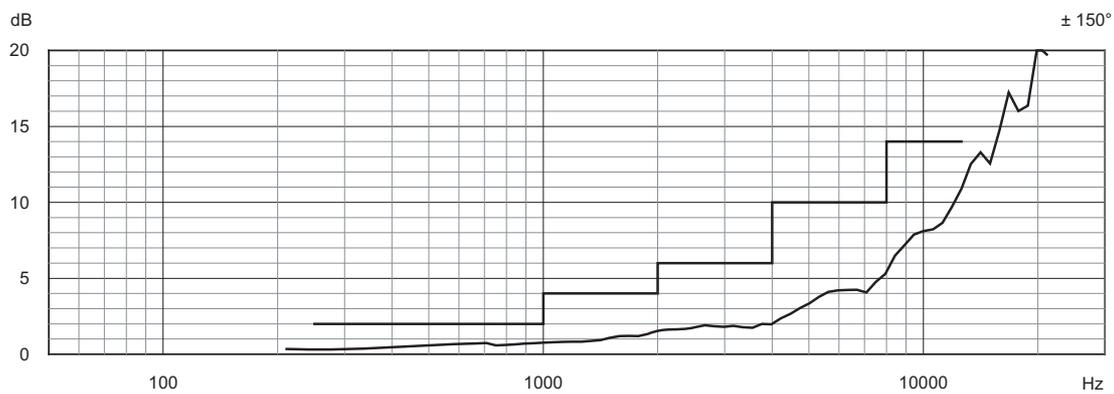
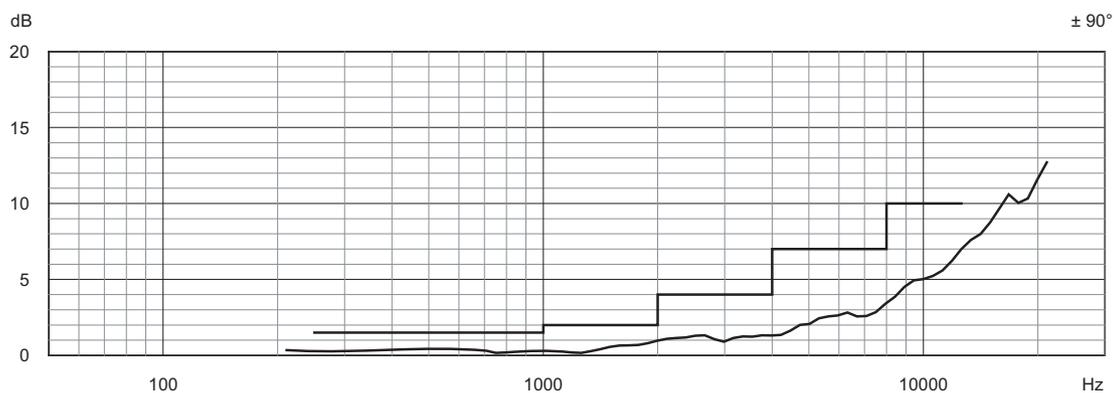
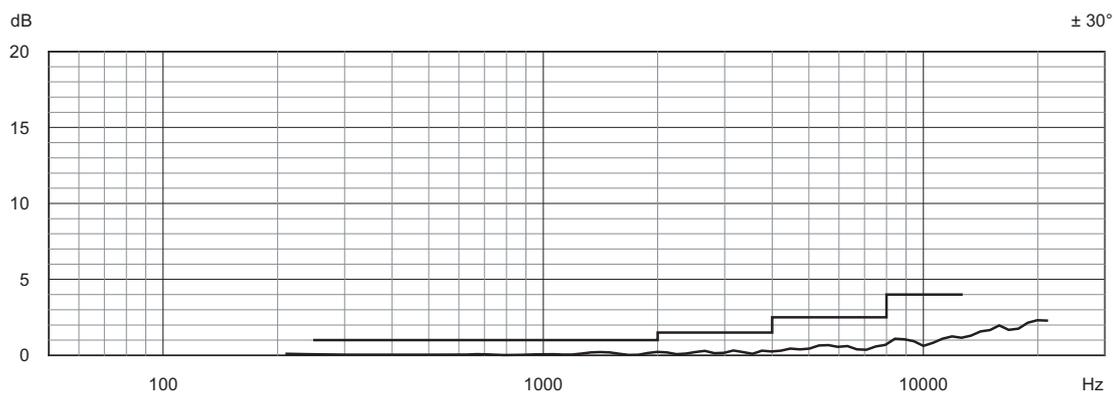


Fig. 4.22 Microphone Type 4191 is not specified together with Outdoor Microphone Kit UA-1404

Fig. 4.23 Microphone Type 4191 is not specified together with Outdoor Microphone Kit UA-1404

4.8 Self-generated Noise

Self-generated noise is given for nominal microphone Open Circuit Sensitivity. *Sound Field Correction* 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) | Z-weighting* Extended Low Frequency (dB) |
| Single-range | | | | | |
| Microphone | 20.9 | 19.7 | 19.7 | 21.8 | 21.8 |
| Electrical | 25.4 | 24.4 | 25.5 | 30.3 | 43.0 |
| Total | 26.7 | 25.7 | 26.5 | 30.9 | 43.0 |
| High Range | | | | | |
| Microphone | 20.9 | 19.7 | 19.7 | 21.8 | 21.8 |
| Electrical | 43.8 | 42.4 | 42.4 | 46.6 | 48.1 |
| Total | 43.8 | 42.4 | 42.4 | 46.6 | 48.1 |
| Low Range | | | | | |
| Microphone | 20.9 | 19.7 | 19.7 | 21.8 | 21.8 |
| Electrical | 25.4 | 24.4 | 25.5 | 30.3 | 43.0 |
| Total | 26.7 | 25.7 | 26.5 | 30.9 | 43.0 |

*. minimum 120 seconds L_{Zeq}

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) | Z-weighting* Extended Low Frequency (dB) |
| Single-range | | | | | |
| Microphone | 19.9 | 18.7 | 18.7 | 20.8 | 20.8 |
| Electrical | 24.2 | 23.1 | 24.1 | 29.1 | 37.9 |
| Total | 25.6 | 24.4 | 25.2 | 29.7 | 38.0 |
| High Range | | | | | |
| Microphone | 19.9 | 18.7 | 18.7 | 20.8 | 20.8 |
| Electrical | 40.2 | 38.8 | 38.9 | 42.9 | 43.9 |
| Total | 40.2 | 38.8 | 38.9 | 42.9 | 43.9 |
| Low Range | | | | | |
| Microphone | 19.9 | 18.7 | 18.7 | 20.8 | 20.8 |
| Electrical | 24.2 | 23.1 | 24.1 | 29.1 | 37.9 |
| Total | 25.6 | 24.4 | 25.2 | 29.7 | 38.0 |

*. minimum 120 seconds L_{Zeq}

4.8.3 Typical Self-generated Noise Spectra

Typical spectra for self-generated noise are shown in Fig.4.24 to Fig.4.29.

Fig.4.24 Typical self-generated noise, 1/1 octave band, Single-range

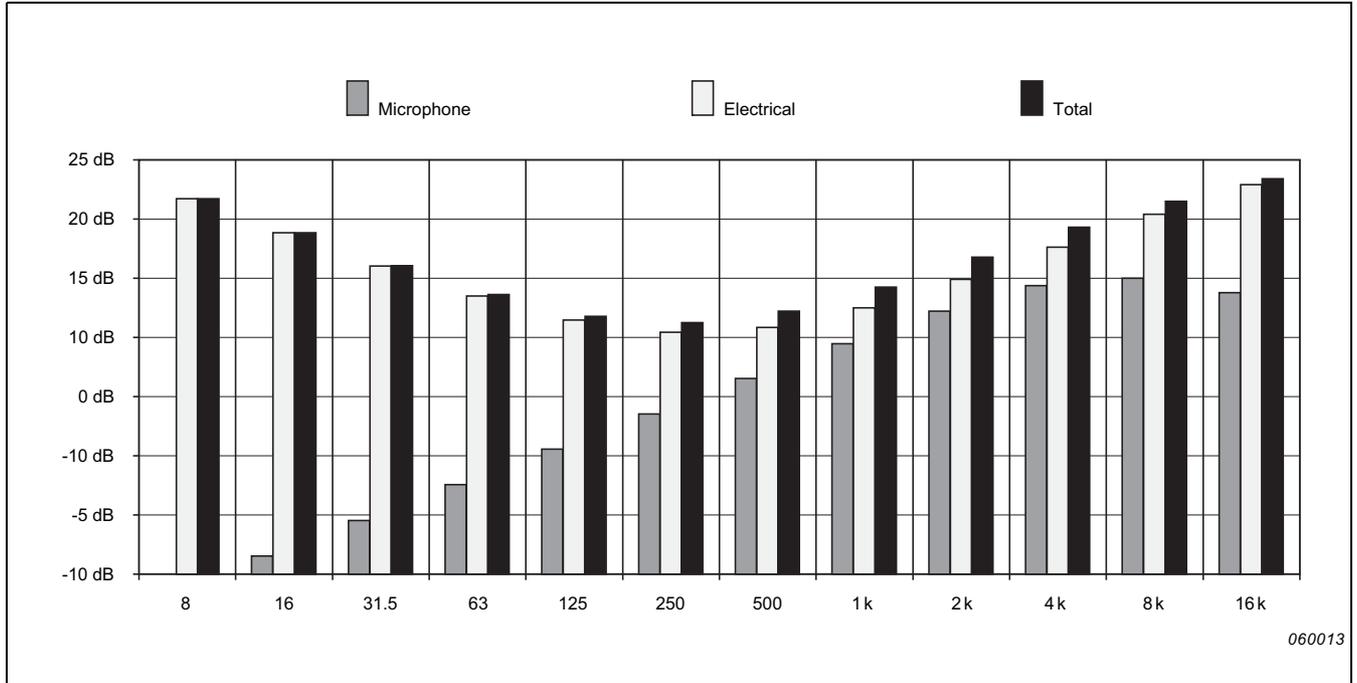


Fig.4.25 Typical self-generated noise, 1/1-octave band, High Range

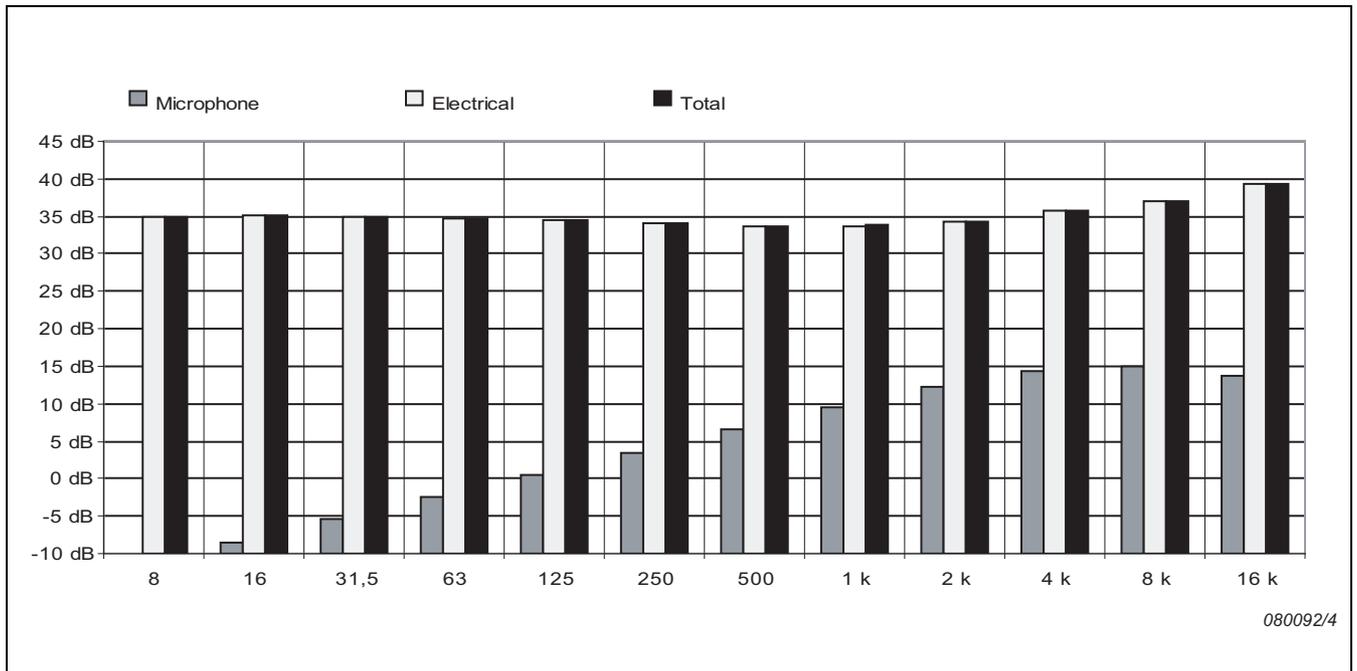


Fig. 4.26 Typical self-generated noise, 1/1 octave band, Low Range

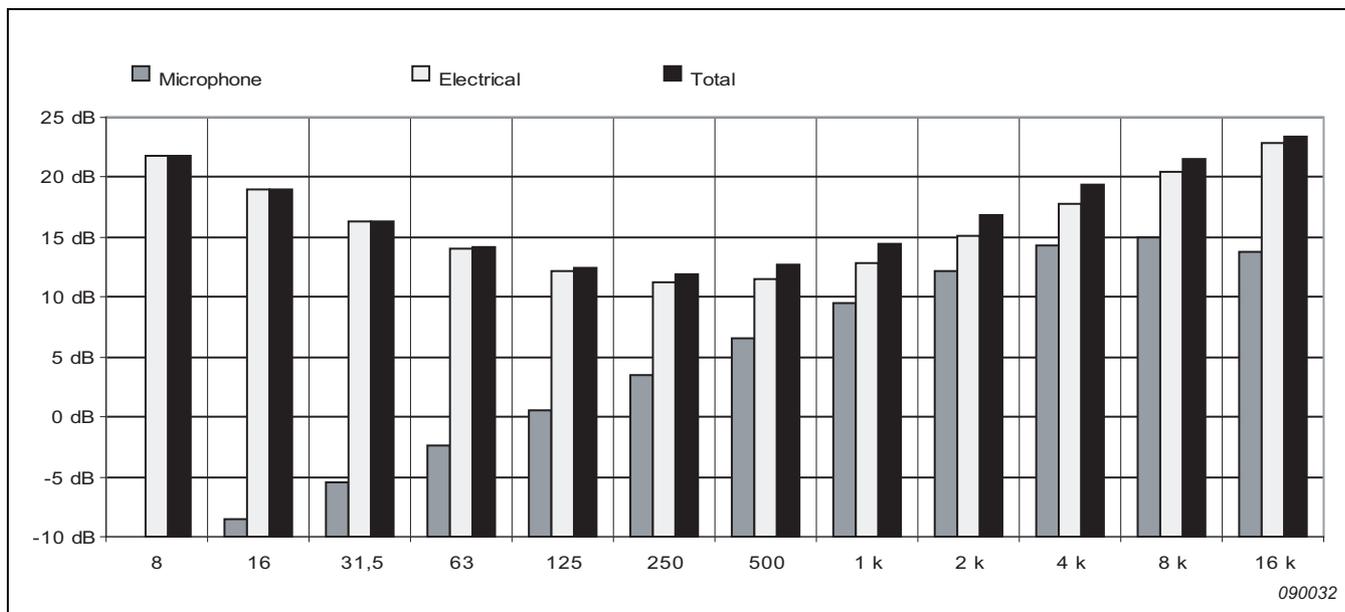


Fig. 4.27 Typical self-generated noise, 1/3 octave band, Single-range

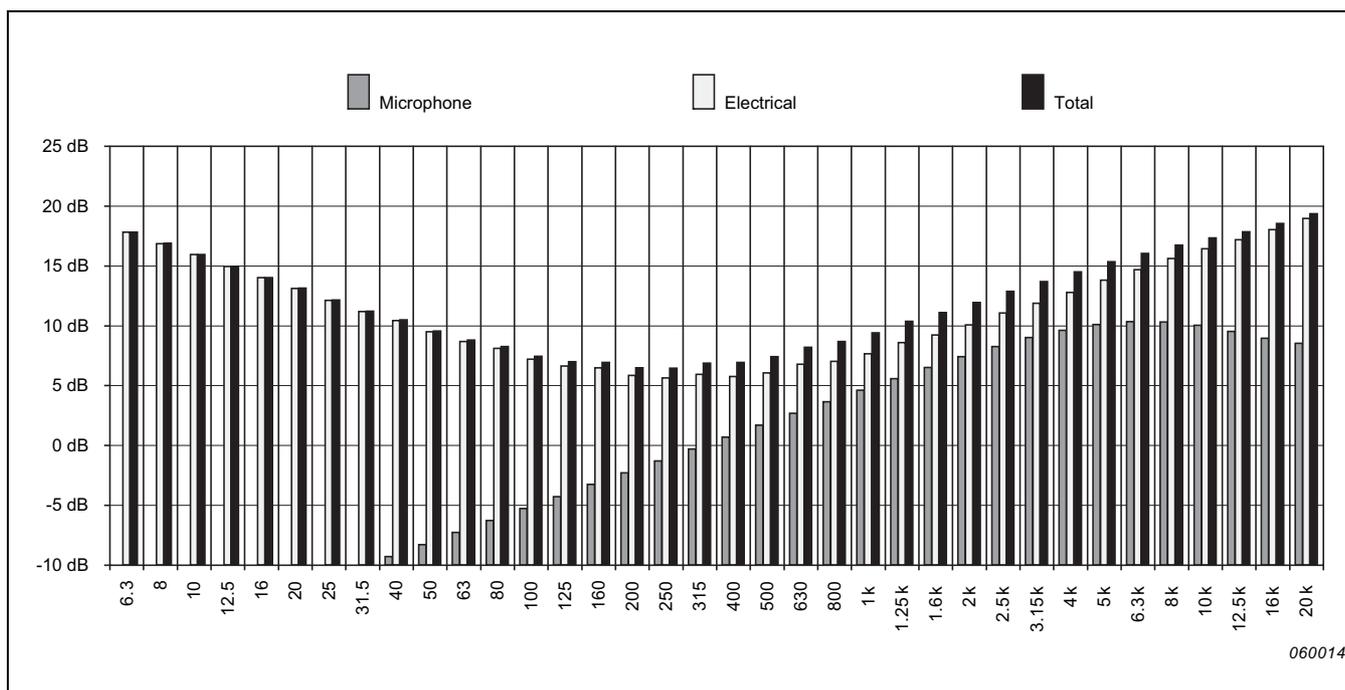


Fig.4.28 Typical self-generated noise, 1/3-octave band, High Range

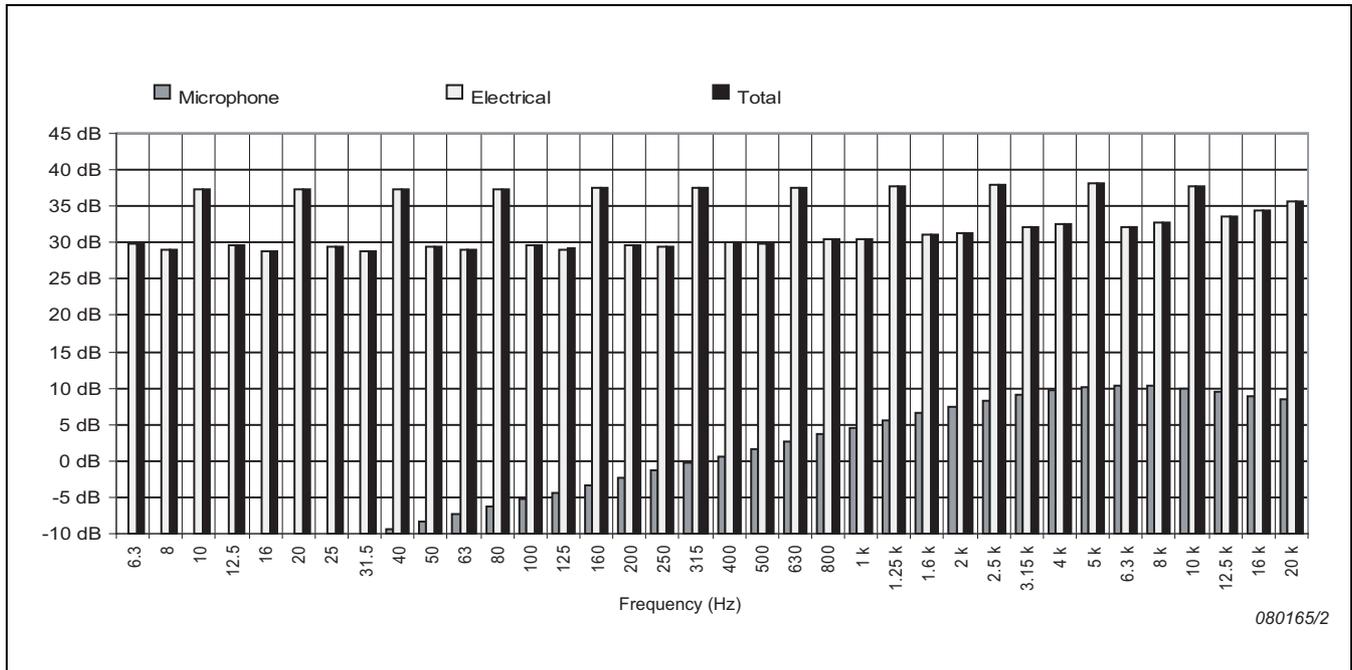
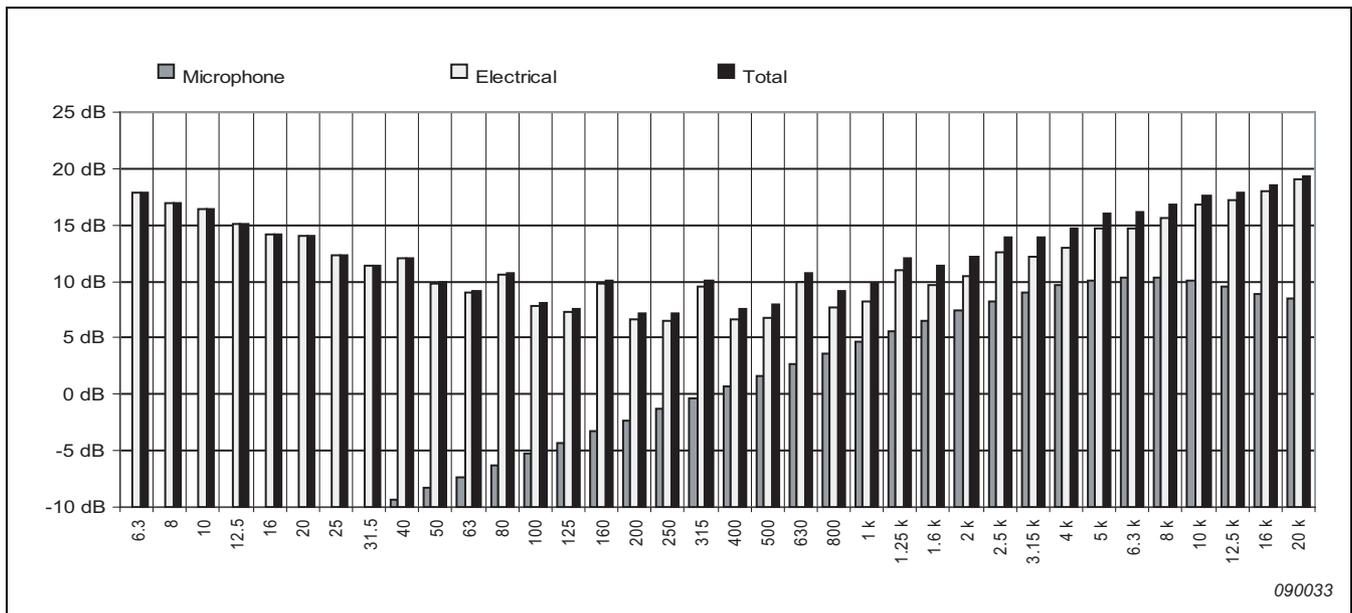


Fig.4.29 Typical self-generated noise, 1/3 octave band, Low Range



4.9 Measuring Ranges

The Upper Limit in the following sections is based on the guaranteed worst-case limit for the analyzer and the nominal Open Circuit Sensitivity of the microphone. The Overload Limit can, due to tolerances in the analyzer, be up to 1.5dB 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 analyzer and the nominal Open Circuit Sensitivity of the microphone, under Reference Environmental Conditions, *Sound Field Correction* 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: 171 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) | Z-weighting Extended Low Frequency (dB) |
| 151.8 – 36.6 | 151.8 – 35.6 | 151.8 – 36.7 | 151.8 – 41.5 | 151.8 – 54.2 |

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

| Range | Upper Limit (dB) | Lower Limit | | | | |
|--------|------------------|------------------|------------------|------------------|------------------|---|
| | | A-weighting (dB) | B-weighting (dB) | C-weighting (dB) | Z-weighting (dB) | Z-weighting Extended Low Frequency (dB) |
| Single | 134.3 | 35.3 | 34.3 | 35.4 | 40.2 | 52.9 |
| High | 134.3 | 53.7 | 52.3 | 52.3 | 56.5 | 58.0 |
| Low | 104.3 | 35.3 | 34.3 | 35.4 | 40.2 | 52.9 |

4.9.4 Indicator Range

Indicator Range according to the International Standard IEC 60804:

Table 4.5
Indicator Range

| Range | Upper Limit (dB) | Lower Limit | | | | |
|--------|------------------|------------------|------------------|------------------|------------------|---|
| | | A-weighting (dB) | B-weighting (dB) | C-weighting (dB) | Z-weighting (dB) | Z-weighting Extended Low Frequency (dB) |
| Single | 151.3 | 35.3 | 34.3 | 35.4 | 40.2 | 52.9 |
| High | 151.3 | 53.7 | 52.3 | 52.3 | 56.5 | 58.0 |
| Low | 121.3 | 35.3 | 34.3 | 35.4 | 40.2 | 52.9 |

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

| Range | Upper Limit (dB) | Lower Limit | | | | |
|--------|------------------|------------------|------------------|------------------|------------------|---|
| | | A-weighting (dB) | B-weighting (dB) | C-weighting (dB) | Z-weighting (dB) | Z-weighting Extended Low Frequency (dB) |
| Single | 152.8 | 33.2 | 32.2 | 33.3 | 38.1 | 50.8 |
| High | 152.8 | 51.6 | 50.2 | 50.2 | 54.4 | 55.9 |
| Low | 122.8 | 33.2 | 32.2 | 33.3 | 38.1 | 50.8 |

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

| Range | Upper Limit (dB) | Lower Limit | | | | |
|--------|------------------|------------------|------------------|------------------|------------------|---|
| | | A-weighting (dB) | B-weighting (dB) | C-weighting (dB) | Z-weighting (dB) | Z-weighting Extended Low Frequency (dB) |
| Single | 155.8 | 33.2 | 32.2 | 33.3 | 38.1 | 50.8 |
| High | 155.8 | 51.6 | 50.2 | 50.2 | 54.4 | 55.9 |
| Low | 125.8 | 33.2 | 32.2 | 33.3 | 38.1 | 50.8 |

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) |
| Single-range | | | | | | |
| A-weighting | 112.6 | 151.8 | 152.8 | 150.9 | 147.3 | 36.6 |
| B-weighting | 134.9 | 151.8 | 151.1 | 149.1 | 145.5 | 35.6 |
| C-weighting | 149.0 | 151.8 | 151.0 | 149.0 | 145.3 | 36.7 |

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) |
| Z-weighting | 152.0 | 151.8 | 151.9 | 152.0 | 151.6 | 41.5 |
| Z-weighting Extended Low Frequency | 152.0 | 151.8 | 151.9 | 152.0 | 151.6 | 54.2 |
| High Range | | | | | | |
| A-weighting | 112.6 | 151.8 | 152.8 | 150.9 | 147.3 | 55.0 |
| B-weighting | 134.9 | 151.8 | 151.1 | 149.1 | 145.5 | 53.6 |
| C-weighting | 149.0 | 151.8 | 151.0 | 149.0 | 145.3 | 53.6 |
| Z-weighting | 152.0 | 151.8 | 151.9 | 152.0 | 151.6 | 57.8 |
| Z-weighting Extended Low Frequency | 152.0 | 151.8 | 151.9 | 152.0 | 151.6 | 59.3 |
| Low Range | | | | | | |
| A-weighting | 82.6 | 121.8 | 122.8 | 120.9 | 117.3 | 36.6 |
| B-weighting | 104.9 | 121.8 | 121.1 | 119.1 | 115.5 | 35.6 |
| C-weighting | 119.0 | 121.8 | 121.0 | 119.0 | 115.3 | 36.7 |
| Z-weighting | 122.0 | 121.8 | 121.9 | 122.0 | 121.6 | 41.5 |
| Z-weighting Extended Low Frequency | 122.0 | 121.8 | 121.9 | 122.0 | 121.6 | 54.2 |

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

| Range | Upper Limit | | | | | Lower Limit |
|---------------|--------------|------------|------------|------------|---------------|-------------|
| | 31.5 Hz (dB) | 1 kHz (dB) | 4 kHz (dB) | 8 kHz (dB) | 12.5 kHz (dB) | All (dB) |
| Single | 152.0 | 154.8 | 154.0 | 152.0 | 148.3 | 53.5 |
| High | 152.0 | 154.8 | 154.0 | 152.0 | 148.3 | 70.4 |
| Low | 122.0 | 124.8 | 124.0 | 122.0 | 118.3 | 53.5 |

4.11 Spectrum Analysis

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 4.10
Linear Operating
Range

| Range | Upper Limit (dB) | Lower Limit 1/1-octave (dB) | Lower Limit 1/3-octave (dB) |
|--------|------------------|-----------------------------|-----------------------------|
| Single | 152.0 | 36.1 | 32.2 |
| High | 152.0 | 55.0 | 51.3 |
| Low | 122.0 | 36.1 | 32.2 |

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 4.11
Measurement
Range

| 1/1-octave (dB) | 1/3-octave (dB) |
|-----------------|-----------------|
| 152.0 – 36.1 | 152.0 – 32.2 |

4.12 Influence from the Operating Environment

4.12.4 Vibration

Vibration Sensitivity (20 – 1000 Hz) for 1 ms^{-2} : A-weighted max. 76 dB, Z-weighted max. 86 dB.

Appendix A

Tables

A.2 Free-field Frequency Responses

Frequency responses with Z-frequency-weighting. Measured with plane progressive sinusoidal sound waves incident from the reference direction and the instrument's *Sound Field Correction* parameter set to *Free-field*, see section 4.6.5.

Table A.2 Free-field 0° frequency response for Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer's electrical response with the Microphone Preamplifier connected to a microphone extension cable

| Nominal Frequency Hz | Exact Frequency (6 digits) Hz | Microphone Actuator Response dB | Microphone Free-field Correction dB | Microphone Free-field Response dB | Electrical Response dB | Acoustical Response dB | Expanded Uncertainty dB |
|-------------------------|-------------------------------------|------------------------------------|--|--------------------------------------|---------------------------|---------------------------|----------------------------|
| 63 | 63.0957 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 |
| 80 | 79.4328 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 |
| 100 | 100 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 |
| 125 | 125.893 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 |
| 160 | 158.489 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 |
| 200 | 199.526 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 |
| 250 | 251.189 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 |
| 315 | 316.228 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.06 |
| 400 | 398.107 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.06 |
| 500 | 501.187 | -0.01 | 0.02 | 0.02 | 0.00 | 0.02 | 0.07 |
| 630 | 630.957 | -0.03 | 0.04 | 0.01 | 0.00 | 0.01 | 0.07 |
| 800 | 794.328 | -0.04 | 0.06 | 0.02 | 0.00 | 0.02 | 0.07 |
| 1000 | 1000 | -0.08 | 0.10 | 0.02 | 0.00 | 0.02 | 0.07 |
| 1060 | 1059.25 | -0.09 | 0.11 | 0.02 | 0.00 | 0.02 | 0.07 |
| 1120 | 1122.02 | -0.10 | 0.12 | 0.02 | 0.00 | 0.02 | 0.07 |
| 1180 | 1188.5 | -0.11 | 0.13 | 0.02 | 0.00 | 0.02 | 0.08 |
| 1250 | 1258.93 | -0.12 | 0.15 | 0.02 | 0.00 | 0.02 | 0.08 |
| 1320 | 1333.52 | -0.14 | 0.16 | 0.02 | 0.00 | 0.02 | 0.08 |
| 1400 | 1412.54 | -0.15 | 0.18 | 0.03 | 0.00 | 0.03 | 0.08 |
| 1500 | 1496.24 | -0.17 | 0.19 | 0.03 | 0.00 | 0.03 | 0.08 |
| 1600 | 1584.89 | -0.19 | 0.21 | 0.03 | 0.00 | 0.03 | 0.08 |
| 1700 | 1678.8 | -0.21 | 0.23 | 0.02 | 0.00 | 0.02 | 0.08 |
| 1800 | 1778.28 | -0.23 | 0.26 | 0.02 | 0.00 | 0.02 | 0.09 |
| 1900 | 1883.65 | -0.26 | 0.28 | 0.02 | 0.00 | 0.02 | 0.09 |
| 2000 | 1995.26 | -0.28 | 0.31 | 0.02 | 0.00 | 0.02 | 0.09 |
| 2120 | 2113.49 | -0.32 | 0.34 | 0.02 | 0.00 | 0.02 | 0.09 |
| 2240 | 2238.72 | -0.36 | 0.37 | 0.01 | 0.00 | 0.01 | 0.09 |
| 2360 | 2371.37 | -0.39 | 0.41 | 0.01 | 0.00 | 0.01 | 0.10 |
| 2500 | 2511.89 | -0.44 | 0.45 | 0.01 | 0.01 | 0.02 | 0.10 |
| 2650 | 2660.73 | -0.49 | 0.50 | 0.01 | 0.01 | 0.02 | 0.10 |
| 2800 | 2818.38 | -0.55 | 0.55 | 0.00 | 0.01 | 0.01 | 0.11 |
| 3000 | 2985.38 | -0.61 | 0.61 | 0.00 | 0.01 | 0.01 | 0.11 |
| 3150 | 3162.28 | -0.68 | 0.67 | -0.01 | 0.01 | 0.00 | 0.12 |
| 3350 | 3349.65 | -0.76 | 0.75 | -0.01 | 0.01 | 0.00 | 0.12 |
| 3550 | 3548.13 | -0.84 | 0.83 | -0.01 | 0.01 | 0.00 | 0.13 |

| Nominal Frequency | Exact Frequency (6 digits) | Microphone Actuator Response | Microphone Free-field Correction | Microphone Free-field Response | Electrical Response | Acoustical Response | Expanded Uncertainty |
|-------------------|----------------------------|------------------------------|----------------------------------|--------------------------------|---------------------|---------------------|----------------------|
| Hz | Hz | dB | dB | dB | dB | dB | dB |
| 3750 | 3758.37 | -0.93 | 0.92 | -0.01 | 0.01 | 0.00 | 0.13 |
| 4000 | 3981.07 | -1.03 | 1.03 | -0.01 | 0.01 | 0.00 | 0.14 |
| 4250 | 4216.97 | -1.15 | 1.14 | -0.01 | 0.01 | 0.00 | 0.14 |
| 4500 | 4466.84 | -1.27 | 1.26 | -0.01 | 0.01 | 0.00 | 0.14 |
| 4750 | 4731.51 | -1.41 | 1.40 | -0.01 | 0.01 | 0.00 | 0.14 |
| 5000 | 5011.87 | -1.55 | 1.55 | -0.01 | 0.01 | 0.00 | 0.15 |
| 5300 | 5308.84 | -1.71 | 1.69 | -0.02 | 0.01 | -0.01 | 0.15 |
| 5600 | 5623.41 | -1.88 | 1.86 | -0.02 | 0.01 | -0.01 | 0.15 |
| 6000 | 5956.62 | -2.07 | 2.07 | 0.00 | 0.00 | 0.00 | 0.16 |
| 6300 | 6309.57 | -2.26 | 2.26 | 0.00 | 0.00 | 0.00 | 0.16 |
| 6700 | 6683.44 | -2.50 | 2.50 | 0.00 | -0.01 | -0.01 | 0.17 |
| 7100 | 7079.46 | -2.76 | 2.74 | -0.01 | -0.02 | -0.03 | 0.17 |
| 7500 | 7498.94 | -3.03 | 3.01 | -0.01 | -0.03 | -0.04 | 0.17 |
| 8000 | 7943.28 | -3.28 | 3.33 | 0.05 | -0.04 | 0.01 | 0.18 |
| 8500 | 8413.95 | -3.58 | 3.64 | 0.06 | -0.07 | -0.01 | 0.19 |
| 9000 | 8912.51 | -3.89 | 4.01 | 0.12 | -0.10 | 0.02 | 0.20 |
| 9500 | 9440.61 | -4.23 | 4.37 | 0.14 | -0.14 | 0.00 | 0.22 |
| 10000 | 10000 | -4.60 | 4.80 | 0.20 | -0.19 | 0.01 | 0.23 |
| 10600 | 10592.5 | -4.99 | 5.23 | 0.24 | -0.25 | -0.01 | 0.24 |
| 11200 | 11220.2 | -5.39 | 5.68 | 0.29 | -0.31 | -0.02 | 0.26 |
| 11800 | 11885 | -5.79 | 6.16 | 0.37 | -0.38 | -0.01 | 0.28 |
| 12500 | 12589.3 | -6.19 | 6.67 | 0.49 | -0.44 | 0.05 | 0.29 |
| 13200 | 13335.2 | -6.58 | 7.10 | 0.53 | -0.50 | 0.03 | 0.31 |
| 14000 | 14125.4 | -6.95 | 7.49 | 0.54 | -0.54 | 0.00 | 0.33 |
| 15000 | 14962.4 | -7.33 | 7.89 | 0.56 | -0.57 | -0.01 | 0.35 |
| 16000 | 15848.9 | -7.69 | 8.21 | 0.52 | -0.58 | -0.06 | 0.38 |
| 17000 | 16788 | -8.05 | 8.67 | 0.62 | -0.59 | 0.03 | 0.40 |
| 18000 | 17782.8 | -8.38 | 9.02 | 0.63 | -0.60 | 0.03 | 0.43 |
| 19000 | 18836.5 | -8.71 | 9.32 | 0.61 | -0.60 | 0.01 | 0.45 |
| 20000 | 19952.6 | -9.07 | 9.62 | 0.55 | -0.61 | -0.06 | 0.48 |
| 21200 | 21134.9 | -9.42 | 9.90 | 0.48 | -0.62 | -0.14 | 0.49 |
| 22400 | 22387.2 | -9.77 | 10.12 | 0.35 | -0.66 | -0.31 | 0.49 |

Table A.3 Free-field 0° frequency response for Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer

| Nominal Frequency | Exact Frequency (6 digits) | Acoustical Response (From Table A.2) | Expanded Uncertainty | Body Influence | Expanded Uncertainty | Acoustical Response | Expanded Uncertainty |
|-------------------|----------------------------|--------------------------------------|----------------------|----------------|----------------------|---------------------|----------------------|
| Hz | Hz | dB | dB | dB | dB | dB | dB |
| 63 | 63.0957 | 0.00 | 0.05 | 0.00 | 0.10 | 0.00 | 0.11 |
| 80 | 79.4328 | 0.00 | 0.05 | 0.00 | 0.10 | 0.00 | 0.11 |
| 100 | 100 | 0.00 | 0.05 | 0.00 | 0.10 | 0.00 | 0.11 |
| 125 | 125.893 | 0.00 | 0.05 | 0.00 | 0.10 | 0.00 | 0.11 |
| 160 | 158.489 | 0.00 | 0.05 | 0.01 | 0.10 | 0.01 | 0.11 |
| 200 | 199.526 | 0.00 | 0.05 | 0.03 | 0.10 | 0.03 | 0.11 |
| 250 | 251.189 | 0.00 | 0.05 | 0.06 | 0.10 | 0.07 | 0.11 |
| 315 | 316.228 | 0.01 | 0.06 | 0.13 | 0.10 | 0.14 | 0.12 |
| 400 | 398.107 | 0.01 | 0.06 | 0.21 | 0.10 | 0.22 | 0.12 |
| 500 | 501.187 | 0.02 | 0.07 | 0.22 | 0.10 | 0.24 | 0.12 |
| 630 | 630.957 | 0.01 | 0.07 | 0.07 | 0.10 | 0.08 | 0.12 |
| 800 | 794.328 | 0.02 | 0.07 | -0.11 | 0.10 | -0.09 | 0.12 |
| 1000 | 1000 | 0.02 | 0.07 | -0.09 | 0.10 | -0.08 | 0.12 |
| 1060 | 1059.25 | 0.02 | 0.07 | -0.14 | 0.10 | -0.12 | 0.12 |
| 1120 | 1122.02 | 0.02 | 0.07 | -0.21 | 0.10 | -0.19 | 0.12 |
| 1180 | 1188.5 | 0.02 | 0.08 | -0.29 | 0.10 | -0.27 | 0.13 |
| 1250 | 1258.93 | 0.02 | 0.08 | -0.31 | 0.10 | -0.29 | 0.13 |
| 1320 | 1333.52 | 0.02 | 0.08 | -0.24 | 0.10 | -0.21 | 0.13 |
| 1400 | 1412.54 | 0.03 | 0.08 | -0.11 | 0.10 | -0.08 | 0.13 |
| 1500 | 1496.24 | 0.03 | 0.08 | 0.00 | 0.10 | 0.03 | 0.13 |
| 1600 | 1584.89 | 0.03 | 0.08 | 0.04 | 0.10 | 0.06 | 0.13 |
| 1700 | 1678.8 | 0.02 | 0.08 | -0.02 | 0.10 | 0.00 | 0.13 |
| 1800 | 1778.28 | 0.02 | 0.09 | -0.13 | 0.10 | -0.11 | 0.13 |
| 1900 | 1883.65 | 0.02 | 0.09 | -0.18 | 0.10 | -0.15 | 0.13 |
| 2000 | 1995.26 | 0.02 | 0.09 | -0.10 | 0.10 | -0.08 | 0.13 |
| 2120 | 2113.49 | 0.02 | 0.09 | 0.05 | 0.10 | 0.07 | 0.13 |
| 2240 | 2238.72 | 0.01 | 0.09 | 0.04 | 0.15 | 0.05 | 0.13 |
| 2360 | 2371.37 | 0.01 | 0.10 | -0.33 | 0.15 | -0.32 | 0.18 |
| 2500 | 2511.89 | 0.02 | 0.10 | -0.18 | 0.15 | -0.16 | 0.18 |
| 2650 | 2660.73 | 0.02 | 0.10 | 0.09 | 0.15 | 0.11 | 0.18 |
| 2800 | 2818.38 | 0.01 | 0.11 | -0.02 | 0.15 | -0.01 | 0.19 |
| 3000 | 2985.38 | 0.01 | 0.11 | -0.19 | 0.15 | -0.18 | 0.19 |
| 3150 | 3162.28 | 0.00 | 0.12 | 0.10 | 0.15 | 0.11 | 0.19 |
| 3350 | 3349.65 | 0.00 | 0.12 | 0.13 | 0.15 | 0.14 | 0.19 |
| 3550 | 3548.13 | 0.00 | 0.13 | -0.10 | 0.15 | -0.10 | 0.19 |
| 3750 | 3758.37 | 0.00 | 0.13 | 0.07 | 0.15 | 0.07 | 0.20 |
| 4000 | 3981.07 | 0.00 | 0.14 | 0.04 | 0.15 | 0.04 | 0.20 |
| 4250 | 4216.97 | 0.00 | 0.14 | -0.10 | 0.15 | -0.10 | 0.21 |
| 4500 | 4466.84 | 0.00 | 0.14 | 0.13 | 0.15 | 0.13 | 0.21 |
| 4750 | 4731.51 | 0.00 | 0.14 | -0.17 | 0.15 | -0.17 | 0.21 |
| 5000 | 5011.87 | 0.00 | 0.15 | -0.12 | 0.15 | -0.12 | 0.21 |
| 5300 | 5308.84 | -0.01 | 0.15 | -0.24 | 0.15 | -0.25 | 0.21 |
| 5600 | 5623.41 | -0.01 | 0.15 | -0.06 | 0.15 | -0.07 | 0.21 |
| 6000 | 5956.62 | 0.00 | 0.16 | -0.13 | 0.15 | -0.13 | 0.21 |
| 6300 | 6309.57 | 0.00 | 0.16 | 0.01 | 0.15 | 0.01 | 0.22 |
| 6700 | 6683.44 | -0.01 | 0.17 | 0.00 | 0.15 | -0.01 | 0.22 |
| 7100 | 7079.46 | -0.03 | 0.17 | 0.01 | 0.15 | -0.02 | 0.23 |
| 7500 | 7498.94 | -0.04 | 0.17 | 0.10 | 0.20 | 0.05 | 0.23 |
| 8000 | 7943.28 | 0.01 | 0.18 | -0.19 | 0.20 | -0.18 | 0.26 |
| 8500 | 8413.95 | -0.01 | 0.19 | -0.29 | 0.20 | -0.30 | 0.27 |
| 9000 | 8912.51 | 0.02 | 0.20 | -0.14 | 0.20 | -0.12 | 0.28 |
| 9500 | 9440.61 | 0.00 | 0.22 | 0.01 | 0.20 | 0.01 | 0.28 |
| 10000 | 10000 | 0.01 | 0.23 | -0.04 | 0.20 | -0.03 | 0.30 |
| 10600 | 10592.5 | -0.01 | 0.24 | -0.02 | 0.20 | -0.04 | 0.30 |
| 11200 | 11220.2 | -0.02 | 0.26 | -0.22 | 0.20 | -0.24 | 0.33 |

| Nominal Frequency | Exact Frequency (6 digits) | Acoustical Response (From Table A.2) | Expanded Uncertainty | Body Influence | Expanded Uncertainty | Acoustical Response | Expanded Uncertainty |
|-------------------|----------------------------|--------------------------------------|----------------------|----------------|----------------------|---------------------|----------------------|
| Hz | Hz | dB | dB | dB | dB | dB | dB |
| 11800 | 11885 | -0.01 | 0.28 | -0.23 | 0.20 | -0.24 | 0.34 |
| 12500 | 12589.3 | 0.05 | 0.29 | -0.03 | 0.20 | 0.02 | 0.35 |
| 13200 | 13335.2 | 0.03 | 0.31 | 0.01 | 0.20 | 0.04 | 0.37 |
| 14000 | 14125.4 | 0.00 | 0.33 | -0.04 | 0.20 | -0.05 | 0.39 |
| 15000 | 14962.4 | -0.01 | 0.35 | -0.13 | 0.20 | -0.14 | 0.39 |
| 16000 | 15848.9 | -0.06 | 0.38 | -0.04 | 0.20 | -0.10 | 0.40 |
| 17000 | 16788 | 0.03 | 0.40 | 0.11 | 0.20 | 0.14 | 0.43 |
| 18000 | 17782.8 | 0.03 | 0.43 | -0.12 | 0.20 | -0.08 | 0.45 |
| 19000 | 18836.5 | 0.01 | 0.45 | -0.10 | 0.20 | -0.09 | 0.47 |
| 20000 | 19952.6 | -0.06 | 0.48 | 0.06 | 0.20 | 0.00 | 0.49 |
| 21200 | 21134.9 | -0.14 | 0.49 | -0.19 | 0.20 | -0.33 | 0.52 |
| 22400 | 22387.2 | -0.31 | 0.49 | -0.43 | 0.20 | -0.75 | 0.53 |

Table A.4 Free-field 0° frequency response for Windscreen UA-1650, Microphone Type 4191, Microphone Pre-amplifier ZC-0032 and the analyzer's electrical response, with the Microphone Pre-amplifier connected to a microphone extension cable

| Nominal Frequency | Exact Frequency (6 digits) | Microphone Free-field Response (From Table A.2) | Expanded Uncertainty | Influence of Windscreen | Expanded Uncertainty | Electrical Response | Acoustical Response | Expanded Uncertainty |
|-------------------|----------------------------|---|----------------------|-------------------------|----------------------|---------------------|---------------------|----------------------|
| Hz | Hz | dB | dB | dB | dB | dB | dB | dB |
| 63 | 63.0957 | 0.00 | 0.05 | 0.00 | 0.15 | 0.00 | 0.00 | 0.16 |
| 80 | 79.4328 | 0.00 | 0.05 | 0.00 | 0.15 | 0.00 | 0.00 | 0.16 |
| 100 | 100 | 0.00 | 0.05 | 0.00 | 0.15 | 0.00 | 0.00 | 0.16 |
| 125 | 125.893 | 0.00 | 0.05 | 0.00 | 0.15 | 0.00 | 0.00 | 0.16 |
| 160 | 158.489 | 0.00 | 0.05 | 0.00 | 0.15 | 0.00 | 0.00 | 0.16 |
| 200 | 199.526 | 0.00 | 0.05 | 0.00 | 0.15 | -0.01 | -0.01 | 0.16 |
| 250 | 251.189 | 0.00 | 0.05 | 0.02 | 0.15 | -0.01 | 0.01 | 0.16 |
| 315 | 316.228 | 0.01 | 0.06 | 0.03 | 0.15 | -0.02 | 0.02 | 0.16 |
| 400 | 398.107 | 0.01 | 0.06 | 0.05 | 0.15 | -0.03 | 0.03 | 0.16 |
| 500 | 501.187 | 0.02 | 0.07 | 0.08 | 0.15 | -0.05 | 0.05 | 0.17 |
| 630 | 630.957 | 0.01 | 0.07 | 0.11 | 0.15 | -0.08 | 0.04 | 0.17 |
| 800 | 794.328 | 0.02 | 0.07 | 0.14 | 0.15 | -0.13 | 0.03 | 0.17 |
| 1000 | 1000 | 0.02 | 0.07 | 0.19 | 0.15 | -0.21 | 0.00 | 0.17 |
| 1060 | 1059.25 | 0.02 | 0.07 | 0.22 | 0.15 | -0.24 | 0.00 | 0.17 |
| 1120 | 1122.02 | 0.02 | 0.07 | 0.25 | 0.15 | -0.27 | 0.00 | 0.17 |
| 1180 | 1188.5 | 0.02 | 0.08 | 0.29 | 0.15 | -0.30 | 0.01 | 0.17 |
| 1250 | 1258.93 | 0.02 | 0.08 | 0.32 | 0.15 | -0.34 | 0.00 | 0.17 |
| 1320 | 1333.52 | 0.02 | 0.08 | 0.37 | 0.15 | -0.38 | 0.01 | 0.17 |
| 1400 | 1412.54 | 0.03 | 0.08 | 0.41 | 0.15 | -0.42 | 0.02 | 0.17 |
| 1500 | 1496.24 | 0.03 | 0.08 | 0.46 | 0.15 | -0.47 | 0.02 | 0.17 |
| 1600 | 1584.89 | 0.03 | 0.08 | 0.51 | 0.15 | -0.52 | 0.02 | 0.17 |
| 1700 | 1678.8 | 0.02 | 0.08 | 0.55 | 0.15 | -0.57 | 0.00 | 0.17 |
| 1800 | 1778.28 | 0.02 | 0.09 | 0.59 | 0.15 | -0.62 | -0.01 | 0.17 |
| 1900 | 1883.65 | 0.02 | 0.09 | 0.64 | 0.15 | -0.66 | 0.00 | 0.17 |
| 2000 | 1995.26 | 0.02 | 0.09 | 0.67 | 0.20 | -0.70 | -0.01 | 0.22 |
| 2120 | 2113.49 | 0.02 | 0.09 | 0.70 | 0.20 | -0.73 | -0.01 | 0.22 |
| 2240 | 2238.72 | 0.01 | 0.09 | 0.71 | 0.20 | -0.74 | -0.02 | 0.22 |
| 2360 | 2371.37 | 0.01 | 0.10 | 0.72 | 0.20 | -0.74 | -0.01 | 0.22 |
| 2500 | 2511.89 | 0.01 | 0.10 | 0.72 | 0.20 | -0.71 | 0.02 | 0.22 |
| 2650 | 2660.73 | 0.01 | 0.10 | 0.70 | 0.20 | -0.67 | 0.04 | 0.22 |
| 2800 | 2818.38 | 0.00 | 0.11 | 0.68 | 0.20 | -0.61 | 0.07 | 0.11 |
| 3000 | 2985.38 | 0.00 | 0.11 | 0.63 | 0.20 | -0.53 | 0.10 | 0.23 |
| 3150 | 3162.28 | -0.01 | 0.12 | 0.55 | 0.20 | -0.46 | 0.08 | 0.23 |
| 3350 | 3349.65 | -0.01 | 0.12 | 0.44 | 0.20 | -0.37 | 0.06 | 0.23 |
| 3550 | 3548.13 | -0.01 | 0.13 | 0.30 | 0.20 | -0.29 | 0.00 | 0.24 |
| 3750 | 3758.37 | -0.01 | 0.13 | 0.16 | 0.20 | -0.22 | -0.07 | 0.24 |
| 4000 | 3981.07 | -0.01 | 0.14 | 0.04 | 0.20 | -0.15 | -0.12 | 0.24 |
| 4250 | 4216.97 | -0.01 | 0.14 | -0.05 | 0.20 | -0.08 | -0.14 | 0.24 |
| 4500 | 4466.84 | -0.01 | 0.14 | -0.13 | 0.20 | -0.02 | -0.16 | 0.24 |

| Nominal Frequency | Exact Frequency (6 digits) | Microphone Free-field Response (From Table A.2) | Expanded Uncertainty | Influence of Windscreen | Expanded Uncertainty | Electrical Response | Acoustical Response | Expanded Uncertainty |
|-------------------|----------------------------|---|----------------------|-------------------------|----------------------|---------------------|---------------------|----------------------|
| Hz | Hz | dB | dB | dB | dB | dB | dB | dB |
| 4750 | 4731.51 | -0.01 | 0.14 | -0.18 | 0.20 | 0.03 | -0.16 | 0.24 |
| 5000 | 5011.87 | -0.01 | 0.15 | -0.19 | 0.20 | 0.08 | -0.12 | 0.25 |
| 5300 | 5308.84 | -0.02 | 0.15 | -0.17 | 0.25 | 0.12 | -0.07 | 0.29 |
| 5600 | 5623.41 | -0.02 | 0.15 | -0.16 | 0.25 | 0.16 | -0.02 | 0.29 |
| 6000 | 5956.62 | 0.00 | 0.16 | -0.13 | 0.25 | 0.20 | 0.07 | 0.30 |
| 6300 | 6309.57 | 0.00 | 0.16 | -0.11 | 0.25 | 0.23 | 0.12 | 0.30 |
| 6700 | 6683.44 | 0.00 | 0.17 | -0.16 | 0.25 | 0.26 | 0.10 | 0.30 |
| 7100 | 7079.46 | -0.01 | 0.17 | -0.28 | 0.25 | 0.29 | 0.00 | 0.30 |
| 7500 | 7498.94 | -0.01 | 0.17 | -0.36 | 0.25 | 0.32 | -0.05 | 0.30 |
| 8000 | 7943.28 | 0.05 | 0.18 | -0.41 | 0.25 | 0.34 | -0.02 | 0.31 |
| 8500 | 8413.95 | 0.06 | 0.19 | -0.47 | 0.25 | 0.37 | -0.04 | 0.31 |
| 9000 | 8912.51 | 0.12 | 0.20 | -0.45 | 0.25 | 0.40 | 0.07 | 0.32 |
| 9500 | 9440.61 | 0.14 | 0.22 | -0.47 | 0.25 | 0.42 | 0.09 | 0.33 |
| 10000 | 10000 | 0.20 | 0.23 | -0.52 | 0.25 | 0.45 | 0.13 | 0.34 |
| 10600 | 10592.5 | 0.24 | 0.24 | -0.63 | 0.25 | 0.48 | 0.09 | 0.35 |
| 11200 | 11220.2 | 0.29 | 0.26 | -0.74 | 0.25 | 0.51 | 0.06 | 0.36 |
| 11800 | 11885 | 0.37 | 0.28 | -0.86 | 0.25 | 0.54 | 0.05 | 0.38 |
| 12500 | 12589.3 | 0.49 | 0.29 | -0.88 | 0.25 | 0.57 | 0.18 | 0.38 |
| 13200 | 13335.2 | 0.53 | 0.31 | -1.00 | 0.25 | 0.60 | 0.13 | 0.40 |
| 14000 | 14125.4 | 0.54 | 0.33 | -1.13 | 0.25 | 0.64 | 0.05 | 0.41 |
| 15000 | 14962.4 | 0.56 | 0.35 | -1.21 | 0.30 | 0.67 | 0.02 | 0.46 |
| 16000 | 15848.9 | 0.52 | 0.38 | -1.33 | 0.30 | 0.71 | -0.10 | 0.48 |
| 17000 | 16788 | 0.62 | 0.40 | -1.50 | 0.30 | 0.74 | -0.14 | 0.50 |
| 18000 | 17782.8 | 0.63 | 0.43 | -1.61 | 0.30 | 0.77 | -0.21 | 0.52 |
| 19000 | 18836.5 | 0.61 | 0.45 | -1.64 | 0.30 | 0.80 | -0.23 | 0.54 |
| 20000 | 19952.6 | 0.55 | 0.48 | -1.73 | 0.30 | 0.82 | -0.36 | 0.57 |
| 21200 | 21134.9 | 0.48 | 0.49 | -1.81 | 0.30 | 0.82 | -0.51 | 0.57 |
| 22400 | 22387.2 | 0.35 | 0.49 | -1.79 | 0.30 | 0.80 | -0.64 | 0.57 |

Table A.5 Free-field 0° frequency response for Windscreen UA-1650, Microphone Type 4191, Microphone Pre-amplifier ZC-0032 and the analyzer with the Microphone Pre-amplifier mounted directly on the analyzer

| Nominal Frequency | Exact Frequency (6 digits) | Acoustical Response (From Table A.4) | Expanded Uncertainty | Body Influence | Expanded Uncertainty | Acoustical Response | Expanded Uncertainty |
|-------------------|----------------------------|--------------------------------------|----------------------|----------------|----------------------|---------------------|----------------------|
| | | dB | dB | dB | dB | dB | dB |
| 63 | 63.0957 | 0.00 | 0.16 | 0.00 | 0.10 | 0.00 | 0.19 |
| 80 | 79.4328 | 0.00 | 0.16 | 0.00 | 0.10 | 0.00 | 0.19 |
| 100 | 100 | 0.00 | 0.16 | 0.00 | 0.10 | 0.00 | 0.19 |
| 125 | 125.893 | 0.00 | 0.16 | 0.00 | 0.10 | 0.00 | 0.19 |
| 160 | 158.489 | 0.00 | 0.16 | 0.01 | 0.10 | 0.01 | 0.19 |
| 200 | 199.526 | -0.01 | 0.16 | 0.03 | 0.10 | 0.02 | 0.19 |
| 250 | 251.189 | 0.01 | 0.16 | 0.06 | 0.10 | 0.08 | 0.19 |
| 315 | 316.228 | 0.02 | 0.16 | 0.13 | 0.10 | 0.15 | 0.19 |
| 400 | 398.107 | 0.03 | 0.16 | 0.21 | 0.10 | 0.24 | 0.19 |
| 500 | 501.187 | 0.05 | 0.17 | 0.22 | 0.10 | 0.27 | 0.19 |
| 630 | 630.957 | 0.04 | 0.17 | 0.07 | 0.10 | 0.11 | 0.19 |
| 800 | 794.328 | 0.03 | 0.17 | -0.11 | 0.10 | -0.08 | 0.19 |
| 1000 | 1000 | 0.00 | 0.17 | -0.09 | 0.10 | -0.10 | 0.19 |
| 1060 | 1059.25 | 0.00 | 0.17 | -0.14 | 0.10 | -0.14 | 0.19 |
| 1120 | 1122.02 | 0.00 | 0.17 | -0.21 | 0.10 | -0.21 | 0.19 |
| 1180 | 1188.5 | 0.01 | 0.17 | -0.29 | 0.10 | -0.28 | 0.20 |
| 1250 | 1258.93 | 0.00 | 0.17 | -0.31 | 0.10 | -0.31 | 0.20 |
| 1320 | 1333.52 | 0.01 | 0.17 | -0.24 | 0.10 | -0.22 | 0.20 |
| 1400 | 1412.54 | 0.02 | 0.17 | -0.11 | 0.10 | -0.09 | 0.20 |
| 1500 | 1496.24 | 0.02 | 0.17 | 0.00 | 0.10 | 0.02 | 0.20 |
| 1600 | 1584.89 | 0.02 | 0.17 | 0.04 | 0.10 | 0.05 | 0.20 |
| 1700 | 1678.8 | 0.00 | 0.17 | -0.02 | 0.10 | -0.02 | 0.20 |
| 1800 | 1778.28 | -0.01 | 0.17 | -0.13 | 0.10 | -0.14 | 0.20 |

| Nominal Frequency | Exact Frequency (6 digits) | Acoustical Response (From Table A.4) dB | Expanded Uncertainty dB | Body Influence dB | Expanded Uncertainty dB | Acoustical Response dB | Expanded Uncertainty dB |
|-------------------|----------------------------|---|-------------------------|-------------------|-------------------------|------------------------|-------------------------|
| 1900 | 1883.65 | 0.00 | 0.17 | -0.18 | 0.10 | -0.17 | 0.20 |
| 2000 | 1995.26 | -0.01 | 0.22 | -0.10 | 0.10 | -0.11 | 0.24 |
| 2120 | 2113.49 | -0.01 | 0.22 | 0.05 | 0.10 | 0.04 | 0.24 |
| 2240 | 2238.72 | -0.02 | 0.22 | 0.04 | 0.15 | 0.02 | 0.27 |
| 2360 | 2371.37 | -0.01 | 0.22 | -0.33 | 0.15 | -0.34 | 0.27 |
| 2500 | 2511.89 | 0.02 | 0.22 | -0.18 | 0.15 | -0.16 | 0.27 |
| 2650 | 2660.73 | 0.04 | 0.22 | 0.09 | 0.15 | 0.13 | 0.27 |
| 2800 | 2818.38 | 0.07 | 0.11 | -0.02 | 0.15 | 0.05 | 0.19 |
| 3000 | 2985.38 | 0.10 | 0.23 | -0.19 | 0.15 | -0.09 | 0.27 |
| 3150 | 3162.28 | 0.08 | 0.23 | 0.10 | 0.15 | 0.19 | 0.28 |
| 3350 | 3349.65 | 0.06 | 0.23 | 0.13 | 0.15 | 0.20 | 0.28 |
| 3550 | 3548.13 | 0.00 | 0.24 | -0.10 | 0.15 | -0.10 | 0.28 |
| 3750 | 3758.37 | -0.07 | 0.24 | 0.07 | 0.15 | 0.00 | 0.28 |
| 4000 | 3981.07 | -0.12 | 0.24 | 0.04 | 0.15 | -0.08 | 0.29 |
| 4250 | 4216.97 | -0.14 | 0.24 | -0.10 | 0.15 | -0.24 | 0.29 |
| 4500 | 4466.84 | -0.16 | 0.24 | 0.13 | 0.15 | -0.03 | 0.29 |
| 4750 | 4731.51 | -0.16 | 0.24 | -0.17 | 0.15 | -0.33 | 0.29 |
| 5000 | 5011.87 | -0.12 | 0.25 | -0.12 | 0.15 | -0.24 | 0.29 |
| 5300 | 5308.84 | -0.07 | 0.29 | -0.24 | 0.15 | -0.31 | 0.33 |
| 5600 | 5623.41 | -0.02 | 0.29 | -0.06 | 0.15 | -0.08 | 0.33 |
| 6000 | 5956.62 | 0.07 | 0.30 | -0.13 | 0.15 | -0.06 | 0.33 |
| 6300 | 6309.57 | 0.12 | 0.30 | 0.01 | 0.15 | 0.13 | 0.33 |
| 6700 | 6683.44 | 0.10 | 0.30 | 0.00 | 0.15 | 0.10 | 0.34 |
| 7100 | 7079.46 | 0.00 | 0.30 | 0.01 | 0.15 | 0.01 | 0.34 |
| 7500 | 7498.94 | -0.05 | 0.30 | 0.10 | 0.20 | 0.04 | 0.36 |
| 8000 | 7943.28 | -0.02 | 0.31 | -0.19 | 0.20 | -0.21 | 0.37 |
| 8500 | 8413.95 | -0.04 | 0.31 | -0.29 | 0.20 | -0.33 | 0.37 |
| 9000 | 8912.51 | 0.07 | 0.32 | -0.14 | 0.20 | -0.07 | 0.38 |
| 9500 | 9440.61 | 0.09 | 0.33 | 0.01 | 0.20 | 0.10 | 0.39 |
| 10000 | 10000 | 0.13 | 0.34 | -0.04 | 0.20 | 0.09 | 0.39 |
| 10600 | 10592.5 | 0.09 | 0.35 | -0.02 | 0.20 | 0.06 | 0.40 |
| 11200 | 11220.2 | 0.06 | 0.36 | -0.22 | 0.20 | -0.16 | 0.41 |
| 11800 | 11885 | 0.05 | 0.38 | -0.23 | 0.20 | -0.18 | 0.43 |
| 12500 | 12589.3 | 0.18 | 0.38 | -0.03 | 0.20 | 0.15 | 0.43 |
| 13200 | 13335.2 | 0.13 | 0.40 | 0.01 | 0.20 | 0.14 | 0.45 |
| 14000 | 14125.4 | 0.05 | 0.41 | -0.04 | 0.20 | 0.00 | 0.46 |
| 15000 | 14962.4 | 0.02 | 0.46 | -0.13 | 0.20 | -0.11 | 0.50 |
| 16000 | 15848.9 | -0.10 | 0.48 | -0.04 | 0.20 | -0.14 | 0.52 |
| 17000 | 16788 | -0.14 | 0.50 | 0.11 | 0.20 | -0.03 | 0.54 |
| 18000 | 17782.8 | -0.21 | 0.52 | -0.12 | 0.20 | -0.32 | 0.56 |
| 19000 | 18836.5 | -0.23 | 0.54 | -0.10 | 0.20 | -0.33 | 0.58 |
| 20000 | 19952.6 | -0.36 | 0.57 | 0.06 | 0.20 | -0.30 | 0.60 |
| 21200 | 21134.9 | -0.51 | 0.57 | -0.19 | 0.20 | -0.70 | 0.61 |
| 22400 | 22387.2 | -0.64 | 0.57 | -0.43 | 0.20 | -1.08 | 0.61 |

Table A.6 Microphone Type 4191 is not specified together with Outdoor Microphone Kit UA-1404

A.3 Diffuse-field Frequency Responses

Diffuse-field frequency responses with Z-frequency-weighting. Measured with sounds at random incidence and the instrument's *Sound Field Correction* parameter set to *Diffuse-field*, see section 4.6.6.

Table A.7 Diffuse-field frequency response for Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with or without the Microphone Preamplifier connected to a microphone extension cable

| Nominal Frequency Hz | Exact Frequency (6 digits) Hz | Microphone Actuator Response dB | Microphone Diffuse-field Correction dB | Microphone Diffuse-field Response dB | Electrical Response dB | Acoustical Response dB | Expanded Uncertainty dB |
|-------------------------|-------------------------------------|------------------------------------|---|---|---------------------------|---------------------------|----------------------------|
| 63 | 63.0957 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 |
| 80 | 79.4328 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 |
| 100 | 100 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 |
| 125 | 125.893 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 |
| 160 | 158.489 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 |
| 200 | 199.526 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 |
| 250 | 251.189 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.05 |
| 315 | 316.228 | 0.00 | -0.01 | -0.01 | 0.01 | 0.00 | 0.06 |
| 400 | 398.107 | 0.00 | -0.01 | -0.01 | 0.01 | 0.00 | 0.06 |
| 500 | 501.187 | -0.01 | -0.01 | -0.02 | 0.02 | 0.00 | 0.10 |
| 630 | 630.957 | -0.03 | -0.01 | -0.04 | 0.03 | -0.01 | 0.10 |
| 800 | 794.328 | -0.04 | -0.02 | -0.06 | 0.05 | -0.01 | 0.10 |
| 1000 | 1000 | -0.08 | -0.03 | -0.11 | 0.07 | -0.04 | 0.10 |
| 1060 | 1059.25 | -0.09 | -0.03 | -0.12 | 0.08 | -0.04 | 0.10 |
| 1120 | 1122.02 | -0.10 | -0.03 | -0.13 | 0.09 | -0.04 | 0.10 |
| 1180 | 1188.5 | -0.11 | -0.03 | -0.14 | 0.10 | -0.04 | 0.10 |
| 1250 | 1258.93 | -0.12 | -0.04 | -0.16 | 0.11 | -0.05 | 0.10 |
| 1320 | 1333.52 | -0.14 | -0.04 | -0.18 | 0.13 | -0.05 | 0.10 |
| 1400 | 1412.54 | -0.15 | -0.05 | -0.20 | 0.14 | -0.06 | 0.10 |
| 1500 | 1496.24 | -0.17 | -0.06 | -0.22 | 0.16 | -0.06 | 0.10 |
| 1600 | 1584.89 | -0.19 | -0.06 | -0.25 | 0.18 | -0.07 | 0.10 |
| 1700 | 1678.8 | -0.21 | -0.06 | -0.27 | 0.20 | -0.07 | 0.10 |
| 1800 | 1778.28 | -0.23 | -0.06 | -0.29 | 0.22 | -0.07 | 0.10 |
| 1900 | 1883.65 | -0.26 | -0.05 | -0.30 | 0.25 | -0.05 | 0.10 |
| 2000 | 1995.26 | -0.28 | -0.03 | -0.31 | 0.28 | -0.03 | 0.10 |
| 2120 | 2113.49 | -0.32 | 0.00 | -0.32 | 0.31 | -0.01 | 0.10 |
| 2240 | 2238.72 | -0.36 | 0.01 | -0.34 | 0.34 | 0.00 | 0.11 |
| 2360 | 2371.37 | -0.39 | 0.03 | -0.37 | 0.38 | 0.01 | 0.11 |
| 2500 | 2511.89 | -0.44 | 0.03 | -0.41 | 0.42 | 0.01 | 0.12 |
| 2650 | 2660.73 | -0.49 | 0.02 | -0.47 | 0.47 | 0.00 | 0.12 |
| 2800 | 2818.38 | -0.55 | 0.01 | -0.54 | 0.52 | -0.02 | 0.13 |
| 3000 | 2985.38 | -0.61 | 0.01 | -0.61 | 0.58 | -0.03 | 0.13 |
| 3150 | 3162.28 | -0.68 | 0.01 | -0.67 | 0.64 | -0.03 | 0.13 |
| 3350 | 3349.65 | -0.76 | 0.02 | -0.74 | 0.71 | -0.03 | 0.14 |
| 3550 | 3548.13 | -0.84 | 0.05 | -0.80 | 0.79 | 0.00 | 0.14 |
| 3750 | 3758.37 | -0.93 | 0.07 | -0.86 | 0.87 | 0.01 | 0.15 |
| 4000 | 3981.07 | -1.03 | 0.08 | -0.95 | 0.96 | 0.01 | 0.15 |
| 4250 | 4216.97 | -1.15 | 0.08 | -1.07 | 1.05 | -0.02 | 0.15 |
| 4500 | 4466.84 | -1.27 | 0.06 | -1.21 | 1.16 | -0.05 | 0.16 |
| 4750 | 4731.51 | -1.41 | 0.08 | -1.33 | 1.27 | -0.06 | 0.16 |
| 5000 | 5011.87 | -1.55 | 0.15 | -1.40 | 1.39 | -0.01 | 0.16 |
| 5300 | 5308.84 | -1.71 | 0.21 | -1.51 | 1.51 | 0.00 | 0.17 |
| 5600 | 5623.41 | -1.88 | 0.26 | -1.63 | 1.64 | 0.01 | 0.17 |
| 6000 | 5956.62 | -2.07 | 0.32 | -1.75 | 1.78 | 0.03 | 0.17 |
| 6300 | 6309.57 | -2.26 | 0.35 | -1.92 | 1.93 | 0.01 | 0.18 |
| 6700 | 6683.44 | -2.50 | 0.43 | -2.08 | 2.08 | 0.00 | 0.18 |
| 7100 | 7079.46 | -2.76 | 0.51 | -2.24 | 2.24 | 0.00 | 0.18 |
| 7500 | 7498.94 | -3.03 | 0.65 | -2.38 | 2.40 | 0.02 | 0.19 |
| 8000 | 7943.28 | -3.28 | 0.76 | -2.52 | 2.57 | 0.05 | 0.19 |
| 8500 | 8413.95 | -3.58 | 0.84 | -2.74 | 2.74 | 0.00 | 0.22 |
| 9000 | 8912.51 | -3.89 | 0.98 | -2.90 | 2.91 | 0.01 | 0.25 |
| 9500 | 9440.61 | -4.23 | 1.13 | -3.10 | 3.08 | -0.02 | 0.28 |
| 10000 | 10000 | -4.60 | 1.33 | -3.26 | 3.26 | 0.00 | 0.31 |
| 10600 | 10592.5 | -4.99 | 1.54 | -3.45 | 3.44 | -0.01 | 0.34 |
| 11200 | 11220.2 | -5.39 | 1.75 | -3.63 | 3.62 | -0.01 | 0.37 |

| Nominal Frequency | Exact Frequency (6 digits) | Microphone Actuator Response | Microphone Diffuse-field Correction | Microphone Diffuse-field Response | Electrical Response | Acoustical Response | Expanded Uncertainty |
|-------------------|----------------------------|------------------------------|-------------------------------------|-----------------------------------|---------------------|---------------------|----------------------|
| Hz | Hz | dB | dB | dB | dB | dB | dB |
| 11800 | 11885 | -5.79 | 1.98 | -3.81 | 3.81 | 0.00 | 0.40 |
| 12500 | 12589.3 | -6.19 | 2.23 | -3.96 | 4.01 | 0.05 | 0.43 |
| 13200 | 13335.2 | -6.58 | 2.35 | -4.22 | 4.23 | 0.01 | 0.46 |
| 14000 | 14125.4 | -6.95 | 2.48 | -4.48 | 4.48 | 0.00 | 0.49 |
| 15000 | 14962.4 | -7.33 | 2.56 | -4.77 | 4.74 | -0.03 | 0.52 |
| 16000 | 15848.9 | -7.69 | 2.60 | -5.10 | 5.03 | -0.07 | 0.55 |
| 17000 | 16788 | -8.05 | 2.72 | -5.33 | 5.34 | 0.01 | 0.57 |
| 18000 | 17782.8 | -8.38 | 2.74 | -5.65 | 5.67 | 0.02 | 0.59 |
| 19000 | 18836.5 | -8.71 | 2.72 | -5.98 | 5.98 | 0.00 | 0.61 |
| 20000 | 19952.6 | -9.07 | 2.67 | -6.40 | 6.27 | -0.13 | 0.63 |
| 21200 | 21134.9 | -9.42 | 2.61 | -6.82 | 6.50 | -0.32 | 0.65 |
| 22400 | 22387.2 | -9.77 | 2.45 | -7.32 | 6.64 | -0.68 | 0.67 |

Table A.8 Diffuse-field frequency response for Windscreen UA-1650, Microphone Type 4191, Microphone Pre-amplifier ZC-0032 and the analyzer with or without the Microphone Pre-amplifier connected to a microphone extension cable

| Nominal Frequency | Exact Frequency (6 digits) | Microphone Diffuse-field Response (From Table A.7) | Expanded Uncertainty | Influence of Windscreen | Expanded Uncertainty | Electrical Response | Acoustical Response | Expanded Uncertainty |
|-------------------|----------------------------|--|----------------------|-------------------------|----------------------|---------------------|---------------------|----------------------|
| Hz | Hz | dB | dB | dB | dB | dB | dB | dB |
| 63 | 63.0957 | 0.00 | 0.05 | 0.00 | 0.05 | 0.00 | 0.00 | 0.07 |
| 80 | 79.4328 | 0.00 | 0.05 | 0.00 | 0.05 | 0.00 | 0.00 | 0.07 |
| 100 | 100 | 0.00 | 0.05 | 0.00 | 0.05 | 0.00 | 0.00 | 0.07 |
| 125 | 125.893 | 0.00 | 0.05 | 0.00 | 0.05 | 0.00 | 0.00 | 0.07 |
| 160 | 158.489 | 0.00 | 0.05 | 0.00 | 0.05 | 0.00 | 0.00 | 0.07 |
| 200 | 199.526 | 0.00 | 0.05 | 0.00 | 0.05 | 0.00 | 0.00 | 0.07 |
| 250 | 251.189 | 0.00 | 0.05 | 0.01 | 0.05 | 0.00 | 0.01 | 0.07 |
| 315 | 316.228 | -0.01 | 0.06 | 0.02 | 0.05 | 0.00 | 0.01 | 0.08 |
| 400 | 398.107 | -0.01 | 0.06 | 0.04 | 0.05 | -0.01 | 0.02 | 0.08 |
| 500 | 501.187 | -0.02 | 0.10 | 0.06 | 0.05 | -0.01 | 0.03 | 0.11 |
| 630 | 630.957 | -0.04 | 0.10 | 0.09 | 0.05 | -0.02 | 0.03 | 0.11 |
| 800 | 794.328 | -0.06 | 0.10 | 0.11 | 0.05 | -0.03 | 0.02 | 0.11 |
| 1000 | 1000 | -0.11 | 0.10 | 0.15 | 0.05 | -0.06 | -0.02 | 0.11 |
| 1060 | 1059.25 | -0.12 | 0.10 | 0.18 | 0.08 | -0.07 | -0.01 | 0.13 |
| 1120 | 1122.02 | -0.13 | 0.10 | 0.20 | 0.08 | -0.08 | 0.00 | 0.13 |
| 1180 | 1188.5 | -0.14 | 0.10 | 0.24 | 0.08 | -0.09 | 0.01 | 0.13 |
| 1250 | 1258.93 | -0.16 | 0.10 | 0.28 | 0.08 | -0.10 | 0.02 | 0.13 |
| 1320 | 1333.52 | -0.18 | 0.10 | 0.32 | 0.10 | -0.12 | 0.02 | 0.14 |
| 1400 | 1412.54 | -0.20 | 0.10 | 0.36 | 0.10 | -0.13 | 0.03 | 0.14 |
| 1500 | 1496.24 | -0.22 | 0.10 | 0.40 | 0.10 | -0.15 | 0.03 | 0.14 |
| 1600 | 1584.89 | -0.25 | 0.10 | 0.44 | 0.12 | -0.18 | 0.01 | 0.16 |
| 1700 | 1678.8 | -0.27 | 0.10 | 0.48 | 0.15 | -0.20 | 0.01 | 0.18 |
| 1800 | 1778.28 | -0.29 | 0.10 | 0.52 | 0.15 | -0.23 | 0.00 | 0.18 |
| 1900 | 1883.65 | -0.30 | 0.10 | 0.55 | 0.15 | -0.25 | 0.00 | 0.18 |
| 2000 | 1995.26 | -0.31 | 0.10 | 0.58 | 0.15 | -0.28 | -0.01 | 0.18 |
| 2120 | 2113.49 | -0.32 | 0.10 | 0.62 | 0.15 | -0.30 | 0.00 | 0.18 |
| 2240 | 2238.72 | -0.34 | 0.11 | 0.64 | 0.15 | -0.31 | -0.01 | 0.19 |
| 2360 | 2371.37 | -0.37 | 0.11 | 0.66 | 0.15 | -0.30 | -0.01 | 0.19 |
| 2500 | 2511.89 | -0.41 | 0.12 | 0.68 | 0.15 | -0.27 | 0.00 | 0.19 |
| 2650 | 2660.73 | -0.47 | 0.12 | 0.68 | 0.15 | -0.21 | 0.00 | 0.19 |
| 2800 | 2818.38 | -0.54 | 0.13 | 0.66 | 0.15 | -0.12 | 0.00 | 0.20 |
| 3000 | 2985.38 | -0.61 | 0.13 | 0.61 | 0.15 | 0.00 | 0.01 | 0.20 |
| 3150 | 3162.28 | -0.67 | 0.13 | 0.54 | 0.15 | 0.15 | 0.02 | 0.20 |
| 3350 | 3349.65 | -0.74 | 0.14 | 0.45 | 0.15 | 0.32 | 0.04 | 0.20 |
| 3550 | 3548.13 | -0.80 | 0.14 | 0.32 | 0.15 | 0.49 | 0.02 | 0.21 |
| 3750 | 3758.37 | -0.86 | 0.15 | 0.18 | 0.15 | 0.68 | 0.00 | 0.21 |
| 4000 | 3981.07 | -0.95 | 0.15 | 0.02 | 0.15 | 0.86 | -0.07 | 0.21 |
| 4250 | 4216.97 | -1.07 | 0.15 | -0.13 | 0.15 | 1.05 | -0.15 | 0.21 |
| 4500 | 4466.84 | -1.21 | 0.16 | -0.27 | 0.15 | 1.23 | -0.25 | 0.22 |

| Nominal Frequency | Exact Frequency (6 digits) | Microphone Diffuse-field Response (From Table A.7) | Expanded Uncertainty | Influence of Windscreen | Expanded Uncertainty | Electrical Response | Acoustical Response | Expanded Uncertainty |
|-------------------|----------------------------|--|----------------------|-------------------------|----------------------|---------------------|---------------------|----------------------|
| Hz | Hz | dB | dB | dB | dB | dB | dB | dB |
| 4750 | 4731.51 | -1.33 | 0.16 | -0.39 | 0.25 | 1.41 | -0.31 | 0.30 |
| 5000 | 5011.87 | -1.40 | 0.16 | -0.46 | 0.35 | 1.59 | -0.27 | 0.39 |
| 5300 | 5308.84 | -1.51 | 0.17 | -0.49 | 0.45 | 1.77 | -0.23 | 0.48 |
| 5600 | 5623.41 | -1.63 | 0.17 | -0.48 | 0.50 | 1.96 | -0.15 | 0.53 |
| 6000 | 5956.62 | -1.75 | 0.17 | -0.43 | 0.50 | 2.15 | -0.03 | 0.53 |
| 6300 | 6309.57 | -1.92 | 0.18 | -0.38 | 0.50 | 2.35 | 0.05 | 0.53 |
| 6700 | 6683.44 | -2.08 | 0.18 | -0.34 | 0.50 | 2.55 | 0.13 | 0.53 |
| 7100 | 7079.46 | -2.24 | 0.18 | -0.36 | 0.50 | 2.77 | 0.17 | 0.53 |
| 7500 | 7498.94 | -2.38 | 0.19 | -0.45 | 0.50 | 2.99 | 0.16 | 0.53 |
| 8000 | 7943.28 | -2.52 | 0.19 | -0.58 | 0.50 | 3.22 | 0.12 | 0.53 |
| 8500 | 8413.95 | -2.74 | 0.22 | -0.71 | 0.50 | 3.45 | 0.00 | 0.55 |
| 9000 | 8912.51 | -2.90 | 0.25 | -0.79 | 0.50 | 3.69 | 0.00 | 0.56 |
| 9500 | 9440.61 | -3.10 | 0.28 | -0.82 | 0.50 | 3.94 | 0.02 | 0.57 |
| 10000 | 10000 | -3.26 | 0.31 | -0.82 | 0.50 | 4.20 | 0.12 | 0.59 |
| 10600 | 10592.5 | -3.45 | 0.34 | -0.87 | 0.80 | 4.46 | 0.14 | 0.87 |
| 11200 | 11220.2 | -3.63 | 0.37 | -0.96 | 0.80 | 4.72 | 0.13 | 0.88 |
| 11800 | 11885 | -3.81 | 0.40 | -1.07 | 0.80 | 4.98 | 0.10 | 0.89 |
| 12500 | 12589.3 | -3.96 | 0.43 | -1.19 | 0.80 | 5.25 | 0.10 | 0.91 |
| 13200 | 13335.2 | -4.22 | 0.46 | -1.31 | 0.80 | 5.51 | -0.02 | 0.92 |
| 14000 | 14125.4 | -4.48 | 0.49 | -1.43 | 0.80 | 5.77 | -0.14 | 0.94 |
| 15000 | 14962.4 | -4.77 | 0.52 | -1.53 | 0.80 | 6.02 | -0.28 | 0.95 |
| 16000 | 15848.9 | -5.10 | 0.55 | -1.63 | 0.80 | 6.26 | -0.47 | 0.97 |
| 17000 | 16788 | -5.33 | 0.57 | -1.77 | 0.80 | 6.49 | -0.61 | 0.98 |
| 18000 | 17782.8 | -5.65 | 0.59 | -1.92 | 0.80 | 6.69 | -0.88 | 0.99 |
| 19000 | 18836.5 | -5.98 | 0.61 | -1.98 | 0.80 | 6.87 | -1.09 | 1.01 |
| 20000 | 19952.6 | -6.40 | 0.63 | -2.07 | 0.80 | 7.02 | -1.45 | 1.02 |
| 21200 | 21134.9 | -6.82 | 0.65 | -2.18 | 0.80 | 7.13 | -1.87 | 1.03 |
| 22400 | 22387.2 | -7.32 | 0.67 | -2.19 | 0.80 | 7.18 | -2.33 | 1.04 |

Table A.9 Microphone Type 4191 is not specified together with Outdoor Microphone Kit UA-1404

A.4 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 instrument's *Sound Field Correction* parameter set to *Diffuse-field*.

Table A.10 Free-field 0° frequency response with the *Sound Field Correction* parameter 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 | Configuration as in Table A.4 | Configuration as in Table A.5 |
|-------------------|----------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Hz | Hz | dB | dB | dB | dB |
| 63 | 63.0957 | 0.00 | 0.00 | 0.00 | 0.00 |
| 80 | 79.4328 | 0.00 | 0.00 | 0.00 | 0.00 |
| 100 | 100 | 0.00 | 0.00 | 0.00 | 0.00 |
| 125 | 125.893 | 0.00 | 0.00 | 0.00 | 0.00 |
| 160 | 158.489 | 0.00 | 0.01 | 0.00 | 0.01 |
| 200 | 199.526 | 0.00 | 0.03 | 0.00 | 0.03 |
| 250 | 251.189 | 0.01 | 0.08 | 0.02 | 0.09 |
| 315 | 316.228 | 0.02 | 0.15 | 0.04 | 0.17 |
| 400 | 398.107 | 0.02 | 0.23 | 0.05 | 0.26 |
| 500 | 501.187 | 0.04 | 0.26 | 0.09 | 0.31 |
| 630 | 630.957 | 0.04 | 0.11 | 0.10 | 0.17 |

| Nominal Frequency Hz | Exact Frequency (6 digits) Hz | Configuration as in Table A.2 dB | Configuration as in Table A.3 dB | Configuration as in Table A.4 dB | Configuration as in Table A.5 dB |
|-------------------------|-------------------------------------|---|---|---|---|
| 800 | 794.328 | 0.07 | -0.04 | 0.13 | 0.02 |
| 1000 | 1000 | 0.09 | -0.01 | 0.15 | 0.05 |
| 1060 | 1059.25 | 0.10 | -0.04 | 0.17 | 0.03 |
| 1120 | 1122.02 | 0.11 | -0.10 | 0.19 | -0.02 |
| 1180 | 1188.5 | 0.12 | -0.17 | 0.22 | -0.07 |
| 1250 | 1258.93 | 0.13 | -0.18 | 0.24 | -0.07 |
| 1320 | 1333.52 | 0.15 | -0.08 | 0.27 | 0.04 |
| 1400 | 1412.54 | 0.17 | 0.06 | 0.31 | 0.20 |
| 1500 | 1496.24 | 0.19 | 0.19 | 0.34 | 0.34 |
| 1600 | 1584.89 | 0.21 | 0.24 | 0.36 | 0.39 |
| 1700 | 1678.8 | 0.22 | 0.20 | 0.37 | 0.35 |
| 1800 | 1778.28 | 0.24 | 0.11 | 0.38 | 0.25 |
| 1900 | 1883.65 | 0.27 | 0.10 | 0.41 | 0.24 |
| 2000 | 1995.26 | 0.30 | 0.20 | 0.41 | 0.31 |
| 2120 | 2113.49 | 0.33 | 0.38 | 0.42 | 0.47 |
| 2240 | 2238.72 | 0.35 | 0.39 | 0.41 | 0.45 |
| 2360 | 2371.37 | 0.39 | 0.06 | 0.43 | 0.10 |
| 2500 | 2511.89 | 0.43 | 0.25 | 0.46 | 0.28 |
| 2650 | 2660.73 | 0.48 | 0.57 | 0.50 | 0.59 |
| 2800 | 2818.38 | 0.52 | 0.50 | 0.56 | 0.54 |
| 3000 | 2985.38 | 0.58 | 0.39 | 0.63 | 0.44 |
| 3150 | 3162.28 | 0.63 | 0.74 | 0.69 | 0.80 |
| 3350 | 3349.65 | 0.70 | 0.84 | 0.75 | 0.89 |
| 3550 | 3548.13 | 0.78 | 0.68 | 0.78 | 0.68 |
| 3750 | 3758.37 | 0.86 | 0.93 | 0.83 | 0.90 |
| 4000 | 3981.07 | 0.95 | 0.99 | 0.89 | 0.93 |
| 4250 | 4216.97 | 1.04 | 0.94 | 0.99 | 0.89 |
| 4500 | 4466.84 | 1.15 | 1.28 | 1.09 | 1.22 |
| 4750 | 4731.51 | 1.26 | 1.09 | 1.22 | 1.05 |
| 5000 | 5011.87 | 1.38 | 1.26 | 1.39 | 1.27 |
| 5300 | 5308.84 | 1.49 | 1.25 | 1.58 | 1.34 |
| 5600 | 5623.41 | 1.62 | 1.56 | 1.78 | 1.72 |
| 6000 | 5956.62 | 1.78 | 1.65 | 2.02 | 1.89 |
| 6300 | 6309.57 | 1.93 | 1.94 | 2.24 | 2.25 |
| 6700 | 6683.44 | 2.08 | 2.08 | 2.39 | 2.39 |
| 7100 | 7079.46 | 2.23 | 2.24 | 2.48 | 2.49 |
| 7500 | 7498.94 | 2.39 | 2.48 | 2.62 | 2.71 |
| 8000 | 7943.28 | 2.62 | 2.43 | 2.86 | 2.67 |
| 8500 | 8413.95 | 2.80 | 2.51 | 3.04 | 2.75 |
| 9000 | 8912.51 | 3.03 | 2.89 | 3.36 | 3.22 |
| 9500 | 9440.61 | 3.22 | 3.23 | 3.61 | 3.62 |
| 10000 | 10000 | 3.46 | 3.42 | 3.88 | 3.84 |
| 10600 | 10592.5 | 3.68 | 3.65 | 4.07 | 4.04 |
| 11200 | 11220.2 | 3.91 | 3.69 | 4.27 | 4.05 |
| 11800 | 11885 | 4.18 | 3.95 | 4.49 | 4.26 |
| 12500 | 12589.3 | 4.50 | 4.47 | 4.86 | 4.83 |
| 13200 | 13335.2 | 4.76 | 4.77 | 5.04 | 5.05 |
| 14000 | 14125.4 | 5.02 | 4.97 | 5.18 | 5.13 |
| 15000 | 14962.4 | 5.30 | 5.17 | 5.37 | 5.24 |
| 16000 | 15848.9 | 5.55 | 5.51 | 5.45 | 5.41 |
| 17000 | 16788 | 5.96 | 6.07 | 5.61 | 5.72 |
| 18000 | 17782.8 | 6.30 | 6.19 | 5.71 | 5.60 |
| 19000 | 18836.5 | 6.59 | 6.49 | 5.84 | 5.74 |
| 20000 | 19952.6 | 6.82 | 6.88 | 5.84 | 5.90 |
| 21200 | 21134.9 | 6.98 | 6.79 | 5.80 | 5.61 |
| 22400 | 22387.2 | 6.99 | 6.55 | 5.74 | 5.30 |

A.5 Directional Responses

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

Table A.11 Directional response for Microphone Type 4191 and Microphone Preamplifier ZC-0032 with the Microphone Preamplifier connected to a microphone extension cable, 500 Hz–3550 Hz, in dB

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 500 Hz | 630 Hz | 800 Hz | 1000 Hz | 1250 Hz | 1600 Hz | 2000 Hz | 2240 Hz | 2500 Hz | 2800 Hz | 3150 Hz | 3550 Hz |
| 0° | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5° | 0.00 | 0.00 | 0.00 | -0.02 | -0.01 | -0.01 | -0.01 | 0.00 | 0.00 | -0.01 | -0.02 | -0.01 |
| 10° | 0.01 | 0.00 | 0.00 | -0.01 | -0.01 | -0.01 | -0.01 | 0.00 | 0.00 | -0.01 | -0.03 | -0.02 |
| 15° | 0.01 | 0.01 | 0.00 | -0.02 | -0.02 | -0.02 | -0.01 | -0.01 | -0.03 | -0.05 | -0.05 | -0.03 |
| 20° | 0.01 | 0.01 | 0.00 | -0.01 | -0.01 | -0.03 | -0.01 | -0.02 | -0.04 | -0.07 | -0.06 | -0.06 |
| 25° | 0.02 | 0.01 | 0.00 | -0.02 | -0.02 | -0.04 | -0.03 | -0.02 | -0.06 | -0.11 | -0.10 | -0.09 |
| 30° | 0.02 | 0.01 | 0.00 | -0.02 | -0.04 | -0.06 | -0.04 | -0.03 | -0.08 | -0.15 | -0.15 | -0.15 |
| 35° | 0.01 | 0.01 | -0.01 | -0.04 | -0.05 | -0.08 | -0.06 | -0.06 | -0.10 | -0.18 | -0.20 | -0.21 |
| 40° | 0.01 | 0.00 | -0.02 | -0.04 | -0.06 | -0.10 | -0.08 | -0.08 | -0.13 | -0.22 | -0.26 | -0.28 |
| 45° | 0.00 | -0.01 | -0.03 | -0.05 | -0.08 | -0.12 | -0.11 | -0.09 | -0.15 | -0.26 | -0.32 | -0.35 |
| 50° | 0.00 | -0.02 | -0.04 | -0.05 | -0.09 | -0.14 | -0.13 | -0.12 | -0.17 | -0.30 | -0.38 | -0.43 |
| 55° | -0.01 | -0.02 | -0.04 | -0.07 | -0.10 | -0.17 | -0.17 | -0.14 | -0.19 | -0.33 | -0.43 | -0.50 |
| 60° | -0.02 | -0.03 | -0.05 | -0.08 | -0.12 | -0.19 | -0.20 | -0.17 | -0.22 | -0.37 | -0.49 | -0.56 |
| 65° | -0.02 | -0.04 | -0.06 | -0.10 | -0.13 | -0.21 | -0.24 | -0.20 | -0.25 | -0.41 | -0.55 | -0.63 |
| 70° | -0.03 | -0.04 | -0.07 | -0.11 | -0.15 | -0.24 | -0.28 | -0.25 | -0.29 | -0.44 | -0.60 | -0.70 |
| 75° | -0.03 | -0.05 | -0.08 | -0.12 | -0.17 | -0.26 | -0.31 | -0.29 | -0.32 | -0.47 | -0.65 | -0.77 |
| 80° | -0.04 | -0.06 | -0.09 | -0.14 | -0.19 | -0.28 | -0.35 | -0.33 | -0.37 | -0.50 | -0.69 | -0.83 |
| 85° | -0.04 | -0.07 | -0.09 | -0.14 | -0.20 | -0.31 | -0.38 | -0.37 | -0.41 | -0.54 | -0.73 | -0.89 |
| 90° | -0.05 | -0.07 | -0.10 | -0.16 | -0.21 | -0.33 | -0.42 | -0.41 | -0.45 | -0.58 | -0.76 | -0.94 |
| 95° | -0.05 | -0.08 | -0.11 | -0.16 | -0.23 | -0.35 | -0.44 | -0.45 | -0.50 | -0.62 | -0.80 | -0.98 |
| 100° | -0.05 | -0.08 | -0.11 | -0.18 | -0.25 | -0.37 | -0.48 | -0.49 | -0.54 | -0.66 | -0.84 | -1.02 |
| 105° | -0.06 | -0.08 | -0.12 | -0.18 | -0.25 | -0.38 | -0.50 | -0.52 | -0.58 | -0.71 | -0.88 | -1.05 |
| 110° | -0.06 | -0.09 | -0.12 | -0.19 | -0.26 | -0.40 | -0.52 | -0.55 | -0.62 | -0.75 | -0.92 | -1.09 |
| 115° | -0.06 | -0.09 | -0.12 | -0.19 | -0.26 | -0.40 | -0.53 | -0.57 | -0.65 | -0.79 | -0.96 | -1.14 |
| 120° | -0.07 | -0.09 | -0.13 | -0.19 | -0.26 | -0.40 | -0.53 | -0.58 | -0.66 | -0.82 | -1.00 | -1.18 |
| 125° | -0.06 | -0.09 | -0.12 | -0.18 | -0.26 | -0.39 | -0.53 | -0.58 | -0.66 | -0.83 | -1.02 | -1.21 |
| 130° | -0.06 | -0.09 | -0.12 | -0.17 | -0.24 | -0.38 | -0.53 | -0.57 | -0.66 | -0.83 | -1.02 | -1.23 |
| 135° | -0.06 | -0.08 | -0.12 | -0.16 | -0.24 | -0.37 | -0.51 | -0.55 | -0.64 | -0.81 | -1.01 | -1.22 |
| 140° | -0.06 | -0.08 | -0.11 | -0.17 | -0.23 | -0.35 | -0.48 | -0.52 | -0.61 | -0.78 | -0.98 | -1.20 |
| 145° | -0.05 | -0.08 | -0.11 | -0.16 | -0.22 | -0.34 | -0.46 | -0.49 | -0.57 | -0.73 | -0.93 | -1.15 |
| 150° | -0.05 | -0.08 | -0.11 | -0.15 | -0.21 | -0.32 | -0.43 | -0.45 | -0.53 | -0.68 | -0.87 | -1.07 |
| 155° | -0.05 | -0.07 | -0.10 | -0.14 | -0.20 | -0.31 | -0.40 | -0.42 | -0.49 | -0.63 | -0.80 | -1.00 |
| 160° | -0.05 | -0.07 | -0.10 | -0.14 | -0.19 | -0.29 | -0.38 | -0.39 | -0.45 | -0.58 | -0.75 | -0.93 |
| 165° | -0.05 | -0.07 | -0.10 | -0.13 | -0.18 | -0.28 | -0.36 | -0.37 | -0.42 | -0.54 | -0.69 | -0.86 |
| 170° | -0.04 | -0.07 | -0.10 | -0.13 | -0.18 | -0.27 | -0.34 | -0.35 | -0.40 | -0.51 | -0.65 | -0.82 |
| 175° | -0.04 | -0.06 | -0.09 | -0.13 | -0.17 | -0.27 | -0.34 | -0.34 | -0.38 | -0.49 | -0.63 | -0.79 |
| 180° | -0.04 | -0.06 | -0.09 | -0.12 | -0.18 | -0.26 | -0.33 | -0.33 | -0.37 | -0.48 | -0.62 | -0.78 |
| 185° | -0.04 | -0.06 | -0.09 | -0.14 | -0.18 | -0.26 | -0.33 | -0.34 | -0.38 | -0.49 | -0.63 | -0.79 |
| 190° | -0.04 | -0.07 | -0.10 | -0.13 | -0.18 | -0.27 | -0.35 | -0.35 | -0.40 | -0.51 | -0.65 | -0.82 |
| 195° | -0.05 | -0.07 | -0.10 | -0.14 | -0.18 | -0.28 | -0.36 | -0.37 | -0.42 | -0.53 | -0.69 | -0.86 |
| 200° | -0.05 | -0.07 | -0.10 | -0.13 | -0.19 | -0.29 | -0.38 | -0.40 | -0.45 | -0.58 | -0.74 | -0.92 |
| 205° | -0.05 | -0.07 | -0.10 | -0.15 | -0.21 | -0.31 | -0.41 | -0.43 | -0.49 | -0.63 | -0.80 | -1.00 |
| 210° | -0.05 | -0.08 | -0.11 | -0.15 | -0.21 | -0.32 | -0.43 | -0.46 | -0.53 | -0.68 | -0.86 | -1.07 |
| 215° | -0.05 | -0.08 | -0.11 | -0.15 | -0.22 | -0.34 | -0.46 | -0.50 | -0.57 | -0.72 | -0.92 | -1.15 |
| 220° | -0.06 | -0.08 | -0.11 | -0.17 | -0.24 | -0.36 | -0.48 | -0.52 | -0.60 | -0.77 | -0.97 | -1.20 |
| 225° | -0.06 | -0.08 | -0.12 | -0.17 | -0.24 | -0.37 | -0.51 | -0.55 | -0.63 | -0.80 | -1.01 | -1.23 |
| 230° | -0.06 | -0.09 | -0.12 | -0.17 | -0.25 | -0.38 | -0.52 | -0.57 | -0.66 | -0.82 | -1.02 | -1.24 |
| 235° | -0.06 | -0.09 | -0.12 | -0.17 | -0.26 | -0.40 | -0.54 | -0.58 | -0.67 | -0.83 | -1.02 | -1.23 |
| 240° | -0.07 | -0.09 | -0.13 | -0.18 | -0.26 | -0.40 | -0.54 | -0.59 | -0.66 | -0.82 | -1.00 | -1.20 |
| 245° | -0.06 | -0.09 | -0.12 | -0.18 | -0.26 | -0.40 | -0.54 | -0.57 | -0.65 | -0.80 | -0.96 | -1.16 |
| 250° | -0.06 | -0.09 | -0.12 | -0.18 | -0.26 | -0.40 | -0.53 | -0.56 | -0.63 | -0.76 | -0.92 | -1.11 |
| 255° | -0.06 | -0.08 | -0.12 | -0.18 | -0.26 | -0.39 | -0.51 | -0.54 | -0.59 | -0.72 | -0.87 | -1.06 |
| 260° | -0.05 | -0.08 | -0.11 | -0.17 | -0.25 | -0.37 | -0.49 | -0.51 | -0.56 | -0.67 | -0.82 | -1.02 |
| 265° | -0.05 | -0.08 | -0.11 | -0.17 | -0.23 | -0.36 | -0.47 | -0.48 | -0.51 | -0.62 | -0.78 | -0.98 |
| 270° | -0.05 | -0.07 | -0.10 | -0.16 | -0.22 | -0.35 | -0.44 | -0.43 | -0.46 | -0.57 | -0.74 | -0.95 |
| 275° | -0.04 | -0.07 | -0.09 | -0.13 | -0.21 | -0.32 | -0.40 | -0.39 | -0.41 | -0.53 | -0.71 | -0.92 |
| 280° | -0.04 | -0.06 | -0.09 | -0.14 | -0.19 | -0.30 | -0.37 | -0.34 | -0.36 | -0.49 | -0.69 | -0.89 |
| 285° | -0.03 | -0.05 | -0.08 | -0.12 | -0.18 | -0.28 | -0.33 | -0.29 | -0.31 | -0.46 | -0.67 | -0.84 |
| 290° | -0.03 | -0.04 | -0.07 | -0.11 | -0.16 | -0.25 | -0.29 | -0.25 | -0.28 | -0.44 | -0.64 | -0.77 |
| 295° | -0.02 | -0.04 | -0.06 | -0.10 | -0.14 | -0.23 | -0.24 | -0.20 | -0.25 | -0.42 | -0.60 | -0.70 |
| 300° | -0.02 | -0.03 | -0.05 | -0.08 | -0.13 | -0.20 | -0.20 | -0.17 | -0.22 | -0.40 | -0.55 | -0.60 |
| 305° | -0.01 | -0.02 | -0.04 | -0.07 | -0.12 | -0.18 | -0.17 | -0.14 | -0.20 | -0.37 | -0.48 | -0.51 |
| 310° | 0.00 | -0.02 | -0.04 | -0.05 | -0.10 | -0.15 | -0.13 | -0.11 | -0.18 | -0.33 | -0.41 | -0.42 |
| 315° | 0.00 | -0.01 | -0.03 | -0.04 | -0.08 | -0.12 | -0.10 | -0.09 | -0.17 | -0.30 | -0.34 | -0.35 |
| 320° | 0.01 | 0.00 | -0.02 | -0.03 | -0.06 | -0.10 | -0.08 | -0.08 | -0.14 | -0.25 | -0.27 | -0.27 |
| 325° | 0.01 | 0.01 | -0.01 | -0.03 | -0.05 | -0.08 | -0.06 | -0.05 | -0.12 | -0.20 | -0.20 | -0.21 |
| 330° | 0.02 | 0.01 | 0.00 | -0.01 | -0.03 | -0.05 | -0.04 | -0.05 | -0.10 | -0.15 | -0.15 | -0.15 |
| 335° | 0.02 | 0.01 | 0.00 | 0.01 | -0.02 | -0.04 | -0.02 | -0.03 | -0.07 | -0.11 | -0.10 | -0.10 |
| 340° | 0.01 | 0.01 | 0.00 | 0.01 | -0.02 | -0.02 | -0.01 | -0.01 | -0.05 | -0.07 | -0.06 | -0.06 |
| 345° | 0.01 | 0.01 | 0.00 | 0.02 | 0.00 | -0.01 | 0.00 | 0.00 | -0.04 | -0.04 | -0.03 | -0.03 |
| 350° | 0.01 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.01 | 0.00 | -0.01 | -0.02 | -0.01 | 0.00 |
| 355° | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.01 | 0.01 | -0.01 | -0.01 | 0.01 | 0.01 |

Table A.12 Directional response for Microphone Type 4191 and Microphone Preamplicifier ZC-0032 with the Microphone Preamplicifier connected to a microphone extension cable, 4000 Hz – 10600 Hz, in dB

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|
| | 4000 Hz | 4500 Hz | 5000 Hz | 5600 Hz | 6300 Hz | 7100 Hz | 8000 Hz | 8500 Hz | 9000 Hz | 9500 Hz | 10000 Hz | 10600 Hz |
| 0° | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5° | -0.02 | -0.02 | -0.01 | -0.03 | -0.01 | -0.01 | -0.02 | -0.02 | -0.03 | -0.01 | -0.01 | -0.03 |
| 10° | -0.02 | -0.05 | -0.02 | -0.07 | -0.03 | -0.03 | -0.06 | -0.06 | -0.11 | -0.05 | -0.09 | -0.07 |
| 15° | -0.04 | -0.08 | -0.04 | -0.11 | -0.05 | -0.10 | -0.13 | -0.11 | -0.23 | -0.10 | -0.20 | -0.13 |
| 20° | -0.08 | -0.15 | -0.08 | -0.17 | -0.10 | -0.21 | -0.24 | -0.19 | -0.40 | -0.22 | -0.34 | -0.26 |
| 25° | -0.11 | -0.22 | -0.16 | -0.23 | -0.18 | -0.36 | -0.35 | -0.32 | -0.57 | -0.41 | -0.47 | -0.45 |
| 30° | -0.16 | -0.30 | -0.27 | -0.28 | -0.30 | -0.52 | -0.47 | -0.49 | -0.72 | -0.69 | -0.60 | -0.73 |
| 35° | -0.20 | -0.38 | -0.41 | -0.33 | -0.45 | -0.69 | -0.57 | -0.72 | -0.86 | -1.01 | -0.78 | -1.03 |
| 40° | -0.27 | -0.45 | -0.57 | -0.38 | -0.63 | -0.85 | -0.69 | -0.94 | -1.03 | -1.30 | -1.11 | -1.27 |
| 45° | -0.34 | -0.51 | -0.74 | -0.48 | -0.79 | -1.00 | -0.86 | -1.09 | -1.32 | -1.46 | -1.56 | -1.51 |
| 50° | -0.44 | -0.58 | -0.89 | -0.66 | -0.92 | -1.16 | -1.13 | -1.19 | -1.66 | -1.65 | -1.89 | -1.96 |
| 55° | -0.55 | -0.67 | -0.98 | -0.90 | -1.03 | -1.34 | -1.47 | -1.37 | -1.86 | -2.02 | -1.99 | -2.55 |
| 60° | -0.65 | -0.79 | -1.05 | -1.14 | -1.17 | -1.52 | -1.77 | -1.72 | -1.98 | -2.41 | -2.22 | -2.85 |
| 65° | -0.74 | -0.94 | -1.14 | -1.28 | -1.44 | -1.69 | -1.95 | -2.07 | -2.29 | -2.62 | -2.63 | -3.02 |
| 70° | -0.82 | -1.09 | -1.29 | -1.34 | -1.77 | -1.86 | -2.14 | -2.24 | -2.74 | -2.95 | -2.88 | -3.40 |
| 75° | -0.87 | -1.19 | -1.50 | -1.39 | -2.03 | -2.11 | -2.44 | -2.39 | -2.90 | -3.49 | -3.21 | -3.64 |
| 80° | -0.93 | -1.26 | -1.71 | -1.51 | -2.14 | -2.42 | -2.74 | -2.77 | -2.93 | -3.66 | -3.85 | -3.85 |
| 85° | -0.99 | -1.29 | -1.84 | -1.74 | -2.20 | -2.70 | -2.94 | -3.24 | -3.31 | -3.57 | -4.11 | -4.40 |
| 90° | -1.06 | -1.34 | -1.91 | -1.96 | -2.32 | -2.89 | -3.10 | -3.49 | -3.86 | -3.90 | -4.06 | -4.75 |
| 95° | -1.12 | -1.40 | -1.92 | -2.09 | -2.52 | -3.04 | -3.31 | -3.59 | -4.13 | -4.42 | -4.43 | -4.91 |
| 100° | -1.17 | -1.46 | -1.97 | -2.15 | -2.69 | -3.19 | -3.57 | -3.80 | -4.25 | -4.65 | -4.94 | -5.27 |
| 105° | -1.21 | -1.51 | -2.02 | -2.17 | -2.79 | -3.33 | -3.75 | -4.04 | -4.48 | -4.81 | -5.19 | -5.55 |
| 110° | -1.24 | -1.54 | -2.07 | -2.19 | -2.84 | -3.43 | -3.84 | -4.17 | -4.72 | -5.04 | -5.40 | -5.85 |
| 115° | -1.29 | -1.57 | -2.10 | -2.20 | -2.85 | -3.48 | -3.91 | -4.24 | -4.85 | -5.20 | -5.57 | -6.13 |
| 120° | -1.33 | -1.60 | -2.13 | -2.21 | -2.83 | -3.49 | -3.94 | -4.31 | -4.93 | -5.33 | -5.67 | -6.23 |
| 125° | -1.37 | -1.65 | -2.18 | -2.22 | -2.80 | -3.46 | -3.93 | -4.30 | -4.94 | -5.36 | -5.72 | -6.34 |
| 130° | -1.40 | -1.69 | -2.24 | -2.26 | -2.83 | -3.45 | -3.84 | -4.21 | -4.85 | -5.21 | -5.56 | -6.31 |
| 135° | -1.41 | -1.71 | -2.28 | -2.31 | -2.89 | -3.50 | -3.82 | -4.14 | -4.73 | -5.05 | -5.33 | -6.02 |
| 140° | -1.40 | -1.70 | -2.29 | -2.34 | -2.96 | -3.58 | -3.89 | -4.17 | -4.77 | -5.06 | -5.29 | -5.80 |
| 145° | -1.34 | -1.64 | -2.24 | -2.31 | -2.97 | -3.64 | -3.98 | -4.28 | -4.90 | -5.20 | -5.47 | -5.87 |
| 150° | -1.26 | -1.55 | -2.15 | -2.21 | -2.89 | -3.60 | -3.98 | -4.30 | -4.99 | -5.26 | -5.64 | -6.07 |
| 155° | -1.17 | -1.44 | -2.03 | -2.06 | -2.73 | -3.46 | -3.83 | -4.16 | -4.89 | -5.14 | -5.56 | -6.05 |
| 160° | -1.08 | -1.33 | -1.89 | -1.89 | -2.54 | -3.23 | -3.59 | -3.89 | -4.64 | -4.86 | -5.24 | -5.73 |
| 165° | -1.01 | -1.23 | -1.78 | -1.74 | -2.35 | -3.00 | -3.33 | -3.60 | -4.32 | -4.52 | -4.84 | -5.30 |
| 170° | -0.94 | -1.15 | -1.68 | -1.62 | -2.19 | -2.81 | -3.09 | -3.33 | -4.03 | -4.23 | -4.49 | -4.90 |
| 175° | -0.91 | -1.11 | -1.63 | -1.54 | -2.09 | -2.69 | -2.95 | -3.16 | -3.84 | -4.04 | -4.27 | -4.64 |
| 180° | -0.90 | -1.09 | -1.60 | -1.51 | -2.05 | -2.64 | -2.88 | -3.08 | -3.76 | -3.97 | -4.20 | -4.57 |
| 185° | -0.91 | -1.10 | -1.63 | -1.54 | -2.08 | -2.67 | -2.92 | -3.12 | -3.81 | -4.05 | -4.30 | -4.66 |
| 190° | -0.94 | -1.15 | -1.69 | -1.62 | -2.16 | -2.78 | -3.05 | -3.27 | -4.00 | -4.27 | -4.55 | -4.93 |
| 195° | -1.00 | -1.23 | -1.79 | -1.73 | -2.30 | -2.95 | -3.27 | -3.53 | -4.31 | -4.61 | -4.90 | -5.29 |
| 200° | -1.08 | -1.33 | -1.91 | -1.88 | -2.47 | -3.16 | -3.54 | -3.85 | -4.67 | -4.96 | -5.26 | -5.63 |
| 205° | -1.17 | -1.43 | -2.05 | -2.03 | -2.65 | -3.38 | -3.80 | -4.15 | -4.94 | -5.20 | -5.48 | -5.86 |
| 210° | -1.27 | -1.55 | -2.18 | -2.16 | -2.81 | -3.56 | -3.95 | -4.31 | -5.03 | -5.28 | -5.56 | -5.94 |
| 215° | -1.34 | -1.64 | -2.26 | -2.26 | -2.90 | -3.64 | -3.98 | -4.30 | -4.97 | -5.25 | -5.52 | -5.88 |
| 220° | -1.40 | -1.70 | -2.30 | -2.29 | -2.91 | -3.62 | -3.90 | -4.22 | -4.90 | -5.20 | -5.43 | -5.79 |
| 225° | -1.43 | -1.71 | -2.30 | -2.28 | -2.88 | -3.56 | -3.84 | -4.15 | -4.87 | -5.17 | -5.36 | -5.85 |
| 230° | -1.43 | -1.69 | -2.26 | -2.25 | -2.80 | -3.49 | -3.85 | -4.14 | -4.87 | -5.21 | -5.43 | -6.06 |
| 235° | -1.40 | -1.65 | -2.21 | -2.19 | -2.74 | -3.47 | -3.87 | -4.17 | -4.91 | -5.36 | -5.55 | -6.15 |
| 240° | -1.36 | -1.61 | -2.16 | -2.14 | -2.71 | -3.50 | -3.91 | -4.22 | -4.97 | -5.40 | -5.48 | -5.98 |
| 245° | -1.31 | -1.56 | -2.10 | -2.11 | -2.73 | -3.55 | -3.91 | -4.21 | -4.92 | -5.20 | -5.31 | -5.85 |
| 250° | -1.27 | -1.51 | -2.06 | -2.12 | -2.77 | -3.53 | -3.83 | -4.11 | -4.76 | -5.00 | -5.30 | -5.81 |
| 255° | -1.22 | -1.48 | -2.04 | -2.16 | -2.75 | -3.40 | -3.68 | -4.00 | -4.61 | -4.91 | -5.26 | -5.61 |
| 260° | -1.18 | -1.45 | -2.03 | -2.17 | -2.62 | -3.21 | -3.55 | -3.88 | -4.47 | -4.74 | -4.89 | -5.23 |
| 265° | -1.15 | -1.43 | -2.01 | -2.08 | -2.41 | -3.12 | -3.38 | -3.68 | -4.25 | -4.39 | -4.40 | -4.96 |
| 270° | -1.11 | -1.40 | -1.97 | -1.90 | -2.25 | -3.06 | -3.09 | -3.43 | -3.93 | -3.95 | -4.15 | -4.81 |
| 275° | -1.07 | -1.34 | -1.86 | -1.69 | -2.20 | -2.85 | -2.83 | -3.21 | -3.51 | -3.66 | -4.14 | -4.46 |
| 280° | -1.01 | -1.27 | -1.70 | -1.53 | -2.18 | -2.48 | -2.70 | -2.89 | -3.11 | -3.63 | -3.91 | -4.04 |
| 285° | -0.93 | -1.17 | -1.51 | -1.45 | -2.01 | -2.13 | -2.51 | -2.46 | -2.95 | -3.54 | -3.38 | -3.77 |
| 290° | -0.84 | -1.07 | -1.35 | -1.40 | -1.70 | -1.95 | -2.17 | -2.18 | -2.89 | -3.15 | -2.93 | -3.45 |
| 295° | -0.74 | -0.95 | -1.23 | -1.29 | -1.38 | -1.83 | -1.86 | -2.09 | -2.59 | -2.72 | -2.56 | -3.10 |
| 300° | -0.64 | -0.84 | -1.14 | -1.08 | -1.17 | -1.62 | -1.71 | -1.89 | -2.18 | -2.40 | -2.20 | -2.89 |
| 305° | -0.55 | -0.73 | -1.04 | -0.84 | -1.06 | -1.35 | -1.56 | -1.53 | -1.88 | -2.07 | -1.95 | -2.56 |
| 310° | -0.46 | -0.66 | -0.90 | -0.63 | -0.96 | -1.14 | -1.27 | -1.22 | -1.69 | -1.75 | -1.77 | -2.05 |
| 315° | -0.38 | -0.57 | -0.73 | -0.48 | -0.82 | -1.01 | -0.92 | -1.03 | -1.44 | -1.50 | -1.48 | -1.67 |
| 320° | -0.31 | -0.49 | -0.55 | -0.40 | -0.63 | -0.93 | -0.64 | -0.90 | -1.18 | -1.27 | -1.13 | -1.39 |
| 325° | -0.24 | -0.40 | -0.39 | -0.35 | -0.44 | -0.82 | -0.48 | -0.75 | -0.97 | -0.99 | -0.84 | -1.06 |
| 330° | -0.19 | -0.31 | -0.24 | -0.30 | -0.27 | -0.65 | -0.40 | -0.57 | -0.78 | -0.71 | -0.66 | -0.69 |
| 335° | -0.14 | -0.22 | -0.15 | -0.22 | -0.17 | -0.46 | -0.32 | -0.40 | -0.59 | -0.47 | -0.49 | -0.40 |
| 340° | -0.10 | -0.13 | -0.07 | -0.17 | -0.10 | -0.30 | -0.24 | -0.26 | -0.41 | -0.29 | -0.32 | -0.22 |
| 345° | -0.07 | -0.07 | -0.02 | -0.10 | -0.05 | -0.17 | -0.15 | -0.15 | -0.24 | -0.17 | -0.15 | -0.13 |
| 350° | -0.04 | -0.02 | 0.01 | -0.05 | -0.01 | -0.07 | -0.09 | -0.08 | -0.10 | -0.09 | -0.03 | -0.08 |
| 355° | -0.02 | 0.01 | 0.02 | -0.02 | 0.01 | -0.02 | -0.03 | -0.04 | -0.01 | -0.05 | 0.05 | -0.06 |

Table A.13 Directional response for Microphone Type 4191 and Microphone Preamplifier ZC-0032 with the Microphone Preamplifier connected to a microphone extension cable, 11200 Hz – 20000 Hz, in dB

| Angle | Frequency | | | | | | | | | | |
|-------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | 11200 Hz | 11800 Hz | 12500 Hz | 13200 Hz | 14000 Hz | 15000 Hz | 16000 Hz | 17000 Hz | 18000 Hz | 19000 Hz | 20000 Hz |
| 0° | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5° | -0.03 | -0.02 | -0.04 | -0.03 | -0.06 | -0.01 | -0.04 | -0.04 | -0.05 | -0.07 | -0.03 |
| 10° | -0.12 | -0.08 | -0.10 | -0.12 | -0.14 | -0.08 | -0.10 | -0.17 | -0.20 | -0.23 | -0.20 |
| 15° | -0.26 | -0.15 | -0.22 | -0.30 | -0.26 | -0.19 | -0.23 | -0.38 | -0.43 | -0.48 | -0.44 |
| 20° | -0.45 | -0.25 | -0.43 | -0.55 | -0.39 | -0.45 | -0.47 | -0.70 | -0.76 | -0.80 | -0.77 |
| 25° | -0.66 | -0.40 | -0.71 | -0.79 | -0.56 | -0.85 | -0.79 | -1.02 | -1.07 | -1.12 | -1.10 |
| 30° | -0.85 | -0.64 | -1.02 | -1.02 | -0.87 | -1.34 | -1.10 | -1.27 | -1.41 | -1.53 | -1.56 |
| 35° | -1.04 | -1.00 | -1.25 | -1.32 | -1.34 | -1.69 | -1.44 | -1.59 | -1.98 | -2.13 | -2.20 |
| 40° | -1.32 | -1.40 | -1.44 | -1.81 | -1.72 | -1.99 | -2.06 | -2.20 | -2.54 | -2.57 | -2.75 |
| 45° | -1.67 | -1.69 | -1.82 | -2.21 | -2.04 | -2.58 | -2.65 | -2.78 | -2.81 | -3.11 | -3.51 |
| 50° | -1.97 | -2.01 | -2.37 | -2.43 | -2.62 | -3.15 | -2.94 | -3.43 | -3.61 | -3.82 | -4.25 |
| 55° | -2.27 | -2.47 | -2.68 | -2.98 | -3.06 | -3.54 | -3.67 | -4.14 | -4.23 | -4.26 | -5.00 |
| 60° | -2.86 | -2.90 | -3.08 | -3.57 | -3.42 | -4.17 | -4.22 | -4.62 | -4.90 | -5.42 | -5.71 |
| 65° | -3.44 | -3.25 | -3.84 | -3.72 | -4.26 | -4.45 | -4.67 | -5.50 | -5.48 | -6.01 | -6.68 |
| 70° | -3.70 | -3.74 | -4.35 | -4.41 | -4.61 | -5.09 | -5.30 | -5.73 | -6.43 | -6.98 | -7.20 |
| 75° | -4.09 | -4.05 | -4.81 | -4.99 | -5.26 | -5.64 | -5.88 | -6.48 | -7.00 | -7.51 | -8.22 |
| 80° | -4.48 | -4.41 | -5.08 | -5.49 | -5.76 | -6.53 | -6.50 | -7.07 | -7.82 | -8.01 | -9.04 |
| 85° | -4.67 | -5.12 | -5.19 | -6.04 | -6.09 | -7.21 | -7.16 | -8.01 | -7.98 | -9.21 | -9.62 |
| 90° | -4.99 | -5.46 | -6.06 | -6.00 | -6.82 | -7.26 | -7.96 | -8.37 | -9.28 | -9.41 | -10.31 |
| 95° | -5.36 | -5.46 | -6.50 | -6.83 | -6.96 | -7.87 | -8.10 | -9.15 | -9.63 | -10.44 | -11.15 |
| 100° | -5.74 | -5.87 | -6.43 | -7.11 | -7.71 | -8.43 | -8.83 | -9.28 | -10.19 | -10.87 | -11.92 |
| 105° | -5.95 | -6.39 | -7.02 | -7.20 | -7.73 | -8.84 | -9.25 | -10.01 | -10.49 | -11.24 | -12.32 |
| 110° | -6.18 | -6.46 | -7.32 | -7.87 | -8.19 | -8.97 | -9.33 | -10.41 | -11.23 | -11.96 | -12.74 |
| 115° | -6.60 | -6.78 | -7.42 | -7.91 | -8.57 | -9.63 | -9.81 | -10.63 | -11.20 | -12.22 | -13.30 |
| 120° | -6.78 | -7.13 | -7.93 | -8.27 | -8.63 | -9.65 | -9.93 | -11.24 | -11.95 | -12.48 | -13.34 |
| 125° | -6.81 | -7.07 | -7.89 | -8.50 | -9.09 | -10.06 | -9.84 | -11.13 | -11.90 | -12.90 | -13.97 |
| 130° | -6.92 | -7.20 | -7.90 | -8.38 | -8.83 | -10.11 | -10.17 | -11.54 | -12.31 | -12.74 | -13.98 |
| 135° | -6.76 | -7.11 | -8.04 | -8.56 | -8.93 | -10.02 | -10.45 | -11.25 | -12.26 | -13.08 | -14.13 |
| 140° | -6.49 | -6.74 | -7.71 | -8.34 | -8.83 | -10.05 | -10.53 | -11.43 | -12.16 | -12.72 | -13.99 |
| 145° | -6.47 | -6.67 | -7.46 | -8.03 | -8.41 | -9.49 | -9.77 | -11.12 | -12.15 | -12.75 | -13.89 |
| 150° | -6.61 | -6.90 | -7.57 | -8.11 | -8.43 | -9.41 | -9.64 | -10.43 | -11.39 | -12.17 | -13.19 |
| 155° | -6.63 | -7.05 | -7.74 | -8.30 | -8.65 | -9.71 | -10.16 | -10.76 | -11.41 | -12.03 | -13.07 |
| 160° | -6.37 | -6.85 | -7.57 | -8.17 | -8.56 | -9.63 | -10.23 | -11.15 | -11.82 | -12.42 | -13.53 |
| 165° | -5.91 | -6.38 | -7.08 | -7.67 | -8.04 | -8.99 | -9.62 | -10.65 | -11.46 | -12.17 | -13.21 |
| 170° | -5.49 | -5.92 | -6.56 | -7.11 | -7.43 | -8.28 | -8.87 | -9.82 | -10.56 | -11.30 | -12.23 |
| 175° | -5.21 | -5.62 | -6.20 | -6.71 | -6.99 | -7.75 | -8.36 | -9.19 | -9.83 | -10.58 | -11.41 |
| 180° | -5.12 | -5.51 | -6.03 | -6.54 | -6.83 | -7.56 | -8.19 | -8.96 | -9.52 | -10.27 | -11.15 |
| 185° | -5.21 | -5.60 | -6.12 | -6.62 | -6.97 | -7.72 | -8.39 | -9.05 | -9.64 | -10.50 | -11.44 |
| 190° | -5.47 | -5.86 | -6.39 | -6.98 | -7.41 | -8.18 | -8.83 | -9.50 | -10.25 | -11.25 | -12.13 |
| 195° | -5.82 | -6.25 | -6.84 | -7.57 | -7.99 | -8.73 | -9.38 | -10.21 | -11.06 | -12.00 | -12.75 |
| 200° | -6.19 | -6.67 | -7.31 | -8.03 | -8.37 | -9.15 | -9.83 | -10.74 | -11.32 | -12.24 | -13.07 |
| 205° | -6.47 | -6.93 | -7.48 | -8.10 | -8.43 | -9.33 | -9.88 | -10.58 | -11.21 | -12.11 | -13.07 |
| 210° | -6.51 | -6.88 | -7.36 | -8.02 | -8.41 | -9.19 | -9.78 | -10.50 | -11.31 | -12.06 | -13.14 |
| 215° | -6.34 | -6.76 | -7.33 | -8.04 | -8.38 | -9.14 | -10.09 | -10.61 | -11.48 | -12.38 | -13.53 |
| 220° | -6.27 | -6.81 | -7.43 | -8.11 | -8.53 | -9.45 | -10.44 | -10.86 | -11.95 | -12.83 | -13.99 |
| 225° | -6.46 | -6.95 | -7.55 | -8.33 | -8.85 | -9.74 | -10.68 | -11.15 | -12.12 | -12.86 | -13.95 |
| 230° | -6.70 | -7.04 | -7.74 | -8.51 | -8.85 | -9.75 | -10.65 | -10.97 | -11.99 | -12.76 | -14.05 |
| 235° | -6.69 | -7.00 | -7.68 | -8.32 | -8.77 | -9.68 | -10.13 | -11.01 | -12.08 | -12.82 | -13.75 |
| 240° | -6.50 | -6.91 | -7.51 | -8.28 | -8.69 | -9.61 | -10.04 | -10.79 | -11.66 | -12.13 | -13.41 |
| 245° | -6.37 | -6.85 | -7.47 | -8.17 | -8.45 | -9.31 | -9.67 | -10.26 | -11.28 | -11.94 | -13.10 |
| 250° | -6.24 | -6.73 | -7.23 | -7.81 | -8.03 | -8.81 | -9.33 | -10.12 | -11.09 | -11.65 | -12.87 |
| 255° | -5.98 | -6.37 | -6.79 | -7.37 | -7.70 | -8.68 | -9.14 | -9.78 | -10.68 | -11.18 | -12.10 |
| 260° | -5.69 | -5.92 | -6.43 | -7.17 | -7.51 | -8.29 | -8.93 | -9.19 | -10.06 | -10.76 | -11.94 |
| 265° | -5.43 | -5.54 | -6.30 | -6.86 | -6.96 | -7.99 | -8.16 | -8.80 | -9.66 | -10.49 | -11.19 |
| 270° | -5.04 | -5.41 | -5.98 | -6.17 | -6.78 | -7.21 | -8.10 | -8.24 | -9.32 | -9.37 | -10.37 |
| 275° | -4.76 | -5.16 | -5.20 | -6.05 | -6.05 | -7.06 | -7.31 | -7.78 | -8.11 | -9.04 | -9.63 |
| 280° | -4.55 | -4.41 | -4.94 | -5.55 | -5.63 | -6.71 | -6.37 | -7.07 | -7.80 | -7.90 | -9.02 |
| 285° | -4.04 | -3.99 | -4.74 | -4.99 | -5.36 | -5.63 | -6.02 | -6.31 | -7.07 | -7.42 | -8.33 |
| 290° | -3.63 | -3.73 | -4.23 | -4.59 | -4.54 | -5.22 | -5.30 | -5.66 | -6.49 | -6.92 | -7.15 |
| 295° | -3.36 | -3.23 | -3.90 | -3.75 | -4.27 | -4.53 | -4.75 | -5.31 | -5.52 | -6.12 | -6.85 |
| 300° | -2.83 | -2.96 | -3.12 | -3.50 | -3.56 | -4.19 | -4.13 | -4.68 | -4.96 | -5.49 | -5.72 |
| 305° | -2.39 | -2.52 | -2.54 | -3.19 | -2.99 | -3.71 | -3.64 | -4.10 | -4.30 | -4.37 | -5.14 |
| 310° | -2.10 | -1.88 | -2.36 | -2.53 | -2.65 | -3.24 | -2.88 | -3.43 | -3.75 | -3.82 | -4.28 |
| 315° | -1.63 | -1.58 | -1.91 | -2.20 | -2.11 | -2.71 | -2.55 | -2.76 | -2.89 | -3.23 | -3.60 |
| 320° | -1.13 | -1.46 | -1.38 | -1.92 | -1.69 | -2.11 | -2.10 | -2.23 | -2.56 | -2.56 | -2.83 |
| 325° | -0.89 | -1.12 | -1.14 | -1.47 | -1.32 | -1.76 | -1.52 | -1.57 | -2.09 | -2.17 | -2.29 |
| 330° | -0.83 | -0.67 | -1.01 | -1.07 | -0.91 | -1.39 | -1.15 | -1.21 | -1.45 | -1.58 | -1.64 |
| 335° | -0.74 | -0.35 | -0.77 | -0.78 | -0.62 | -0.91 | -0.83 | -1.04 | -1.04 | -1.10 | -1.14 |
| 340° | -0.55 | -0.19 | -0.50 | -0.55 | -0.43 | -0.52 | -0.49 | -0.75 | -0.78 | -0.78 | -0.81 |
| 345° | -0.33 | -0.09 | -0.26 | -0.32 | -0.27 | -0.28 | -0.23 | -0.42 | -0.49 | -0.47 | -0.49 |
| 350° | -0.16 | -0.03 | -0.11 | -0.15 | -0.13 | -0.14 | -0.08 | -0.16 | -0.24 | -0.22 | -0.21 |
| 355° | -0.05 | 0.02 | -0.03 | -0.03 | -0.02 | -0.07 | -0.01 | -0.02 | -0.08 | -0.07 | -0.04 |

Table A.14 Sensitivity variations for Microphone Type 4191 and Microphone Preamplifier ZC-0032 with the Microphone Preamplifier connected to a microphone extension cable, at sound incidence angles within $\pm\theta^\circ$ from the reference direction

| Nominal Frequency | Exact Frequency | Max Variation $\pm 30^\circ$ dB | Max Variation $\pm 90^\circ$ dB | Max Variation $\pm 150^\circ$ dB |
|-------------------|-----------------|---------------------------------|---------------------------------|----------------------------------|
| 500 Hz | 501.187 Hz | 0.02 | 0.07 | 0.08 |
| 630 Hz | 630.957 Hz | 0.01 | 0.08 | 0.10 |
| 800 Hz | 794.328 Hz | 0.00 | 0.10 | 0.13 |
| 1000 Hz | 1000 Hz | 0.04 | 0.18 | 0.21 |
| 1250 Hz | 1258.93 Hz | 0.04 | 0.22 | 0.27 |
| 1600 Hz | 1584.89 Hz | 0.06 | 0.35 | 0.40 |
| 2000 Hz | 1995.26 Hz | 0.05 | 0.45 | 0.55 |
| 2240 Hz | 2238.72 Hz | 0.06 | 0.44 | 0.60 |
| 2500 Hz | 2511.89 Hz | 0.10 | 0.46 | 0.67 |
| 2800 Hz | 2818.38 Hz | 0.15 | 0.58 | 0.83 |
| 3150 Hz | 3162.28 Hz | 0.16 | 0.77 | 1.03 |
| 3550 Hz | 3548.13 Hz | 0.16 | 0.97 | 1.26 |
| 4000 Hz | 3981.07 Hz | 0.19 | 1.11 | 1.43 |
| 4500 Hz | 4466.84 Hz | 0.33 | 1.41 | 1.72 |
| 5000 Hz | 5011.87 Hz | 0.30 | 1.99 | 2.33 |
| 5600 Hz | 5623.41 Hz | 0.30 | 1.96 | 2.34 |
| 6300 Hz | 6309.57 Hz | 0.31 | 2.33 | 2.98 |
| 7100 Hz | 7079.46 Hz | 0.65 | 3.06 | 3.64 |
| 8000 Hz | 7943.28 Hz | 0.47 | 3.10 | 3.98 |
| 8500 Hz | 8413.95 Hz | 0.57 | 3.49 | 4.31 |
| 9000 Hz | 8912.51 Hz | 0.78 | 3.93 | 5.03 |
| 9500 Hz | 9440.61 Hz | 0.71 | 3.95 | 5.40 |
| 10000 Hz | 10000 Hz | 0.71 | 4.20 | 5.78 |
| 10600 Hz | 10592.5 Hz | 0.73 | 4.81 | 6.34 |
| 11200 Hz | 11220.2 Hz | 0.85 | 5.04 | 6.92 |
| 11800 Hz | 11885.0 Hz | 0.69 | 5.47 | 7.22 |
| 12500 Hz | 12589.3 Hz | 1.02 | 6.06 | 8.04 |
| 13200 Hz | 13335.2 Hz | 1.07 | 6.17 | 8.56 |
| 14000 Hz | 14125.4 Hz | 0.91 | 6.82 | 9.09 |
| 15000 Hz | 14962.4 Hz | 1.39 | 7.26 | 10.11 |
| 16000 Hz | 15848.9 Hz | 1.15 | 8.10 | 10.68 |
| 17000 Hz | 16788.0 Hz | 1.27 | 8.37 | 11.54 |
| 18000 Hz | 17782.8 Hz | 1.45 | 9.32 | 12.31 |
| 19000 Hz | 18836.5 Hz | 1.58 | 9.41 | 13.08 |
| 20000 Hz | 19952.6 Hz | 1.64 | 10.37 | 14.13 |

Table A.15 Influence of the analyzer's body on the directional response, measured in a plane parallel to the display and along the microphone's axis, 500 Hz – 3550 Hz

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 500 Hz | 630 Hz | 800 Hz | 1000 Hz | 1250 Hz | 1600 Hz | 2000 Hz | 2240 Hz | 2500 Hz | 2800 Hz | 3150 Hz | 3550 Hz |
| 0° | -0.01 | -0.01 | -0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5° | 0.00 | 0.00 | -0.01 | 0.02 | 0.00 | 0.00 | -0.01 | 0.00 | 0.01 | 0.02 | -0.01 | 0.00 |
| 10° | 0.01 | 0.00 | -0.01 | 0.02 | -0.01 | 0.01 | -0.02 | 0.01 | -0.02 | 0.03 | -0.02 | -0.01 |
| 15° | 0.01 | -0.01 | 0.00 | 0.04 | -0.02 | 0.01 | -0.04 | 0.02 | -0.04 | 0.05 | -0.05 | 0.01 |
| 20° | 0.01 | 0.00 | -0.01 | 0.04 | -0.05 | 0.02 | -0.08 | 0.03 | -0.07 | 0.07 | -0.09 | 0.02 |
| 25° | 0.01 | 0.00 | 0.00 | 0.06 | -0.05 | 0.01 | -0.11 | 0.04 | -0.08 | 0.09 | -0.12 | 0.05 |
| 30° | 0.02 | 0.01 | -0.01 | 0.09 | -0.05 | 0.00 | -0.14 | 0.03 | -0.07 | 0.08 | -0.13 | 0.06 |
| 35° | 0.01 | 0.02 | -0.01 | 0.12 | -0.03 | -0.04 | -0.15 | 0.00 | -0.02 | 0.04 | -0.11 | 0.06 |
| 40° | 0.03 | 0.05 | 0.00 | 0.13 | 0.00 | -0.10 | -0.13 | -0.08 | 0.05 | -0.03 | -0.06 | 0.04 |
| 45° | 0.04 | 0.09 | 0.02 | 0.13 | 0.05 | -0.19 | -0.08 | -0.15 | 0.08 | -0.09 | -0.03 | 0.02 |
| 50° | 0.03 | 0.10 | 0.05 | 0.13 | 0.11 | -0.27 | -0.02 | -0.20 | 0.05 | -0.07 | -0.06 | 0.03 |
| 55° | 0.02 | 0.11 | 0.09 | 0.14 | 0.17 | -0.31 | 0.02 | -0.18 | -0.07 | 0.00 | -0.14 | 0.05 |
| 60° | 0.01 | 0.12 | 0.13 | 0.15 | 0.20 | -0.28 | -0.01 | -0.08 | -0.22 | 0.06 | -0.19 | 0.03 |
| 65° | -0.01 | 0.11 | 0.17 | 0.18 | 0.22 | -0.20 | -0.13 | 0.01 | -0.26 | -0.03 | -0.14 | -0.02 |
| 70° | -0.03 | 0.10 | 0.21 | 0.23 | 0.22 | -0.07 | -0.29 | -0.01 | -0.13 | -0.22 | -0.09 | -0.04 |
| 75° | -0.04 | 0.08 | 0.23 | 0.28 | 0.21 | 0.05 | -0.38 | -0.18 | 0.01 | -0.30 | -0.19 | -0.02 |
| 80° | -0.05 | 0.06 | 0.24 | 0.36 | 0.22 | 0.12 | -0.31 | -0.38 | -0.03 | -0.18 | -0.39 | -0.04 |
| 85° | -0.06 | 0.04 | 0.24 | 0.41 | 0.25 | 0.15 | -0.10 | -0.42 | -0.25 | -0.07 | -0.39 | -0.22 |
| 90° | -0.11 | -0.01 | 0.22 | 0.47 | 0.31 | 0.13 | 0.13 | -0.21 | -0.44 | -0.21 | -0.24 | -0.38 |
| 95° | -0.13 | -0.05 | 0.18 | 0.50 | 0.41 | 0.10 | 0.26 | 0.10 | -0.29 | -0.46 | -0.25 | -0.25 |
| 100° | -0.16 | -0.11 | 0.12 | 0.50 | 0.51 | 0.13 | 0.26 | 0.31 | 0.12 | -0.40 | -0.49 | -0.17 |
| 105° | -0.19 | -0.16 | 0.05 | 0.45 | 0.57 | 0.20 | 0.19 | 0.31 | 0.43 | 0.06 | -0.50 | -0.34 |
| 110° | -0.20 | -0.19 | -0.03 | 0.38 | 0.58 | 0.31 | 0.17 | 0.20 | 0.44 | 0.47 | -0.01 | -0.29 |
| 115° | -0.21 | -0.22 | -0.12 | 0.27 | 0.52 | 0.37 | 0.27 | 0.16 | 0.26 | 0.50 | 0.46 | 0.25 |
| 120° | -0.21 | -0.23 | -0.18 | 0.14 | 0.41 | 0.34 | 0.41 | 0.27 | 0.17 | 0.25 | 0.46 | 0.71 |
| 125° | -0.22 | -0.25 | -0.23 | 0.02 | 0.26 | 0.21 | 0.48 | 0.45 | 0.30 | 0.13 | 0.14 | 0.59 |
| 130° | -0.22 | -0.25 | -0.26 | -0.08 | 0.09 | 0.00 | 0.39 | 0.50 | 0.50 | 0.29 | 0.03 | 0.18 |
| 135° | -0.20 | -0.23 | -0.27 | -0.13 | -0.03 | -0.24 | 0.11 | 0.31 | 0.50 | 0.45 | 0.26 | 0.17 |
| 140° | -0.19 | -0.22 | -0.25 | -0.14 | -0.09 | -0.42 | -0.25 | -0.06 | 0.20 | 0.32 | 0.35 | 0.43 |
| 145° | -0.18 | -0.19 | -0.21 | -0.12 | -0.10 | -0.50 | -0.53 | -0.46 | -0.28 | -0.15 | 0.01 | 0.34 |
| 150° | -0.15 | -0.16 | -0.17 | -0.08 | -0.05 | -0.46 | -0.66 | -0.70 | -0.68 | -0.68 | -0.62 | -0.25 |
| 155° | -0.14 | -0.14 | -0.13 | -0.02 | 0.03 | -0.34 | -0.59 | -0.70 | -0.80 | -0.95 | -1.12 | -0.92 |
| 160° | -0.12 | -0.10 | -0.09 | 0.05 | 0.12 | -0.19 | -0.41 | -0.51 | -0.64 | -0.85 | -1.15 | -1.14 |
| 165° | -0.11 | -0.09 | -0.05 | 0.10 | 0.21 | -0.05 | -0.20 | -0.25 | -0.34 | -0.52 | -0.81 | -0.85 |
| 170° | -0.10 | -0.07 | -0.02 | 0.14 | 0.28 | 0.06 | -0.02 | -0.03 | -0.06 | -0.18 | -0.41 | -0.38 |
| 175° | -0.10 | -0.07 | -0.01 | 0.18 | 0.32 | 0.14 | 0.10 | 0.12 | 0.12 | 0.06 | -0.11 | -0.02 |
| 180° | -0.08 | -0.05 | 0.00 | 0.18 | 0.33 | 0.15 | 0.14 | 0.17 | 0.19 | 0.14 | 0.00 | 0.12 |
| 185° | -0.10 | -0.07 | -0.01 | 0.19 | 0.32 | 0.13 | 0.10 | 0.14 | 0.14 | 0.07 | -0.09 | 0.00 |
| 190° | -0.11 | -0.07 | -0.02 | 0.16 | 0.28 | 0.06 | 0.00 | 0.00 | -0.04 | -0.15 | -0.36 | -0.34 |
| 195° | -0.12 | -0.09 | -0.05 | 0.13 | 0.21 | -0.06 | -0.16 | -0.21 | -0.30 | -0.48 | -0.76 | -0.82 |
| 200° | -0.14 | -0.12 | -0.08 | 0.06 | 0.12 | -0.19 | -0.36 | -0.46 | -0.59 | -0.79 | -1.11 | -1.15 |
| 205° | -0.14 | -0.14 | -0.12 | 0.02 | 0.03 | -0.33 | -0.53 | -0.65 | -0.76 | -0.91 | -1.13 | -0.97 |
| 210° | -0.16 | -0.16 | -0.17 | -0.05 | -0.06 | -0.44 | -0.60 | -0.67 | -0.67 | -0.68 | -0.68 | -0.31 |
| 215° | -0.17 | -0.19 | -0.21 | -0.10 | -0.11 | -0.47 | -0.50 | -0.45 | -0.29 | -0.18 | -0.06 | 0.31 |
| 220° | -0.18 | -0.21 | -0.24 | -0.11 | -0.12 | -0.38 | -0.23 | -0.07 | 0.17 | 0.28 | 0.32 | 0.45 |
| 225° | -0.21 | -0.24 | -0.25 | -0.11 | -0.06 | -0.19 | 0.11 | 0.31 | 0.48 | 0.44 | 0.28 | 0.21 |
| 230° | -0.21 | -0.25 | -0.24 | -0.05 | 0.06 | 0.04 | 0.38 | 0.51 | 0.50 | 0.29 | 0.06 | 0.19 |
| 235° | -0.23 | -0.26 | -0.21 | 0.03 | 0.23 | 0.26 | 0.49 | 0.47 | 0.31 | 0.13 | 0.12 | 0.57 |
| 240° | -0.22 | -0.24 | -0.15 | 0.14 | 0.39 | 0.39 | 0.42 | 0.29 | 0.14 | 0.23 | 0.41 | 0.73 |
| 245° | -0.20 | -0.21 | -0.08 | 0.25 | 0.51 | 0.42 | 0.27 | 0.15 | 0.22 | 0.46 | 0.44 | 0.30 |
| 250° | -0.21 | -0.19 | -0.01 | 0.36 | 0.59 | 0.35 | 0.16 | 0.18 | 0.40 | 0.47 | 0.01 | -0.28 |
| 255° | -0.17 | -0.12 | 0.07 | 0.44 | 0.58 | 0.23 | 0.16 | 0.30 | 0.41 | 0.09 | -0.49 | -0.35 |
| 260° | -0.16 | -0.08 | 0.15 | 0.48 | 0.53 | 0.13 | 0.24 | 0.31 | 0.15 | -0.38 | -0.51 | -0.18 |
| 265° | -0.13 | -0.04 | 0.20 | 0.48 | 0.44 | 0.10 | 0.25 | 0.14 | -0.25 | -0.47 | -0.27 | -0.23 |
| 270° | -0.09 | 0.02 | 0.24 | 0.46 | 0.34 | 0.11 | 0.16 | -0.16 | -0.45 | -0.21 | -0.25 | -0.35 |
| 275° | -0.06 | 0.06 | 0.25 | 0.39 | 0.28 | 0.14 | -0.05 | -0.39 | -0.28 | -0.07 | -0.41 | -0.20 |
| 280° | -0.06 | 0.07 | 0.25 | 0.35 | 0.24 | 0.12 | -0.26 | -0.39 | -0.04 | -0.19 | -0.40 | 0.04 |
| 285° | -0.04 | 0.09 | 0.23 | 0.28 | 0.24 | 0.05 | -0.35 | -0.21 | 0.01 | -0.31 | -0.17 | 0.05 |
| 290° | -0.02 | 0.11 | 0.20 | 0.23 | 0.23 | -0.06 | -0.29 | -0.04 | -0.13 | -0.23 | -0.03 | 0.00 |
| 295° | 0.01 | 0.13 | 0.17 | 0.19 | 0.22 | -0.18 | -0.14 | -0.01 | -0.25 | -0.01 | -0.08 | 0.02 |
| 300° | 0.02 | 0.13 | 0.13 | 0.15 | 0.22 | -0.26 | -0.02 | -0.09 | -0.21 | 0.10 | -0.15 | 0.07 |
| 305° | 0.02 | 0.11 | 0.09 | 0.14 | 0.18 | -0.29 | 0.01 | -0.19 | -0.04 | 0.06 | -0.11 | 0.07 |
| 310° | 0.03 | 0.10 | 0.05 | 0.13 | 0.11 | -0.26 | -0.03 | -0.22 | 0.10 | -0.05 | -0.03 | 0.01 |
| 315° | 0.04 | 0.09 | 0.02 | 0.13 | 0.04 | -0.18 | -0.10 | -0.16 | 0.14 | -0.08 | -0.01 | -0.01 |
| 320° | 0.04 | 0.06 | -0.01 | 0.12 | -0.01 | -0.10 | -0.16 | -0.06 | 0.09 | -0.04 | -0.04 | 0.03 |
| 325° | 0.02 | 0.03 | -0.01 | 0.11 | -0.04 | -0.03 | -0.17 | 0.01 | 0.01 | 0.04 | -0.11 | 0.09 |
| 330° | 0.01 | 0.01 | -0.01 | 0.08 | -0.06 | 0.00 | -0.15 | 0.07 | -0.05 | 0.09 | -0.15 | 0.10 |
| 335° | 0.02 | 0.01 | 0.00 | 0.05 | -0.06 | 0.02 | -0.12 | 0.07 | -0.08 | 0.10 | -0.14 | 0.08 |
| 340° | 0.01 | 0.01 | 0.00 | 0.03 | -0.04 | 0.02 | -0.08 | 0.06 | -0.07 | 0.09 | -0.11 | 0.05 |
| 345° | 0.00 | 0.00 | 0.00 | 0.00 | -0.03 | 0.01 | -0.05 | 0.04 | -0.04 | 0.06 | -0.07 | 0.02 |
| 350° | 0.01 | 0.01 | 0.00 | -0.01 | -0.02 | 0.00 | -0.03 | 0.01 | -0.02 | 0.03 | -0.04 | 0.00 |
| 355° | 0.02 | 0.02 | 0.00 | -0.02 | -0.01 | 0.00 | -0.01 | 0.00 | 0.00 | 0.01 | -0.02 | -0.02 |

Table A.16 Influence of the analyzer's body on the directional response, measured in a plane parallel to the display and along the microphone's axis, 4000 Hz – 10600 Hz

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|
| | 4000 Hz | 4500 Hz | 5000 Hz | 5600 Hz | 6300 Hz | 7100 Hz | 8000 Hz | 8500 Hz | 9000 Hz | 9500 Hz | 10000 Hz | 10600 Hz |
| 0° | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 | 0.00 | 0.00 |
| 5° | 0.01 | 0.01 | -0.02 | 0.01 | 0.01 | -0.01 | 0.00 | 0.00 | -0.01 | -0.04 | -0.05 | 0.00 |
| 10° | 0.02 | 0.01 | -0.05 | 0.00 | 0.02 | -0.02 | 0.00 | -0.04 | -0.05 | -0.15 | -0.10 | -0.01 |
| 15° | 0.02 | -0.02 | -0.13 | -0.09 | 0.00 | 0.03 | -0.05 | -0.11 | -0.10 | -0.29 | -0.13 | 0.01 |
| 20° | 0.01 | -0.05 | -0.21 | -0.23 | -0.11 | 0.14 | -0.08 | -0.16 | -0.01 | -0.31 | -0.03 | 0.09 |
| 25° | -0.03 | -0.08 | -0.16 | -0.35 | -0.30 | 0.22 | -0.03 | -0.08 | 0.15 | -0.23 | 0.14 | 0.20 |
| 30° | -0.07 | -0.06 | 0.05 | -0.29 | -0.36 | 0.16 | 0.13 | 0.01 | 0.10 | -0.27 | 0.00 | 0.05 |
| 35° | -0.09 | 0.01 | 0.28 | -0.16 | -0.16 | 0.15 | 0.09 | 0.02 | -0.10 | -0.18 | -0.26 | -0.04 |
| 40° | -0.04 | 0.04 | 0.28 | -0.33 | -0.10 | 0.26 | -0.13 | 0.12 | 0.01 | 0.14 | -0.15 | 0.13 |
| 45° | -0.02 | -0.08 | 0.19 | -0.58 | -0.36 | 0.08 | -0.13 | 0.19 | 0.12 | -0.19 | -0.16 | -0.23 |
| 50° | -0.07 | -0.14 | 0.39 | -0.26 | -0.15 | -0.13 | -0.05 | -0.10 | 0.27 | -0.11 | 0.19 | -0.11 |
| 55° | -0.11 | -0.02 | 0.48 | -0.01 | -0.14 | -0.03 | 0.00 | -0.07 | 0.25 | -0.03 | -0.27 | 0.34 |
| 60° | -0.05 | 0.00 | 0.18 | -0.14 | -0.46 | -0.29 | -0.08 | -0.06 | -0.02 | 0.29 | -0.25 | 0.12 |
| 65° | 0.02 | -0.12 | 0.20 | 0.18 | -0.02 | 0.05 | -0.22 | -0.04 | 0.08 | -0.13 | 0.15 | 0.05 |
| 70° | -0.03 | -0.02 | 0.36 | -0.11 | -0.02 | -0.32 | -0.29 | -0.34 | 0.14 | 0.09 | -0.28 | 0.36 |
| 75° | -0.13 | 0.10 | 0.19 | -0.25 | 0.35 | 0.14 | -0.09 | -0.41 | -0.31 | 0.21 | -0.24 | -0.04 |
| 80° | -0.13 | -0.01 | 0.49 | -0.13 | 0.03 | 0.02 | -0.19 | -0.12 | -0.43 | -0.27 | 0.13 | -0.41 |
| 85° | -0.16 | -0.10 | 0.53 | -0.32 | 0.04 | 0.42 | 0.14 | -0.06 | -0.02 | -0.58 | -0.27 | -0.01 |
| 90° | -0.34 | -0.12 | 0.40 | 0.24 | -0.15 | 0.11 | -0.10 | 0.28 | 0.01 | -0.15 | -0.49 | -0.07 |
| 95° | -0.53 | -0.37 | 0.39 | -0.12 | 0.22 | 0.24 | -0.07 | 0.03 | 0.26 | 0.07 | -0.24 | 0.07 |
| 100° | -0.48 | -0.60 | 0.05 | 0.09 | 0.09 | 0.27 | 0.13 | -0.06 | 0.16 | -0.02 | 0.17 | -0.19 |
| 105° | -0.38 | -0.59 | -0.24 | -0.44 | 0.16 | 0.37 | 0.09 | 0.23 | 0.12 | -0.22 | 0.18 | -0.20 |
| 110° | -0.45 | -0.48 | -0.28 | -0.74 | -0.29 | 0.30 | 0.36 | 0.48 | 0.49 | 0.26 | -0.13 | 0.13 |
| 115° | -0.29 | -0.45 | -0.14 | -0.81 | -0.76 | -0.38 | -0.14 | 0.09 | 0.55 | 0.55 | 0.54 | 0.70 |
| 120° | 0.33 | -0.12 | 0.18 | -0.73 | -0.69 | -0.79 | -0.95 | -0.40 | -0.17 | -0.22 | 0.48 | 0.73 |
| 125° | 0.74 | 0.52 | 0.59 | 0.00 | -0.50 | -0.62 | -0.95 | -1.33 | -1.01 | -0.94 | -0.89 | -0.63 |
| 130° | 0.44 | 0.74 | 1.19 | 0.37 | 0.58 | 0.26 | -0.84 | -0.63 | -0.64 | -1.17 | -1.55 | -1.25 |
| 135° | -0.04 | 0.25 | 1.17 | 0.85 | 0.78 | 1.17 | 0.79 | 0.31 | 0.06 | -0.57 | -0.57 | -0.47 |
| 140° | 0.10 | -0.10 | 0.47 | 0.43 | 0.95 | 1.19 | 1.00 | 1.35 | 1.58 | 1.19 | 0.79 | 0.39 |
| 145° | 0.32 | 0.15 | 0.37 | -0.30 | 0.23 | 0.89 | 0.83 | 0.86 | 1.21 | 1.12 | 1.22 | 1.47 |
| 150° | -0.07 | 0.06 | 0.60 | -0.07 | -0.13 | 0.11 | 0.08 | 0.31 | 0.70 | 0.62 | 0.84 | 0.65 |
| 155° | -0.89 | -0.72 | 0.06 | -0.27 | -0.06 | 0.20 | -0.30 | -0.33 | -0.15 | -0.55 | -0.19 | 0.16 |
| 160° | -1.39 | -1.49 | -0.94 | -1.30 | -0.93 | -0.43 | -0.45 | -0.41 | -0.09 | -0.50 | -0.61 | -0.58 |
| 165° | -1.18 | -1.45 | -1.20 | -1.96 | -1.79 | -1.67 | -1.81 | -1.64 | -1.31 | -1.50 | -1.32 | -1.23 |
| 170° | -0.64 | -0.85 | -0.60 | -1.41 | -1.33 | -1.42 | -2.06 | -2.13 | -2.07 | -2.51 | -2.66 | -2.81 |
| 175° | -0.19 | -0.31 | 0.07 | -0.62 | -0.42 | -0.32 | -0.81 | -0.88 | -0.72 | -1.16 | -1.42 | -1.58 |
| 180° | -0.02 | -0.11 | 0.33 | -0.30 | -0.03 | 0.18 | -0.19 | -0.21 | 0.06 | -0.27 | -0.45 | -0.48 |
| 185° | -0.17 | -0.29 | 0.11 | -0.58 | -0.37 | -0.24 | -0.70 | -0.80 | -0.61 | -0.99 | -1.23 | -1.37 |
| 190° | -0.61 | -0.82 | -0.52 | -1.33 | -1.27 | -1.30 | -1.90 | -2.04 | -1.95 | -2.32 | -2.49 | -2.67 |
| 195° | -1.16 | -1.43 | -1.14 | -1.93 | -1.80 | -1.68 | -1.83 | -1.70 | -1.32 | -1.42 | -1.26 | -1.28 |
| 200° | -1.41 | -1.53 | -0.95 | -1.38 | -1.04 | -0.58 | -0.55 | -0.44 | -0.02 | -0.39 | -0.59 | -0.69 |
| 205° | -0.94 | -0.81 | 0.01 | -0.36 | -0.17 | 0.08 | -0.35 | -0.38 | -0.12 | -0.49 | -0.36 | -0.04 |
| 210° | -0.12 | 0.00 | 0.61 | -0.13 | -0.18 | 0.04 | 0.02 | 0.32 | 0.67 | 0.61 | 0.81 | 0.52 |
| 215° | 0.32 | 0.17 | 0.42 | -0.36 | 0.15 | 0.80 | 0.78 | 0.82 | 1.17 | 1.04 | 1.12 | 1.40 |
| 220° | 0.16 | -0.09 | 0.47 | 0.35 | 0.86 | 1.15 | 0.95 | 1.30 | 1.71 | 1.40 | 1.07 | 0.49 |
| 225° | 0.01 | 0.18 | 1.17 | 0.79 | 0.78 | 1.24 | 0.89 | 0.50 | 0.31 | -0.35 | -0.58 | -0.51 |
| 230° | 0.43 | 0.71 | 1.23 | 0.35 | 0.55 | 0.35 | -0.76 | -0.71 | -0.61 | -1.10 | -1.61 | -1.49 |
| 235° | 0.74 | 0.56 | 0.65 | 0.00 | -0.48 | -0.58 | -0.96 | -1.42 | -1.05 | -1.06 | -1.09 | -0.91 |
| 240° | 0.36 | -0.07 | 0.22 | -0.71 | -0.86 | -0.71 | -1.06 | -0.56 | -0.14 | -0.14 | 0.19 | 0.48 |
| 245° | -0.27 | -0.42 | -0.09 | -0.93 | -0.89 | -0.38 | -0.07 | -0.01 | 0.59 | 0.54 | 0.28 | 0.44 |
| 250° | -0.41 | -0.48 | -0.31 | -0.79 | -0.47 | 0.39 | 0.29 | 0.40 | 0.61 | 0.18 | -0.18 | 0.16 |
| 255° | -0.34 | -0.62 | -0.25 | -0.51 | 0.09 | 0.39 | 0.08 | 0.16 | 0.28 | -0.17 | 0.29 | -0.05 |
| 260° | -0.44 | -0.68 | 0.09 | 0.09 | 0.02 | 0.36 | 0.06 | -0.01 | 0.34 | 0.10 | 0.14 | -0.23 |
| 265° | -0.55 | -0.35 | 0.48 | -0.13 | 0.15 | 0.27 | -0.04 | 0.13 | 0.41 | 0.09 | -0.36 | 0.13 |
| 270° | -0.32 | -0.08 | 0.44 | 0.14 | -0.23 | 0.30 | -0.04 | 0.25 | 0.10 | -0.15 | -0.42 | -0.04 |
| 275° | -0.09 | -0.06 | 0.53 | -0.36 | 0.03 | 0.56 | 0.01 | -0.09 | 0.15 | -0.53 | -0.25 | 0.02 |
| 280° | -0.06 | 0.00 | 0.46 | -0.15 | 0.07 | 0.11 | -0.25 | -0.05 | -0.28 | -0.27 | 0.19 | -0.27 |
| 285° | -0.09 | 0.06 | 0.19 | -0.17 | 0.35 | 0.11 | -0.02 | -0.33 | -0.26 | 0.26 | -0.09 | 0.11 |
| 290° | -0.02 | -0.04 | 0.42 | -0.06 | -0.07 | -0.24 | -0.26 | -0.42 | 0.26 | 0.22 | -0.28 | 0.45 |
| 295° | 0.01 | -0.11 | 0.31 | 0.22 | -0.08 | 0.19 | -0.31 | -0.07 | 0.33 | -0.10 | 0.08 | 0.12 |
| 300° | -0.09 | 0.06 | 0.31 | -0.18 | -0.50 | -0.17 | -0.12 | 0.11 | 0.18 | 0.28 | -0.28 | 0.12 |
| 305° | -0.11 | 0.05 | 0.52 | -0.04 | -0.17 | 0.01 | 0.04 | 0.09 | 0.28 | -0.02 | -0.34 | 0.34 |
| 310° | -0.05 | -0.06 | 0.40 | -0.27 | -0.13 | -0.15 | 0.10 | -0.13 | 0.27 | 0.00 | 0.01 | 0.00 |
| 315° | 0.01 | 0.00 | 0.20 | -0.61 | -0.34 | 0.06 | -0.09 | 0.13 | 0.23 | -0.16 | -0.28 | -0.06 |
| 320° | 0.00 | 0.08 | 0.26 | -0.33 | -0.10 | 0.34 | -0.20 | 0.10 | 0.12 | 0.06 | -0.14 | 0.23 |
| 325° | -0.05 | 0.04 | 0.25 | -0.13 | -0.16 | 0.25 | -0.02 | 0.04 | 0.01 | -0.20 | -0.23 | -0.02 |
| 330° | -0.04 | -0.05 | 0.02 | -0.27 | -0.36 | 0.30 | 0.05 | 0.07 | 0.17 | -0.26 | 0.06 | -0.01 |
| 335° | 0.01 | -0.09 | -0.16 | -0.40 | -0.30 | 0.35 | -0.05 | -0.03 | 0.16 | -0.18 | 0.16 | 0.13 |
| 340° | 0.04 | -0.07 | -0.19 | -0.27 | -0.10 | 0.24 | -0.09 | -0.13 | 0.02 | -0.24 | -0.05 | 0.07 |
| 345° | 0.05 | -0.03 | -0.13 | -0.11 | 0.02 | 0.10 | -0.02 | -0.10 | -0.06 | -0.22 | -0.18 | 0.01 |
| 350° | 0.04 | -0.02 | -0.07 | -0.02 | 0.02 | 0.03 | 0.03 | -0.03 | -0.06 | -0.11 | -0.16 | 0.01 |
| 355° | 0.03 | -0.02 | -0.03 | 0.01 | 0.00 | 0.00 | 0.02 | 0.02 | -0.03 | 0.00 | -0.10 | 0.03 |

Table A.17 Influence of the analyzer's body on the directional response, measured in a plane parallel to the display and along the microphone's axis, 11200 Hz – 20000 Hz

| Angle | Frequency | | | | | | | | | | |
|-------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | 11200 Hz | 11800 Hz | 12500 Hz | 13200 Hz | 14000 Hz | 15000 Hz | 16000 Hz | 17000 Hz | 18000 Hz | 19000 Hz | 20000 Hz |
| 0° | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5° | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | -0.03 | 0.01 | -0.02 | 0.01 | 0.02 | -0.01 |
| 10° | 0.02 | -0.01 | -0.03 | 0.00 | 0.06 | -0.07 | 0.01 | -0.07 | 0.07 | 0.07 | 0.05 |
| 15° | 0.05 | 0.01 | -0.04 | 0.04 | 0.02 | -0.05 | -0.14 | -0.06 | 0.19 | 0.10 | 0.09 |
| 20° | 0.09 | -0.03 | -0.04 | 0.16 | -0.04 | 0.05 | -0.28 | 0.03 | 0.27 | 0.07 | 0.01 |
| 25° | 0.22 | -0.09 | -0.13 | 0.08 | 0.05 | 0.14 | -0.13 | -0.10 | 0.29 | 0.11 | -0.07 |
| 30° | 0.25 | 0.01 | 0.02 | -0.08 | -0.18 | 0.48 | -0.30 | -0.21 | 0.22 | 0.08 | -0.23 |
| 35° | 0.13 | -0.10 | -0.10 | -0.11 | 0.06 | 0.42 | -0.14 | -0.52 | 0.23 | 0.37 | -0.13 |
| 40° | 0.27 | 0.33 | -0.09 | -0.09 | -0.17 | 0.32 | 0.07 | -0.25 | 0.12 | 0.24 | -0.04 |
| 45° | 0.01 | 0.10 | -0.26 | -0.05 | -0.31 | 0.36 | 0.19 | -0.06 | -0.28 | 0.09 | 0.17 |
| 50° | 0.01 | 0.05 | 0.16 | -0.10 | -0.22 | 0.29 | -0.10 | 0.12 | 0.02 | 0.01 | 0.10 |
| 55° | -0.06 | 0.23 | 0.14 | 0.08 | -0.13 | 0.12 | -0.02 | 0.22 | 0.08 | -0.19 | 0.01 |
| 60° | -0.04 | -0.02 | -0.25 | 0.13 | -0.25 | 0.32 | -0.06 | -0.06 | 0.11 | 0.38 | -0.06 |
| 65° | 0.23 | -0.30 | -0.07 | -0.43 | 0.08 | 0.16 | -0.16 | 0.10 | -0.07 | 0.17 | 0.31 |
| 70° | 0.32 | -0.06 | -0.04 | -0.37 | -0.25 | 0.29 | 0.03 | -0.24 | 0.17 | 0.23 | 0.00 |
| 75° | 0.51 | 0.06 | 0.11 | -0.24 | -0.21 | 0.05 | -0.06 | -0.06 | 0.21 | 0.00 | 0.10 |
| 80° | 0.29 | 0.30 | 0.10 | -0.10 | -0.19 | 0.35 | -0.39 | -0.30 | 0.35 | -0.03 | -0.04 |
| 85° | -0.28 | 0.36 | 0.08 | 0.12 | -0.25 | 0.57 | -0.23 | -0.11 | -0.24 | 0.52 | 0.29 |
| 90° | -0.25 | 0.05 | 0.20 | -0.14 | 0.17 | 0.28 | 0.32 | -0.14 | 0.51 | -0.11 | 0.18 |
| 95° | -0.24 | -0.36 | 0.18 | -0.14 | -0.22 | 0.56 | 0.11 | 0.16 | -0.02 | 0.23 | 0.10 |
| 100° | 0.41 | -0.33 | -0.21 | -0.22 | -0.11 | 0.23 | 0.32 | -0.13 | 0.47 | 0.32 | 0.11 |
| 105° | 0.18 | -0.01 | 0.34 | -0.43 | -0.41 | 0.30 | -0.06 | -0.21 | 0.20 | 0.18 | 0.60 |
| 110° | 0.15 | -0.37 | 0.07 | 0.11 | -0.04 | 0.35 | -0.30 | -0.22 | 0.10 | 0.05 | 0.07 |
| 115° | 0.35 | 0.26 | -0.14 | -0.48 | -0.24 | 0.61 | -0.25 | 0.10 | 0.06 | 0.08 | -0.06 |
| 120° | 0.80 | 1.16 | 0.61 | 0.38 | 0.01 | 0.25 | -0.68 | 0.11 | -0.03 | 0.21 | 0.24 |
| 125° | 0.39 | 0.53 | 0.29 | 1.16 | 1.16 | 1.48 | 0.23 | 0.25 | 0.08 | -0.25 | -0.39 |
| 130° | -1.01 | -1.69 | -0.99 | -0.08 | -0.39 | 1.00 | 0.91 | 1.47 | 2.00 | 0.90 | 1.39 |
| 135° | -0.86 | -1.37 | -0.79 | -1.60 | -3.02 | -1.43 | -1.08 | -1.13 | 0.37 | 0.76 | 1.55 |
| 140° | 0.59 | 0.38 | 0.23 | -0.74 | -1.17 | 0.07 | -0.81 | -2.52 | -2.77 | -2.90 | -2.99 |
| 145° | 1.88 | 1.55 | 1.31 | 1.21 | 1.11 | 1.58 | 0.26 | -0.10 | 0.65 | 0.62 | -0.24 |
| 150° | 0.81 | 0.91 | 1.34 | 1.56 | 1.53 | 2.00 | 1.32 | 1.37 | 2.07 | 1.85 | 1.35 |
| 155° | 0.42 | 0.43 | 0.30 | 0.15 | 0.02 | 0.75 | 0.70 | 0.82 | 1.27 | 1.15 | 1.06 |
| 160° | -0.26 | -0.32 | -0.40 | -0.52 | -0.61 | 0.12 | -0.01 | 0.04 | -0.01 | -0.48 | -0.54 |
| 165° | -0.83 | -0.53 | -0.47 | -0.42 | -0.73 | -0.37 | -0.90 | -1.04 | -0.85 | -0.99 | -0.86 |
| 170° | -2.70 | -2.62 | -2.59 | -2.40 | -2.27 | -1.57 | -1.38 | -1.12 | -0.67 | -0.68 | -0.84 |
| 175° | -1.56 | -1.91 | -2.29 | -2.73 | -3.21 | -3.12 | -3.46 | -3.58 | -3.54 | -3.55 | -3.79 |
| 180° | -0.33 | -0.56 | -0.86 | -1.12 | -1.53 | -1.40 | -1.78 | -1.97 | -2.11 | -2.40 | -2.79 |
| 185° | -1.37 | -1.72 | -2.10 | -2.53 | -2.94 | -2.87 | -3.19 | -3.49 | -3.53 | -3.60 | -4.06 |
| 190° | -2.66 | -2.64 | -2.74 | -2.60 | -2.35 | -1.75 | -1.52 | -1.52 | -0.98 | -0.71 | -0.87 |
| 195° | -0.99 | -0.67 | -0.74 | -0.51 | -0.73 | -0.56 | -1.06 | -1.45 | -1.29 | -1.39 | -1.70 |
| 200° | -0.48 | -0.58 | -0.74 | -0.74 | -0.93 | -0.42 | -0.43 | -0.27 | -0.22 | -0.36 | -1.03 |
| 205° | 0.29 | 0.36 | 0.10 | 0.07 | -0.16 | 0.30 | 0.23 | 0.37 | 0.81 | 1.10 | 1.07 |
| 210° | 0.61 | 0.73 | 0.90 | 1.34 | 1.42 | 1.74 | 1.47 | 1.44 | 1.97 | 1.90 | 1.73 |
| 215° | 1.75 | 1.73 | 1.27 | 1.28 | 1.10 | 1.40 | 0.78 | -0.42 | 0.04 | 0.30 | -0.09 |
| 220° | 0.45 | 0.51 | 0.17 | -0.77 | -1.38 | -0.52 | -0.69 | -2.72 | -2.78 | -2.70 | -3.80 |
| 225° | -1.06 | -1.48 | -1.28 | -1.66 | -2.89 | -2.02 | -1.14 | -1.49 | 0.11 | 0.41 | 0.81 |
| 230° | -1.22 | -1.80 | -1.43 | -0.15 | -0.33 | 0.51 | 1.13 | 0.71 | 1.84 | 1.03 | 1.61 |
| 235° | 0.20 | 0.44 | 0.14 | 0.86 | 0.91 | 1.17 | 0.44 | 0.14 | 0.51 | -0.43 | -0.53 |
| 240° | 0.56 | 0.87 | 0.41 | 0.44 | 0.14 | 0.31 | -0.64 | -0.41 | -0.29 | -0.12 | 0.40 |
| 245° | 0.19 | 0.25 | 0.07 | -0.20 | -0.33 | 0.29 | -0.31 | -0.13 | 0.22 | -0.15 | -0.17 |
| 250° | 0.23 | -0.20 | 0.03 | 0.02 | -0.10 | 0.23 | -0.35 | -0.39 | -0.05 | -0.37 | 0.07 |
| 255° | 0.21 | 0.00 | 0.15 | -0.26 | -0.42 | 0.14 | -0.24 | -0.53 | 0.36 | 0.20 | 0.51 |
| 260° | 0.28 | -0.22 | -0.26 | -0.24 | -0.44 | -0.01 | 0.38 | -0.20 | 0.31 | 0.20 | 0.03 |
| 265° | -0.29 | -0.25 | -0.02 | -0.10 | -0.28 | 0.56 | 0.12 | -0.25 | 0.04 | 0.23 | 0.25 |
| 270° | -0.22 | 0.07 | 0.07 | -0.01 | 0.11 | 0.17 | 0.44 | -0.29 | 0.50 | -0.27 | 0.23 |
| 275° | -0.18 | 0.39 | 0.03 | 0.13 | -0.33 | 0.39 | -0.11 | -0.35 | -0.11 | 0.37 | 0.37 |
| 280° | 0.38 | 0.26 | -0.08 | -0.01 | -0.34 | 0.46 | -0.59 | -0.35 | 0.29 | -0.10 | -0.09 |
| 285° | 0.49 | -0.03 | 0.01 | -0.22 | -0.16 | -0.05 | -0.05 | -0.27 | 0.29 | -0.16 | 0.25 |
| 290° | 0.25 | -0.07 | -0.15 | -0.17 | -0.40 | 0.36 | 0.01 | -0.31 | 0.21 | 0.21 | -0.05 |
| 295° | 0.14 | -0.29 | 0.00 | -0.37 | 0.00 | 0.21 | -0.05 | -0.17 | 0.03 | 0.22 | 0.49 |
| 300° | -0.10 | 0.08 | -0.18 | 0.07 | -0.17 | 0.32 | -0.18 | -0.03 | 0.15 | 0.42 | -0.05 |
| 305° | 0.04 | 0.28 | 0.00 | 0.31 | -0.24 | 0.24 | -0.10 | 0.19 | 0.14 | -0.09 | 0.11 |
| 310° | 0.08 | -0.12 | 0.13 | 0.01 | -0.20 | 0.35 | -0.22 | 0.10 | 0.14 | -0.04 | 0.12 |
| 315° | -0.03 | 0.00 | -0.13 | -0.04 | -0.21 | 0.46 | 0.03 | -0.07 | -0.26 | 0.19 | 0.29 |
| 320° | 0.08 | 0.42 | -0.11 | 0.04 | -0.19 | 0.40 | 0.06 | -0.25 | 0.10 | 0.18 | 0.04 |
| 325° | 0.01 | 0.03 | -0.24 | 0.02 | 0.00 | 0.49 | -0.14 | -0.56 | 0.34 | 0.38 | -0.02 |
| 330° | 0.23 | 0.04 | 0.01 | -0.02 | -0.13 | 0.49 | -0.25 | -0.29 | 0.23 | 0.10 | -0.12 |
| 335° | 0.30 | -0.13 | -0.09 | 0.05 | 0.09 | 0.18 | -0.13 | -0.08 | 0.22 | 0.08 | 0.00 |
| 340° | 0.17 | -0.09 | 0.05 | 0.17 | 0.02 | 0.10 | -0.27 | 0.07 | 0.27 | 0.04 | 0.06 |
| 345° | 0.13 | -0.04 | 0.00 | 0.06 | 0.02 | 0.03 | -0.15 | -0.02 | 0.22 | 0.09 | 0.13 |
| 350° | 0.07 | -0.05 | -0.04 | 0.02 | 0.05 | -0.03 | 0.00 | -0.08 | 0.11 | 0.06 | 0.08 |
| 355° | 0.03 | -0.04 | -0.01 | 0.00 | 0.00 | 0.03 | 0.00 | -0.03 | 0.04 | 0.01 | 0.00 |

Table A.18 Influence of the analyzer's body on the directional response, measured in a plane perpendicular to the display and along the microphone's axis, 500 Hz – 3550 Hz

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 500 Hz | 630 Hz | 800 Hz | 1000 Hz | 1250 Hz | 1600 Hz | 2000 Hz | 2240 Hz | 2500 Hz | 2800 Hz | 3150 Hz | 3550 Hz |
| 0° | -0.01 | -0.01 | -0.01 | 0.00 | 0.00 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 |
| 5° | 0.01 | 0.01 | -0.01 | 0.02 | 0.00 | 0.00 | -0.01 | -0.01 | 0.00 | 0.00 | 0.00 | -0.02 |
| 10° | 0.00 | 0.00 | 0.00 | 0.02 | -0.01 | 0.00 | -0.03 | 0.00 | -0.02 | 0.01 | 0.00 | -0.04 |
| 15° | 0.00 | -0.01 | 0.00 | 0.03 | -0.02 | 0.01 | -0.04 | 0.02 | -0.04 | 0.02 | -0.03 | -0.04 |
| 20° | 0.01 | 0.00 | 0.00 | 0.03 | -0.04 | 0.01 | -0.07 | 0.03 | -0.07 | 0.04 | -0.07 | -0.02 |
| 25° | 0.00 | -0.01 | 0.00 | 0.06 | -0.05 | 0.00 | -0.10 | 0.04 | -0.09 | 0.06 | -0.12 | 0.03 |
| 30° | -0.01 | -0.01 | -0.01 | 0.08 | -0.05 | -0.01 | -0.14 | 0.04 | -0.10 | 0.07 | -0.18 | 0.11 |
| 35° | -0.02 | -0.01 | -0.01 | 0.09 | -0.04 | -0.05 | -0.17 | 0.02 | -0.07 | 0.04 | -0.21 | 0.18 |
| 40° | 0.01 | 0.03 | 0.00 | 0.10 | -0.01 | -0.11 | -0.18 | -0.04 | -0.01 | -0.02 | -0.18 | 0.19 |
| 45° | 0.01 | 0.04 | 0.02 | 0.10 | 0.03 | -0.21 | -0.14 | -0.12 | 0.04 | -0.08 | -0.13 | 0.09 |
| 50° | 0.02 | 0.08 | 0.05 | 0.09 | 0.08 | -0.30 | -0.09 | -0.18 | 0.03 | -0.07 | -0.13 | -0.04 |
| 55° | 0.00 | 0.08 | 0.10 | 0.11 | 0.12 | -0.35 | -0.05 | -0.17 | -0.08 | 0.01 | -0.21 | -0.06 |
| 60° | -0.01 | 0.09 | 0.15 | 0.11 | 0.14 | -0.35 | -0.08 | -0.10 | -0.23 | 0.09 | -0.26 | 0.01 |
| 65° | -0.04 | 0.08 | 0.19 | 0.15 | 0.14 | -0.28 | -0.18 | -0.03 | -0.28 | 0.03 | -0.16 | -0.03 |
| 70° | -0.04 | 0.07 | 0.24 | 0.21 | 0.13 | -0.17 | -0.33 | -0.06 | -0.17 | -0.17 | -0.04 | -0.14 |
| 75° | -0.06 | 0.05 | 0.27 | 0.27 | 0.12 | -0.07 | -0.44 | -0.22 | -0.05 | -0.27 | -0.09 | -0.05 |
| 80° | -0.08 | 0.03 | 0.28 | 0.36 | 0.14 | -0.01 | -0.41 | -0.42 | -0.10 | -0.16 | -0.32 | 0.09 |
| 85° | -0.10 | 0.00 | 0.28 | 0.44 | 0.19 | 0.00 | -0.26 | -0.50 | -0.35 | -0.07 | -0.35 | -0.04 |
| 90° | -0.13 | -0.04 | 0.25 | 0.51 | 0.30 | -0.03 | -0.07 | -0.35 | -0.56 | -0.26 | -0.19 | -0.25 |
| 95° | -0.17 | -0.09 | 0.19 | 0.54 | 0.44 | -0.03 | 0.02 | -0.10 | -0.45 | -0.57 | -0.28 | -0.12 |
| 100° | -0.20 | -0.15 | 0.12 | 0.53 | 0.57 | 0.05 | 0.01 | 0.05 | -0.11 | -0.52 | -0.69 | -0.06 |
| 105° | -0.21 | -0.19 | 0.03 | 0.46 | 0.64 | 0.19 | -0.01 | 0.03 | 0.11 | -0.10 | -0.75 | -0.50 |
| 110° | -0.23 | -0.22 | -0.06 | 0.37 | 0.64 | 0.37 | 0.07 | 0.00 | 0.06 | 0.19 | -0.22 | -0.62 |
| 115° | -0.23 | -0.25 | -0.14 | 0.23 | 0.56 | 0.47 | 0.28 | 0.12 | -0.04 | 0.10 | 0.18 | 0.00 |
| 120° | -0.25 | -0.28 | -0.20 | 0.07 | 0.40 | 0.44 | 0.49 | 0.40 | 0.12 | -0.04 | 0.06 | 0.39 |
| 125° | -0.24 | -0.29 | -0.26 | -0.06 | 0.21 | 0.28 | 0.56 | 0.63 | 0.49 | 0.20 | -0.09 | 0.20 |
| 130° | -0.24 | -0.29 | -0.28 | -0.16 | 0.01 | 0.01 | 0.42 | 0.65 | 0.75 | 0.65 | 0.22 | 0.16 |
| 135° | -0.23 | -0.28 | -0.28 | -0.22 | -0.13 | -0.29 | 0.07 | 0.37 | 0.66 | 0.83 | 0.70 | 0.66 |
| 140° | -0.23 | -0.27 | -0.26 | -0.21 | -0.21 | -0.53 | -0.36 | -0.12 | 0.19 | 0.52 | 0.72 | 1.03 |
| 145° | -0.23 | -0.25 | -0.23 | -0.19 | -0.20 | -0.64 | -0.70 | -0.62 | -0.45 | -0.19 | 0.12 | 0.70 |
| 150° | -0.20 | -0.22 | -0.18 | -0.13 | -0.14 | -0.61 | -0.84 | -0.90 | -0.94 | -0.90 | -0.79 | -0.26 |
| 155° | -0.18 | -0.18 | -0.13 | -0.06 | -0.04 | -0.48 | -0.77 | -0.88 | -1.05 | -1.21 | -1.44 | -1.22 |
| 160° | -0.18 | -0.17 | -0.08 | 0.03 | 0.06 | -0.32 | -0.57 | -0.66 | -0.83 | -1.03 | -1.44 | -1.46 |
| 165° | -0.15 | -0.14 | -0.04 | 0.08 | 0.15 | -0.15 | -0.35 | -0.38 | -0.50 | -0.63 | -1.00 | -1.04 |
| 170° | -0.15 | -0.12 | -0.01 | 0.12 | 0.23 | -0.03 | -0.16 | -0.14 | -0.18 | -0.24 | -0.53 | -0.45 |
| 175° | -0.14 | -0.12 | 0.00 | 0.17 | 0.27 | 0.04 | -0.03 | 0.02 | 0.01 | 0.02 | -0.19 | -0.05 |
| 180° | -0.16 | -0.13 | 0.01 | 0.17 | 0.29 | 0.06 | 0.01 | 0.08 | 0.09 | 0.11 | -0.07 | 0.12 |
| 185° | -0.15 | -0.12 | 0.00 | 0.18 | 0.28 | 0.04 | -0.02 | 0.04 | 0.05 | 0.05 | -0.14 | 0.02 |
| 190° | -0.15 | -0.13 | -0.02 | 0.15 | 0.24 | -0.04 | -0.13 | -0.09 | -0.13 | -0.18 | -0.42 | -0.32 |
| 195° | -0.15 | -0.14 | -0.04 | 0.11 | 0.17 | -0.16 | -0.30 | -0.31 | -0.42 | -0.54 | -0.87 | -0.87 |
| 200° | -0.18 | -0.17 | -0.08 | 0.03 | 0.08 | -0.32 | -0.51 | -0.58 | -0.77 | -0.94 | -1.34 | -1.37 |
| 205° | -0.18 | -0.19 | -0.12 | -0.02 | -0.01 | -0.49 | -0.71 | -0.82 | -1.03 | -1.18 | -1.48 | -1.32 |
| 210° | -0.21 | -0.23 | -0.17 | -0.10 | -0.11 | -0.63 | -0.81 | -0.88 | -1.01 | -0.99 | -0.98 | -0.51 |
| 215° | -0.22 | -0.25 | -0.21 | -0.16 | -0.18 | -0.68 | -0.72 | -0.68 | -0.61 | -0.36 | -0.10 | 0.47 |
| 220° | -0.24 | -0.28 | -0.25 | -0.19 | -0.20 | -0.60 | -0.43 | -0.26 | 0.00 | 0.33 | 0.56 | 0.92 |
| 225° | -0.25 | -0.30 | -0.27 | -0.19 | -0.16 | -0.39 | -0.04 | 0.22 | 0.49 | 0.70 | 0.66 | 0.69 |
| 230° | -0.26 | -0.30 | -0.27 | -0.15 | -0.04 | -0.10 | 0.30 | 0.52 | 0.66 | 0.61 | 0.28 | 0.21 |
| 235° | -0.27 | -0.31 | -0.24 | -0.07 | 0.13 | 0.18 | 0.48 | 0.56 | 0.48 | 0.26 | -0.07 | 0.20 |
| 240° | -0.26 | -0.28 | -0.19 | 0.06 | 0.31 | 0.36 | 0.44 | 0.38 | 0.18 | 0.03 | 0.05 | 0.45 |
| 245° | -0.26 | -0.27 | -0.13 | 0.20 | 0.45 | 0.41 | 0.27 | 0.16 | 0.03 | 0.13 | 0.20 | 0.17 |
| 250° | -0.24 | -0.23 | -0.06 | 0.33 | 0.53 | 0.34 | 0.10 | 0.08 | 0.10 | 0.22 | -0.12 | -0.53 |
| 255° | -0.23 | -0.19 | 0.03 | 0.43 | 0.55 | 0.20 | 0.05 | 0.13 | 0.12 | -0.05 | -0.70 | -0.60 |
| 260° | -0.19 | -0.13 | 0.11 | 0.47 | 0.49 | 0.07 | 0.09 | 0.12 | -0.08 | -0.51 | -0.76 | -0.13 |
| 265° | -0.17 | -0.08 | 0.18 | 0.49 | 0.40 | 0.02 | 0.08 | -0.03 | -0.44 | -0.63 | -0.35 | -0.06 |
| 270° | -0.14 | -0.04 | 0.23 | 0.46 | 0.29 | 0.04 | -0.02 | -0.31 | -0.61 | -0.32 | -0.19 | -0.24 |
| 275° | -0.11 | 0.00 | 0.25 | 0.38 | 0.22 | 0.07 | -0.22 | -0.51 | -0.42 | -0.07 | -0.35 | -0.09 |
| 280° | -0.09 | 0.03 | 0.26 | 0.32 | 0.18 | 0.06 | -0.39 | -0.48 | -0.14 | -0.14 | -0.36 | 0.13 |
| 285° | -0.07 | 0.04 | 0.25 | 0.24 | 0.18 | -0.01 | -0.44 | -0.29 | -0.05 | -0.25 | -0.14 | 0.02 |
| 290° | -0.04 | 0.08 | 0.22 | 0.17 | 0.19 | -0.13 | -0.36 | -0.10 | -0.17 | -0.17 | -0.03 | -0.11 |
| 295° | -0.03 | 0.08 | 0.18 | 0.13 | 0.20 | -0.25 | -0.21 | -0.05 | -0.27 | 0.03 | -0.15 | 0.03 |
| 300° | -0.01 | 0.09 | 0.13 | 0.10 | 0.19 | -0.32 | -0.09 | -0.12 | -0.20 | 0.10 | -0.25 | 0.16 |
| 305° | 0.01 | 0.08 | 0.09 | 0.09 | 0.16 | -0.33 | -0.06 | -0.19 | -0.03 | 0.01 | -0.16 | 0.11 |
| 310° | 0.01 | 0.07 | 0.05 | 0.10 | 0.11 | -0.28 | -0.10 | -0.20 | 0.09 | -0.12 | -0.01 | 0.00 |
| 315° | 0.01 | 0.05 | 0.01 | 0.11 | 0.04 | -0.20 | -0.16 | -0.12 | 0.10 | -0.12 | 0.03 | -0.02 |
| 320° | 0.02 | 0.04 | -0.01 | 0.10 | -0.02 | -0.11 | -0.20 | -0.02 | 0.03 | -0.03 | -0.02 | 0.01 |
| 325° | 0.01 | 0.01 | -0.01 | 0.11 | -0.05 | -0.03 | -0.19 | 0.04 | -0.05 | 0.07 | -0.10 | 0.05 |
| 330° | 0.01 | 0.00 | -0.01 | 0.08 | -0.07 | 0.00 | -0.16 | 0.08 | -0.09 | 0.12 | -0.13 | 0.03 |
| 335° | 0.00 | 0.00 | 0.00 | 0.04 | -0.06 | 0.02 | -0.12 | 0.08 | -0.10 | 0.13 | -0.14 | 0.02 |
| 340° | 0.00 | -0.01 | 0.00 | 0.03 | -0.05 | 0.02 | -0.07 | 0.06 | -0.08 | 0.11 | -0.10 | 0.01 |
| 345° | -0.01 | -0.01 | 0.00 | 0.00 | -0.03 | 0.02 | -0.04 | 0.04 | -0.04 | 0.08 | -0.07 | 0.01 |
| 350° | 0.00 | 0.00 | 0.01 | -0.01 | -0.02 | 0.01 | -0.02 | 0.02 | -0.02 | 0.06 | -0.03 | 0.01 |
| 355° | 0.00 | 0.00 | 0.00 | -0.01 | 0.00 | 0.00 | -0.01 | 0.00 | 0.01 | 0.03 | -0.02 | 0.00 |

Table A.19 Influence of the analyzer's body on the directional response, measured in a plane perpendicular to the display and along the microphone's axis, 4000 Hz – 10600 Hz

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|
| | 4000 Hz | 4500 Hz | 5000 Hz | 5600 Hz | 6300 Hz | 7100 Hz | 8000 Hz | 8500 Hz | 9000 Hz | 9500 Hz | 10000 Hz | 10600 Hz |
| 0° | -0.01 | -0.01 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 |
| 5° | 0.02 | 0.00 | -0.02 | -0.03 | -0.04 | 0.00 | -0.02 | -0.03 | 0.04 | -0.01 | -0.01 | 0.05 |
| 10° | 0.03 | 0.02 | -0.01 | -0.06 | -0.09 | 0.05 | -0.04 | -0.03 | 0.15 | -0.05 | 0.02 | 0.11 |
| 15° | 0.06 | 0.02 | -0.01 | -0.13 | -0.17 | 0.12 | -0.04 | 0.01 | 0.26 | -0.19 | 0.05 | 0.13 |
| 20° | 0.08 | 0.03 | 0.02 | -0.14 | -0.25 | 0.14 | 0.09 | 0.08 | 0.25 | -0.39 | 0.06 | 0.05 |
| 25° | 0.06 | 0.03 | 0.11 | -0.08 | -0.21 | 0.08 | 0.26 | 0.00 | -0.01 | -0.44 | 0.10 | -0.06 |
| 30° | 0.03 | 0.04 | 0.22 | 0.01 | -0.02 | 0.09 | 0.19 | -0.15 | -0.12 | -0.06 | 0.04 | 0.08 |
| 35° | -0.04 | 0.08 | 0.27 | -0.07 | 0.04 | 0.29 | -0.13 | 0.15 | 0.02 | 0.01 | -0.45 | 0.13 |
| 40° | -0.06 | 0.11 | 0.24 | -0.33 | -0.23 | 0.24 | 0.02 | 0.30 | -0.23 | -0.26 | -0.19 | 0.23 |
| 45° | -0.01 | 0.10 | 0.27 | -0.33 | -0.25 | -0.04 | 0.02 | -0.08 | 0.12 | -0.19 | 0.09 | -0.18 |
| 50° | -0.13 | 0.02 | 0.39 | -0.02 | -0.01 | 0.17 | 0.00 | 0.08 | 0.14 | -0.35 | -0.08 | 0.14 |
| 55° | 0.19 | -0.07 | 0.42 | -0.07 | -0.37 | -0.09 | 0.30 | -0.16 | 0.01 | 0.11 | -0.36 | 0.26 |
| 60° | 0.08 | 0.02 | 0.32 | -0.09 | -0.33 | -0.11 | 0.00 | 0.19 | -0.01 | -0.28 | 0.02 | 0.28 |
| 65° | -0.04 | 0.18 | 0.31 | 0.16 | 0.01 | 0.08 | 0.21 | -0.15 | 0.04 | 0.02 | -0.33 | 0.26 |
| 70° | 0.02 | 0.08 | 0.33 | -0.06 | -0.14 | -0.26 | -0.21 | 0.05 | -0.17 | -0.05 | -0.12 | 0.06 |
| 75° | -0.03 | -0.05 | 0.48 | -0.12 | 0.32 | 0.19 | 0.15 | -0.40 | 0.01 | -0.27 | -0.11 | 0.18 |
| 80° | -0.16 | 0.02 | 0.48 | -0.05 | 0.07 | -0.09 | 0.00 | -0.07 | -0.56 | 0.02 | -0.38 | 0.05 |
| 85° | -0.03 | -0.10 | 0.36 | -0.07 | 0.05 | 0.41 | 0.11 | 0.20 | -0.33 | -0.55 | 0.01 | -0.28 |
| 90° | 0.01 | -0.18 | 0.40 | -0.04 | 0.03 | 0.24 | 0.10 | 0.03 | 0.26 | -0.61 | -0.38 | 0.10 |
| 95° | -0.26 | -0.04 | 0.19 | -0.09 | -0.10 | 0.32 | -0.03 | 0.24 | -0.09 | 0.00 | -0.23 | -0.04 |
| 100° | -0.25 | -0.29 | 0.29 | -0.12 | 0.00 | 0.24 | 0.33 | 0.06 | 0.12 | 0.00 | -0.03 | 0.29 |
| 105° | -0.10 | -0.37 | 0.12 | -0.25 | -0.10 | 0.13 | 0.00 | 0.30 | 0.29 | -0.12 | 0.09 | 0.21 |
| 110° | -0.52 | -0.24 | -0.13 | -0.35 | -0.11 | 0.27 | 0.03 | -0.13 | 0.02 | -0.04 | 0.31 | 0.12 |
| 115° | -0.64 | -0.69 | 0.03 | -0.64 | -0.37 | -0.02 | 0.02 | 0.19 | -0.05 | -0.36 | -0.13 | 0.44 |
| 120° | 0.15 | -0.64 | -0.34 | -0.57 | -0.60 | -0.17 | -0.30 | -0.29 | -0.05 | 0.00 | -0.18 | -0.01 |
| 125° | 0.45 | 0.25 | 0.00 | -0.93 | -0.57 | -0.37 | -0.49 | -0.47 | -0.45 | -0.75 | -0.25 | 0.11 |
| 130° | 0.12 | 0.32 | 0.85 | -0.10 | -0.69 | -0.21 | -0.65 | -0.79 | -0.94 | -1.03 | -0.89 | -0.28 |
| 135° | 0.27 | 0.01 | 0.66 | 0.44 | 0.48 | 0.13 | -0.35 | -0.47 | -0.54 | -1.19 | -1.46 | -0.96 |
| 140° | 0.92 | 0.53 | 0.57 | -0.06 | 0.28 | 1.03 | 0.49 | 0.21 | 0.00 | -0.34 | -0.45 | -0.66 |
| 145° | 1.04 | 1.02 | 1.25 | 0.41 | 0.14 | 0.36 | 0.55 | 0.56 | 0.77 | 0.62 | 0.80 | 0.73 |
| 150° | 0.23 | 0.55 | 1.27 | 0.96 | 1.05 | 1.03 | 0.41 | 0.21 | 0.10 | -0.15 | 0.37 | 0.79 |
| 155° | -1.04 | -0.79 | 0.07 | 0.09 | 0.70 | 1.40 | 1.22 | 1.12 | 1.11 | 0.53 | 0.45 | 0.54 |
| 160° | -1.72 | -1.93 | -1.43 | -1.81 | -1.27 | -0.34 | 0.14 | 0.35 | 0.81 | 0.61 | 0.73 | 1.05 |
| 165° | -1.37 | -1.78 | -1.64 | -2.60 | -2.70 | -2.65 | -2.67 | -2.59 | -2.24 | -2.30 | -2.02 | -1.68 |
| 170° | -0.66 | -0.98 | -0.77 | -1.68 | -1.76 | -1.99 | -2.66 | -3.01 | -3.24 | -3.81 | -4.18 | -4.79 |
| 175° | -0.12 | -0.33 | 0.02 | -0.70 | -0.57 | -0.45 | -0.82 | -1.01 | -1.01 | -1.41 | -1.61 | -1.77 |
| 180° | 0.08 | -0.07 | 0.33 | -0.30 | -0.09 | 0.17 | -0.04 | -0.15 | -0.02 | -0.30 | -0.40 | -0.33 |
| 185° | -0.04 | -0.23 | 0.14 | -0.55 | -0.39 | -0.22 | -0.54 | -0.73 | -0.68 | -1.02 | -1.21 | -1.20 |
| 190° | -0.50 | -0.78 | -0.54 | -1.39 | -1.44 | -1.58 | -2.22 | -2.59 | -2.78 | -3.33 | -3.62 | -3.92 |
| 195° | -1.17 | -1.56 | -1.43 | -2.40 | -2.58 | -2.81 | -3.12 | -3.22 | -2.94 | -3.07 | -2.67 | -2.51 |
| 200° | -1.66 | -1.94 | -1.54 | -2.08 | -1.83 | -1.04 | -0.45 | -0.18 | 0.38 | 0.33 | 0.55 | 0.76 |
| 205° | -1.25 | -1.12 | -0.24 | -0.34 | 0.15 | 1.09 | 1.13 | 1.12 | 1.22 | 0.78 | 0.66 | 0.66 |
| 210° | -0.07 | 0.24 | 1.09 | 0.71 | 0.86 | 1.17 | 0.51 | 0.26 | 0.08 | -0.21 | 0.16 | 0.33 |
| 215° | 0.85 | 0.89 | 1.27 | 0.37 | 0.27 | 0.20 | 0.35 | 0.56 | 1.03 | 1.01 | 1.07 | 1.18 |
| 220° | 0.92 | 0.56 | 0.64 | -0.15 | 0.14 | 1.04 | 1.11 | 0.97 | 0.58 | -0.25 | -0.44 | -0.58 |
| 225° | 0.36 | 0.03 | 0.59 | 0.38 | 0.60 | 0.81 | -0.35 | -0.79 | -0.65 | -0.97 | -1.17 | -1.07 |
| 230° | 0.14 | 0.32 | 0.98 | 0.09 | -0.38 | -0.62 | -0.56 | -0.67 | -0.98 | -1.33 | -1.17 | -0.58 |
| 235° | 0.50 | 0.44 | 0.27 | -0.96 | -0.96 | -0.20 | -0.71 | -0.85 | -0.42 | -0.73 | -0.78 | -0.33 |
| 240° | 0.34 | -0.42 | -0.50 | -0.77 | -0.66 | -0.52 | -0.11 | -0.21 | -0.33 | -0.29 | -0.65 | -0.41 |
| 245° | -0.49 | -0.86 | 0.01 | -0.79 | -0.68 | 0.22 | -0.16 | -0.18 | -0.14 | -0.43 | -0.03 | 0.04 |
| 250° | -0.64 | -0.30 | -0.08 | -0.60 | -0.23 | 0.05 | 0.00 | -0.04 | 0.37 | -0.33 | -0.44 | 0.20 |
| 255° | -0.14 | -0.34 | -0.10 | -0.27 | -0.36 | 0.22 | 0.14 | 0.09 | -0.16 | -0.07 | 0.09 | 0.39 |
| 260° | -0.14 | -0.47 | 0.37 | -0.29 | -0.23 | 0.27 | 0.00 | 0.07 | 0.20 | 0.07 | -0.06 | -0.18 |
| 265° | -0.31 | -0.03 | 0.16 | -0.23 | -0.12 | 0.09 | 0.19 | 0.18 | 0.22 | -0.39 | -0.43 | 0.08 |
| 270° | -0.02 | -0.14 | 0.29 | -0.08 | -0.38 | 0.49 | 0.15 | -0.01 | 0.00 | -0.54 | -0.31 | -0.33 |
| 275° | 0.08 | -0.25 | 0.48 | -0.28 | 0.01 | 0.47 | -0.08 | 0.04 | -0.16 | -0.61 | -0.60 | 0.23 |
| 280° | -0.15 | 0.06 | 0.38 | -0.33 | 0.11 | 0.11 | 0.02 | 0.00 | -0.61 | -0.38 | -0.14 | 0.03 |
| 285° | -0.05 | 0.08 | 0.25 | 0.01 | 0.19 | 0.06 | 0.21 | -0.55 | -0.13 | -0.35 | -0.12 | 0.05 |
| 290° | 0.11 | -0.03 | 0.29 | -0.07 | -0.15 | -0.03 | -0.36 | -0.18 | -0.27 | -0.02 | -0.36 | 0.05 |
| 295° | 0.08 | -0.03 | 0.45 | 0.05 | -0.14 | 0.12 | 0.05 | -0.34 | 0.19 | -0.20 | -0.44 | 0.30 |
| 300° | -0.01 | 0.01 | 0.38 | -0.10 | -0.31 | -0.09 | -0.18 | 0.19 | -0.11 | -0.15 | -0.18 | 0.23 |
| 305° | 0.01 | 0.12 | 0.36 | -0.21 | -0.30 | 0.06 | 0.20 | -0.15 | 0.05 | -0.14 | -0.45 | 0.09 |
| 310° | 0.04 | 0.17 | 0.37 | -0.14 | -0.21 | 0.11 | 0.10 | 0.00 | -0.04 | -0.26 | -0.15 | 0.15 |
| 315° | 0.07 | 0.10 | 0.33 | -0.31 | -0.29 | -0.15 | -0.06 | -0.22 | 0.25 | -0.29 | -0.25 | -0.07 |
| 320° | 0.14 | 0.04 | 0.22 | -0.34 | -0.17 | 0.34 | -0.08 | 0.11 | -0.11 | -0.20 | -0.35 | 0.22 |
| 325° | 0.18 | 0.03 | 0.19 | -0.21 | -0.08 | 0.41 | -0.24 | 0.16 | 0.03 | -0.22 | -0.30 | 0.07 |
| 330° | 0.18 | 0.07 | 0.16 | -0.11 | -0.24 | 0.16 | 0.05 | -0.13 | 0.06 | -0.25 | -0.01 | 0.08 |
| 335° | 0.13 | 0.09 | 0.12 | -0.07 | -0.31 | 0.15 | 0.20 | -0.03 | -0.01 | -0.32 | -0.05 | -0.14 |
| 340° | 0.08 | 0.08 | 0.07 | -0.03 | -0.22 | 0.20 | 0.10 | 0.11 | 0.00 | -0.17 | -0.05 | 0.06 |
| 345° | 0.05 | 0.07 | 0.03 | 0.02 | -0.10 | 0.15 | -0.01 | 0.13 | 0.02 | -0.06 | -0.04 | 0.18 |
| 350° | 0.03 | 0.02 | 0.00 | 0.04 | -0.02 | 0.07 | -0.02 | 0.11 | 0.00 | 0.00 | -0.07 | 0.11 |
| 355° | 0.02 | 0.00 | -0.01 | 0.04 | 0.01 | 0.02 | 0.01 | 0.07 | -0.01 | 0.04 | -0.08 | 0.05 |

Table A.20 Influence of the analyzer's body on the directional response, measured in a plane perpendicular to the display and along the microphone's axis, 11200 Hz – 20000 Hz

| Angle | Frequency | | | | | | | | | | |
|-------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | 11200 Hz | 11800 Hz | 12500 Hz | 13200 Hz | 14000 Hz | 15000 Hz | 16000 Hz | 17000 Hz | 18000 Hz | 19000 Hz | 20000 Hz |
| 0° | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.01 | -0.02 | -0.02 | -0.03 |
| 5° | 0.01 | 0.00 | 0.04 | 0.00 | 0.02 | -0.06 | 0.00 | -0.03 | -0.01 | 0.05 | -0.01 |
| 10° | 0.05 | 0.02 | 0.03 | 0.03 | 0.07 | -0.13 | 0.02 | -0.05 | 0.09 | 0.14 | 0.06 |
| 15° | 0.08 | 0.05 | 0.02 | 0.08 | 0.10 | -0.09 | -0.15 | 0.03 | 0.22 | 0.10 | 0.05 |
| 20° | 0.08 | 0.01 | 0.01 | 0.14 | -0.03 | 0.03 | -0.30 | 0.17 | 0.21 | 0.04 | 0.00 |
| 25° | 0.11 | -0.21 | -0.11 | 0.15 | -0.05 | -0.03 | -0.12 | -0.03 | 0.29 | 0.04 | -0.12 |
| 30° | 0.28 | -0.18 | -0.02 | -0.03 | -0.13 | 0.42 | -0.43 | -0.09 | 0.21 | 0.02 | -0.17 |
| 35° | 0.03 | -0.10 | -0.03 | -0.09 | 0.01 | 0.23 | -0.23 | -0.47 | 0.35 | 0.20 | -0.11 |
| 40° | 0.06 | 0.14 | -0.33 | -0.10 | -0.12 | 0.26 | -0.05 | -0.32 | 0.27 | 0.19 | -0.03 |
| 45° | 0.03 | -0.05 | -0.21 | 0.12 | -0.17 | 0.30 | -0.04 | -0.11 | -0.16 | 0.09 | 0.21 |
| 50° | 0.04 | -0.01 | 0.15 | -0.11 | -0.16 | 0.13 | -0.24 | 0.14 | 0.04 | 0.00 | 0.16 |
| 55° | -0.31 | -0.17 | -0.31 | -0.14 | -0.22 | 0.09 | -0.11 | 0.22 | 0.05 | -0.32 | 0.01 |
| 60° | 0.11 | -0.24 | -0.37 | -0.13 | -0.20 | 0.26 | -0.14 | -0.07 | 0.09 | 0.21 | -0.10 |
| 65° | 0.31 | -0.15 | -0.10 | -0.41 | 0.09 | 0.25 | -0.33 | 0.04 | -0.03 | 0.10 | 0.21 |
| 70° | 0.28 | -0.07 | 0.00 | -0.38 | -0.08 | 0.30 | -0.03 | -0.39 | 0.20 | 0.24 | 0.02 |
| 75° | 0.10 | -0.03 | 0.08 | -0.18 | -0.20 | 0.09 | -0.19 | -0.11 | 0.08 | -0.05 | 0.01 |
| 80° | 0.37 | -0.26 | 0.13 | -0.02 | -0.16 | 0.09 | -0.61 | -0.30 | 0.31 | -0.17 | 0.12 |
| 85° | 0.20 | 0.16 | -0.30 | 0.25 | -0.18 | 0.14 | -0.90 | -0.45 | -0.14 | 0.51 | 0.42 |
| 90° | -0.13 | -0.05 | -0.05 | -0.15 | 0.07 | -0.10 | -0.51 | -0.44 | 0.38 | -0.24 | -0.09 |
| 95° | -0.08 | -0.25 | -0.45 | -0.13 | -0.19 | 0.20 | -0.35 | 0.27 | 0.21 | -0.17 | -0.75 |
| 100° | -0.10 | -0.29 | -0.65 | -0.33 | -0.37 | 0.24 | 0.36 | -0.01 | 0.16 | -0.26 | -0.42 |
| 105° | 0.04 | 0.04 | -0.37 | -0.57 | -0.46 | 0.28 | -0.33 | -0.29 | 0.16 | -0.07 | 0.26 |
| 110° | 0.14 | -0.10 | -0.13 | 0.05 | -0.44 | -0.01 | -0.79 | -0.40 | 0.13 | 0.15 | 0.17 |
| 115° | 0.59 | 0.07 | -0.14 | 0.07 | -0.13 | 0.36 | -0.99 | -0.11 | -0.01 | 0.04 | -0.78 |
| 120° | 0.29 | 0.30 | 0.49 | 0.50 | -0.26 | 0.18 | -0.71 | 0.51 | 0.22 | -0.32 | -1.16 |
| 125° | 0.20 | -0.13 | -0.12 | 0.28 | 0.04 | 0.82 | -0.46 | 0.18 | 0.42 | -0.50 | -0.16 |
| 130° | -0.17 | -0.57 | -0.29 | -0.22 | -0.66 | 0.41 | -0.49 | 0.27 | 1.23 | -0.47 | 0.83 |
| 135° | -0.59 | -0.69 | -0.41 | -1.05 | -1.19 | -0.08 | -0.75 | -0.88 | 0.53 | -0.19 | 0.00 |
| 140° | -0.54 | -1.11 | -1.22 | -1.43 | -0.90 | 0.06 | -1.10 | -1.76 | -0.36 | -0.80 | -1.90 |
| 145° | 0.45 | -0.26 | -0.50 | -0.31 | -0.52 | -0.56 | -2.34 | -1.62 | 0.11 | -0.44 | -1.47 |
| 150° | 1.11 | 0.98 | 1.14 | 0.99 | 0.29 | -0.03 | -0.74 | 0.05 | 0.81 | -0.69 | -1.89 |
| 155° | 0.35 | 0.08 | 0.08 | 0.50 | 0.76 | 1.43 | 1.11 | 1.35 | 1.12 | -0.32 | -0.23 |
| 160° | 1.30 | 1.09 | 1.09 | 0.93 | 0.24 | 0.04 | -0.28 | 0.45 | 0.94 | 0.27 | 1.30 |
| 165° | -0.99 | -0.52 | 0.02 | 0.56 | 0.45 | 0.68 | 0.43 | 1.00 | 0.98 | -0.19 | 0.19 |
| 170° | -5.21 | -5.41 | -5.60 | -5.24 | -5.04 | -4.40 | -3.86 | -2.70 | -1.94 | -2.30 | -1.35 |
| 175° | -2.07 | -2.52 | -2.91 | -3.44 | -4.22 | -4.88 | -5.33 | -5.62 | -6.07 | -7.44 | -6.64 |
| 180° | -0.39 | -0.64 | -0.79 | -1.02 | -1.49 | -1.76 | -1.99 | -1.81 | -1.97 | -2.95 | -2.45 |
| 185° | -1.40 | -1.77 | -2.09 | -2.51 | -3.07 | -3.57 | -3.94 | -4.09 | -4.36 | -5.63 | -5.61 |
| 190° | -4.51 | -5.07 | -5.77 | -5.95 | -6.35 | -6.27 | -5.99 | -5.14 | -4.33 | -4.33 | -3.38 |
| 195° | -2.04 | -1.64 | -1.15 | -0.38 | -0.27 | -0.06 | -0.21 | 0.37 | 0.72 | -0.49 | -0.43 |
| 200° | 0.99 | 0.90 | 0.86 | 0.92 | 0.42 | -0.11 | -0.84 | -0.45 | -0.37 | -1.01 | -0.57 |
| 205° | 0.37 | -0.13 | -0.70 | -0.38 | -0.15 | 0.51 | 0.41 | 1.17 | 1.55 | 0.25 | -0.15 |
| 210° | 0.75 | 0.83 | 0.96 | 1.32 | 1.03 | 0.49 | -0.37 | 0.04 | 1.28 | 0.54 | -0.56 |
| 215° | 0.89 | 0.23 | -0.55 | -0.30 | -0.19 | -0.13 | -1.58 | -3.02 | -1.16 | -0.29 | -1.22 |
| 220° | -0.51 | -0.69 | -1.37 | -2.14 | -1.77 | -0.42 | -0.82 | -3.30 | -1.37 | -0.08 | -2.45 |
| 225° | -1.12 | -0.99 | -1.08 | -1.47 | -1.80 | -0.42 | 0.00 | -1.59 | -0.64 | -0.01 | -0.74 |
| 230° | -0.41 | -1.03 | -0.75 | -0.04 | -1.09 | -0.60 | 0.50 | -0.47 | 0.65 | -0.05 | -0.39 |
| 235° | 0.13 | -0.57 | -0.75 | 0.37 | 0.00 | -0.14 | -0.21 | -0.95 | 0.91 | -0.38 | -0.64 |
| 240° | 0.19 | 0.29 | -0.39 | 0.16 | -0.30 | -0.01 | -0.44 | -0.87 | 0.23 | -0.88 | -1.00 |
| 245° | -0.28 | 0.05 | -0.33 | 0.34 | -0.13 | 0.09 | -1.22 | -0.91 | 0.31 | -0.31 | -1.09 |
| 250° | 0.04 | 0.18 | -0.31 | -0.12 | -0.64 | 0.32 | -0.86 | -1.33 | -0.25 | -0.37 | -0.51 |
| 255° | -0.14 | -0.15 | -0.58 | -0.29 | -0.70 | -0.03 | -0.52 | -1.04 | -0.31 | 0.05 | -0.60 |
| 260° | 0.00 | -0.15 | -0.71 | -0.87 | -0.68 | -0.01 | -0.25 | -0.52 | -0.44 | -0.31 | -0.86 |
| 265° | 0.04 | -0.72 | -0.34 | -0.62 | -0.87 | 0.26 | -0.46 | -0.52 | 0.01 | 0.03 | -0.94 |
| 270° | 0.13 | -0.27 | -0.28 | -0.49 | -0.20 | -0.48 | -0.27 | -1.01 | 0.17 | -0.52 | -0.13 |
| 275° | -0.02 | -0.13 | -0.30 | -0.22 | -0.44 | -0.11 | -0.85 | -1.14 | -0.65 | -0.15 | -0.14 |
| 280° | 0.14 | -0.14 | -0.47 | -0.12 | -0.61 | 0.06 | -1.21 | -0.67 | 0.01 | -0.30 | -0.11 |
| 285° | 0.12 | -0.32 | -0.17 | -0.48 | -0.41 | -0.46 | -0.31 | -0.52 | 0.06 | -0.27 | -0.29 |
| 290° | 0.14 | -0.20 | -0.37 | -0.50 | -0.65 | 0.04 | -0.34 | -0.59 | -0.02 | -0.12 | -0.57 |
| 295° | 0.13 | -0.34 | -0.37 | -0.77 | -0.26 | 0.09 | -0.43 | -0.53 | -0.37 | -0.15 | 0.03 |
| 300° | -0.16 | -0.44 | -0.71 | -0.40 | -0.24 | 0.14 | -0.59 | -0.39 | -0.15 | -0.01 | -0.56 |
| 305° | -0.31 | -0.30 | -0.48 | 0.11 | -0.29 | 0.08 | -0.37 | -0.20 | -0.20 | -0.38 | -0.27 |
| 310° | 0.04 | -0.18 | -0.01 | -0.06 | -0.25 | 0.07 | -0.67 | -0.14 | 0.00 | -0.17 | -0.11 |
| 315° | -0.19 | -0.43 | -0.36 | -0.19 | -0.38 | 0.04 | -0.35 | -0.28 | -0.25 | -0.06 | -0.05 |
| 320° | -0.20 | 0.23 | -0.28 | -0.03 | -0.33 | 0.15 | -0.24 | -0.57 | -0.01 | -0.05 | -0.23 |
| 325° | -0.22 | -0.15 | -0.33 | -0.03 | -0.25 | 0.11 | -0.33 | -0.56 | 0.22 | 0.14 | -0.22 |
| 330° | 0.28 | -0.05 | -0.02 | -0.12 | -0.24 | 0.24 | -0.58 | -0.40 | 0.01 | -0.18 | -0.24 |
| 335° | 0.06 | -0.41 | -0.14 | -0.08 | -0.12 | 0.02 | -0.16 | -0.13 | 0.15 | -0.09 | -0.22 |
| 340° | 0.20 | -0.13 | 0.12 | 0.16 | -0.13 | -0.05 | -0.40 | 0.07 | 0.16 | -0.06 | -0.05 |
| 345° | 0.28 | 0.01 | 0.03 | 0.08 | -0.01 | -0.07 | -0.26 | -0.02 | 0.11 | -0.05 | 0.00 |
| 350° | 0.16 | -0.04 | -0.09 | 0.01 | 0.07 | -0.04 | 0.02 | -0.14 | 0.15 | 0.05 | 0.09 |
| 355° | 0.05 | -0.05 | -0.04 | -0.01 | 0.03 | 0.04 | 0.04 | -0.05 | 0.08 | 0.04 | 0.03 |

Table A.21 Directional response for Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer, measured in a plane parallel to the display and along the microphone's axis, 500 Hz – 3550 Hz, in dB

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 500 Hz | 630 Hz | 800 Hz | 1000 Hz | 1250 Hz | 1600 Hz | 2000 Hz | 2240 Hz | 2500 Hz | 2800 Hz | 3150 Hz | 3550 Hz |
| 0° | -0.01 | -0.01 | -0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5° | 0.00 | 0.00 | -0.01 | 0.00 | -0.01 | 0.00 | -0.01 | 0.00 | -0.01 | 0.00 | -0.01 | -0.01 |
| 10° | 0.01 | 0.00 | -0.01 | 0.01 | -0.02 | 0.00 | -0.02 | 0.00 | -0.03 | 0.00 | -0.04 | -0.01 |
| 15° | 0.02 | 0.00 | -0.01 | 0.03 | -0.04 | -0.01 | -0.05 | 0.01 | -0.06 | 0.01 | -0.08 | -0.02 |
| 20° | 0.02 | 0.01 | -0.01 | 0.03 | -0.05 | -0.01 | -0.09 | 0.02 | -0.11 | 0.00 | -0.15 | -0.03 |
| 25° | 0.02 | 0.01 | -0.01 | 0.04 | -0.08 | -0.03 | -0.14 | 0.02 | -0.14 | -0.02 | -0.22 | -0.05 |
| 30° | 0.03 | 0.03 | -0.02 | 0.07 | -0.09 | -0.06 | -0.18 | 0.00 | -0.15 | -0.06 | -0.28 | -0.08 |
| 35° | 0.02 | 0.03 | -0.02 | 0.08 | -0.08 | -0.12 | -0.21 | -0.06 | -0.13 | -0.15 | -0.31 | -0.14 |
| 40° | 0.04 | 0.05 | -0.02 | 0.09 | -0.06 | -0.20 | -0.22 | -0.15 | -0.08 | -0.26 | -0.32 | -0.24 |
| 45° | 0.04 | 0.08 | -0.01 | 0.08 | -0.03 | -0.31 | -0.19 | -0.25 | -0.06 | -0.35 | -0.36 | -0.33 |
| 50° | 0.03 | 0.08 | 0.01 | 0.08 | 0.02 | -0.41 | -0.15 | -0.32 | -0.11 | -0.38 | -0.44 | -0.39 |
| 55° | 0.01 | 0.08 | 0.05 | 0.07 | 0.06 | -0.47 | -0.14 | -0.32 | -0.27 | -0.33 | -0.57 | -0.45 |
| 60° | 0.00 | 0.09 | 0.08 | 0.07 | 0.09 | -0.47 | -0.21 | -0.25 | -0.44 | -0.31 | -0.68 | -0.53 |
| 65° | -0.04 | 0.07 | 0.11 | 0.08 | 0.09 | -0.41 | -0.37 | -0.20 | -0.51 | -0.43 | -0.70 | -0.65 |
| 70° | -0.05 | 0.05 | 0.14 | 0.12 | 0.07 | -0.31 | -0.57 | -0.26 | -0.42 | -0.66 | -0.69 | -0.74 |
| 75° | -0.08 | 0.02 | 0.15 | 0.17 | 0.05 | -0.22 | -0.69 | -0.47 | -0.32 | -0.78 | -0.84 | -0.79 |
| 80° | -0.09 | 0.00 | 0.16 | 0.22 | 0.03 | -0.16 | -0.66 | -0.71 | -0.39 | -0.68 | -1.08 | -0.87 |
| 85° | -0.11 | -0.03 | 0.15 | 0.27 | 0.05 | -0.16 | -0.48 | -0.79 | -0.66 | -0.61 | -1.13 | -1.11 |
| 90° | -0.16 | -0.09 | 0.12 | 0.32 | 0.10 | -0.20 | -0.29 | -0.62 | -0.89 | -0.78 | -0.99 | -1.32 |
| 95° | -0.18 | -0.13 | 0.08 | 0.34 | 0.18 | -0.25 | -0.19 | -0.35 | -0.79 | -1.08 | -1.04 | -1.24 |
| 100° | -0.22 | -0.19 | 0.01 | 0.32 | 0.26 | -0.25 | -0.22 | -0.18 | -0.42 | -1.07 | -1.33 | -1.19 |
| 105° | -0.25 | -0.24 | -0.06 | 0.28 | 0.32 | -0.18 | -0.31 | -0.21 | -0.15 | -0.65 | -1.38 | -1.39 |
| 110° | -0.26 | -0.28 | -0.15 | 0.19 | 0.32 | -0.09 | -0.35 | -0.35 | -0.18 | -0.28 | -0.93 | -1.39 |
| 115° | -0.27 | -0.31 | -0.24 | 0.08 | 0.27 | -0.03 | -0.26 | -0.41 | -0.39 | -0.29 | -0.50 | -0.89 |
| 120° | -0.27 | -0.32 | -0.31 | -0.05 | 0.15 | -0.05 | -0.12 | -0.30 | -0.50 | -0.57 | -0.54 | -0.47 |
| 125° | -0.28 | -0.34 | -0.36 | -0.16 | 0.00 | -0.18 | -0.05 | -0.13 | -0.36 | -0.70 | -0.88 | -0.62 |
| 130° | -0.28 | -0.34 | -0.38 | -0.25 | -0.15 | -0.39 | -0.14 | -0.07 | -0.16 | -0.54 | -0.99 | -1.05 |
| 135° | -0.26 | -0.32 | -0.38 | -0.30 | -0.27 | -0.61 | -0.40 | -0.24 | -0.14 | -0.36 | -0.75 | -1.06 |
| 140° | -0.24 | -0.30 | -0.36 | -0.31 | -0.32 | -0.77 | -0.73 | -0.58 | -0.41 | -0.46 | -0.62 | -0.77 |
| 145° | -0.23 | -0.27 | -0.32 | -0.28 | -0.31 | -0.84 | -0.99 | -0.95 | -0.85 | -0.88 | -0.92 | -0.81 |
| 150° | -0.20 | -0.24 | -0.28 | -0.23 | -0.26 | -0.78 | -1.09 | -1.16 | -1.21 | -1.36 | -1.49 | -1.32 |
| 155° | -0.19 | -0.21 | -0.23 | -0.16 | -0.16 | -0.65 | -1.00 | -1.12 | -1.29 | -1.58 | -1.92 | -1.92 |
| 160° | -0.17 | -0.17 | -0.19 | -0.09 | -0.06 | -0.48 | -0.79 | -0.90 | -1.09 | -1.43 | -1.89 | -2.07 |
| 165° | -0.16 | -0.15 | -0.14 | -0.03 | 0.03 | -0.33 | -0.56 | -0.62 | -0.76 | -1.06 | -1.51 | -1.71 |
| 170° | -0.14 | -0.13 | -0.11 | 0.02 | 0.10 | -0.21 | -0.37 | -0.38 | -0.46 | -0.69 | -1.06 | -1.19 |
| 175° | -0.14 | -0.13 | -0.10 | 0.05 | 0.14 | -0.13 | -0.24 | -0.22 | -0.26 | -0.43 | -0.74 | -0.81 |
| 180° | -0.12 | -0.11 | -0.09 | 0.06 | 0.16 | -0.10 | -0.19 | -0.16 | -0.19 | -0.34 | -0.62 | -0.66 |
| 185° | -0.14 | -0.13 | -0.10 | 0.05 | 0.15 | -0.13 | -0.23 | -0.20 | -0.25 | -0.42 | -0.72 | -0.79 |
| 190° | -0.15 | -0.13 | -0.12 | 0.02 | 0.10 | -0.21 | -0.34 | -0.35 | -0.43 | -0.65 | -1.01 | -1.16 |
| 195° | -0.16 | -0.16 | -0.15 | -0.02 | 0.03 | -0.33 | -0.52 | -0.58 | -0.72 | -1.01 | -1.45 | -1.68 |
| 200° | -0.19 | -0.19 | -0.19 | -0.07 | -0.07 | -0.48 | -0.74 | -0.85 | -1.04 | -1.37 | -1.85 | -2.07 |
| 205° | -0.19 | -0.21 | -0.23 | -0.13 | -0.17 | -0.64 | -0.94 | -1.08 | -1.25 | -1.54 | -1.93 | -1.97 |
| 210° | -0.21 | -0.24 | -0.27 | -0.20 | -0.27 | -0.76 | -1.03 | -1.13 | -1.20 | -1.35 | -1.55 | -1.38 |
| 215° | -0.22 | -0.27 | -0.32 | -0.25 | -0.34 | -0.81 | -0.96 | -0.95 | -0.86 | -0.90 | -0.98 | -0.84 |
| 220° | -0.24 | -0.29 | -0.35 | -0.28 | -0.35 | -0.74 | -0.72 | -0.59 | -0.43 | -0.49 | -0.65 | -0.75 |
| 225° | -0.27 | -0.32 | -0.37 | -0.28 | -0.30 | -0.57 | -0.40 | -0.24 | -0.15 | -0.37 | -0.72 | -1.02 |
| 230° | -0.27 | -0.34 | -0.36 | -0.22 | -0.19 | -0.34 | -0.15 | -0.06 | -0.16 | -0.53 | -0.96 | -1.06 |
| 235° | -0.30 | -0.35 | -0.33 | -0.14 | -0.03 | -0.14 | -0.05 | -0.11 | -0.36 | -0.70 | -0.90 | -0.66 |
| 240° | -0.29 | -0.33 | -0.28 | -0.04 | 0.13 | 0.00 | -0.12 | -0.29 | -0.52 | -0.59 | -0.59 | -0.47 |
| 245° | -0.27 | -0.30 | -0.21 | 0.07 | 0.25 | 0.02 | -0.27 | -0.42 | -0.43 | -0.33 | -0.52 | -0.86 |
| 250° | -0.27 | -0.27 | -0.13 | 0.18 | 0.32 | -0.05 | -0.37 | -0.37 | -0.22 | -0.30 | -0.91 | -1.39 |
| 255° | -0.23 | -0.21 | -0.04 | 0.26 | 0.33 | -0.16 | -0.35 | -0.24 | -0.17 | -0.63 | -1.37 | -1.41 |
| 260° | -0.21 | -0.16 | 0.04 | 0.31 | 0.28 | -0.24 | -0.26 | -0.19 | -0.40 | -1.05 | -1.33 | -1.20 |
| 265° | -0.18 | -0.11 | 0.09 | 0.32 | 0.20 | -0.26 | -0.21 | -0.33 | -0.76 | -1.09 | -1.05 | -1.21 |
| 270° | -0.14 | -0.05 | 0.13 | 0.30 | 0.12 | -0.23 | -0.28 | -0.59 | -0.90 | -0.78 | -0.99 | -1.30 |
| 275° | -0.10 | -0.01 | 0.15 | 0.26 | 0.07 | -0.19 | -0.46 | -0.78 | -0.69 | -0.60 | -1.13 | -1.13 |
| 280° | -0.09 | 0.01 | 0.16 | 0.21 | 0.04 | -0.18 | -0.63 | -0.73 | -0.40 | -0.67 | -1.09 | -0.85 |
| 285° | -0.07 | 0.04 | 0.15 | 0.17 | 0.05 | -0.23 | -0.68 | -0.50 | -0.30 | -0.78 | -0.84 | -0.79 |
| 290° | -0.04 | 0.07 | 0.13 | 0.12 | 0.07 | -0.32 | -0.58 | -0.29 | -0.40 | -0.67 | -0.67 | -0.78 |
| 295° | -0.01 | 0.09 | 0.11 | 0.09 | 0.08 | -0.41 | -0.39 | -0.21 | -0.50 | -0.43 | -0.68 | -0.68 |
| 300° | 0.01 | 0.10 | 0.07 | 0.07 | 0.08 | -0.47 | -0.23 | -0.26 | -0.43 | -0.29 | -0.70 | -0.54 |
| 305° | 0.01 | 0.08 | 0.05 | 0.07 | 0.06 | -0.47 | -0.16 | -0.32 | -0.24 | -0.32 | -0.60 | -0.44 |
| 310° | 0.03 | 0.08 | 0.01 | 0.08 | 0.02 | -0.41 | -0.17 | -0.33 | -0.08 | -0.38 | -0.45 | -0.41 |
| 315° | 0.05 | 0.08 | -0.01 | 0.09 | -0.03 | -0.30 | -0.21 | -0.26 | -0.02 | -0.38 | -0.34 | -0.36 |
| 320° | 0.05 | 0.06 | -0.02 | 0.09 | -0.07 | -0.20 | -0.23 | -0.14 | -0.05 | -0.28 | -0.31 | -0.24 |
| 325° | 0.03 | 0.03 | -0.02 | 0.08 | -0.09 | -0.11 | -0.23 | -0.04 | -0.11 | -0.16 | -0.31 | -0.12 |
| 330° | 0.03 | 0.02 | -0.01 | 0.07 | -0.09 | -0.06 | -0.19 | 0.03 | -0.15 | -0.06 | -0.30 | -0.05 |
| 335° | 0.03 | 0.02 | -0.01 | 0.06 | -0.08 | -0.02 | -0.14 | 0.05 | -0.15 | -0.06 | -0.24 | -0.02 |
| 340° | 0.02 | 0.02 | 0.00 | 0.04 | -0.06 | -0.01 | -0.09 | 0.04 | -0.12 | 0.01 | -0.17 | -0.01 |
| 345° | 0.01 | 0.00 | 0.00 | 0.02 | -0.04 | 0.00 | -0.05 | 0.03 | -0.08 | 0.01 | -0.10 | -0.01 |
| 350° | 0.02 | 0.01 | 0.00 | 0.01 | -0.02 | 0.00 | -0.02 | 0.02 | -0.04 | 0.01 | -0.04 | 0.00 |
| 355° | 0.02 | 0.02 | 0.00 | 0.00 | -0.01 | 0.00 | 0.00 | 0.01 | -0.01 | 0.01 | -0.01 | 0.00 |

Table A.22 Directional response for Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer, measured in a plane parallel to the display and along the microphone's axis, 4000 Hz – 10600 Hz, in dB

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|
| | 4000 Hz | 4500 Hz | 5000 Hz | 5600 Hz | 6300 Hz | 7100 Hz | 8000 Hz | 8500 Hz | 9000 Hz | 9500 Hz | 10000 Hz | 10600 Hz |
| 0° | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 | 0.00 | 0.00 |
| 5° | 0.00 | -0.01 | -0.02 | -0.02 | 0.00 | -0.02 | -0.02 | -0.03 | -0.04 | -0.06 | -0.06 | -0.02 |
| 10° | 0.00 | -0.04 | -0.07 | -0.07 | 0.00 | -0.06 | -0.06 | -0.10 | -0.16 | -0.20 | -0.19 | -0.07 |
| 15° | -0.02 | -0.10 | -0.18 | -0.19 | -0.05 | -0.07 | -0.17 | -0.22 | -0.33 | -0.39 | -0.33 | -0.12 |
| 20° | -0.07 | -0.20 | -0.29 | -0.40 | -0.21 | -0.07 | -0.32 | -0.35 | -0.41 | -0.53 | -0.37 | -0.17 |
| 25° | -0.14 | -0.30 | -0.33 | -0.58 | -0.48 | -0.14 | -0.38 | -0.40 | -0.42 | -0.64 | -0.33 | -0.26 |
| 30° | -0.23 | -0.36 | -0.22 | -0.57 | -0.66 | -0.36 | -0.35 | -0.48 | -0.62 | -0.95 | -0.60 | -0.68 |
| 35° | -0.29 | -0.36 | -0.13 | -0.49 | -0.61 | -0.54 | -0.48 | -0.70 | -0.96 | -1.20 | -1.04 | -1.07 |
| 40° | -0.31 | -0.42 | -0.29 | -0.70 | -0.73 | -0.59 | -0.83 | -0.82 | -1.02 | -1.16 | -1.26 | -1.14 |
| 45° | -0.37 | -0.60 | -0.55 | -1.05 | -1.15 | -0.91 | -0.99 | -0.91 | -1.20 | -1.65 | -1.72 | -1.74 |
| 50° | -0.51 | -0.72 | -0.50 | -0.91 | -1.08 | -1.29 | -1.18 | -1.29 | -1.40 | -1.76 | -1.70 | -2.07 |
| 55° | -0.66 | -0.69 | -0.49 | -0.91 | -1.17 | -1.37 | -1.47 | -1.44 | -1.61 | -2.05 | -2.27 | -2.21 |
| 60° | -0.70 | -0.79 | -0.87 | -1.28 | -1.63 | -1.81 | -1.85 | -1.78 | -2.01 | -2.12 | -2.48 | -2.73 |
| 65° | -0.71 | -1.06 | -0.94 | -1.10 | -1.46 | -1.64 | -2.17 | -2.11 | -2.21 | -2.75 | -2.49 | -2.97 |
| 70° | -0.84 | -1.11 | -0.93 | -1.45 | -1.80 | -2.18 | -2.42 | -2.58 | -2.60 | -2.86 | -3.16 | -3.04 |
| 75° | -1.00 | -1.10 | -1.31 | -1.64 | -1.68 | -1.97 | -2.53 | -2.80 | -3.21 | -3.28 | -3.45 | -3.68 |
| 80° | -1.06 | -1.26 | -1.22 | -1.64 | -2.10 | -2.40 | -2.93 | -2.88 | -3.37 | -3.93 | -3.73 | -4.26 |
| 85° | -1.16 | -1.39 | -1.31 | -2.07 | -2.16 | -2.27 | -2.80 | -3.29 | -3.33 | -4.15 | -4.39 | -4.41 |
| 90° | -1.40 | -1.46 | -1.51 | -1.72 | -2.47 | -2.78 | -3.20 | -3.20 | -3.85 | -4.04 | -4.55 | -4.82 |
| 95° | -1.65 | -1.77 | -1.53 | -2.22 | -2.30 | -2.81 | -3.38 | -3.56 | -3.88 | -4.34 | -4.67 | -4.84 |
| 100° | -1.65 | -2.06 | -1.92 | -2.06 | -2.60 | -2.92 | -3.44 | -3.86 | -4.09 | -4.67 | -4.77 | -5.46 |
| 105° | -1.60 | -2.10 | -2.25 | -2.61 | -2.63 | -2.96 | -3.66 | -3.81 | -4.36 | -5.03 | -5.01 | -5.75 |
| 110° | -1.69 | -2.03 | -2.35 | -2.93 | -3.13 | -3.13 | -3.48 | -3.70 | -4.23 | -4.79 | -5.53 | -5.71 |
| 115° | -1.57 | -2.02 | -2.24 | -3.01 | -3.61 | -3.86 | -4.05 | -4.15 | -4.30 | -4.65 | -5.03 | -5.43 |
| 120° | -1.01 | -1.72 | -1.95 | -2.93 | -3.52 | -4.28 | -4.90 | -4.70 | -5.10 | -5.55 | -5.19 | -5.50 |
| 125° | -0.64 | -1.13 | -1.59 | -2.22 | -3.31 | -4.08 | -4.88 | -5.63 | -5.95 | -6.31 | -6.61 | -6.98 |
| 130° | -0.97 | -0.95 | -1.05 | -1.89 | -2.25 | -3.19 | -4.68 | -4.84 | -5.49 | -6.38 | -7.10 | -7.56 |
| 135° | -1.45 | -1.46 | -1.11 | -1.46 | -2.11 | -2.33 | -3.03 | -3.83 | -4.68 | -5.62 | -5.90 | -6.50 |
| 140° | -1.30 | -1.80 | -1.82 | -1.91 | -2.01 | -2.40 | -2.89 | -2.82 | -3.19 | -3.88 | -4.50 | -5.41 |
| 145° | -1.02 | -1.50 | -1.87 | -2.61 | -2.74 | -2.75 | -3.15 | -3.42 | -3.69 | -4.08 | -4.25 | -4.40 |
| 150° | -1.34 | -1.49 | -1.55 | -2.29 | -3.03 | -3.49 | -3.89 | -3.98 | -4.28 | -4.64 | -4.80 | -5.42 |
| 155° | -2.06 | -2.16 | -1.97 | -2.32 | -2.79 | -3.26 | -4.13 | -4.49 | -5.04 | -5.69 | -5.75 | -5.89 |
| 160° | -2.47 | -2.82 | -2.83 | -3.20 | -3.46 | -3.66 | -4.04 | -4.30 | -4.73 | -5.36 | -5.85 | -6.31 |
| 165° | -2.19 | -2.68 | -2.98 | -3.69 | -4.14 | -4.67 | -5.14 | -5.24 | -5.63 | -6.02 | -6.16 | -6.52 |
| 170° | -1.58 | -2.00 | -2.28 | -3.03 | -3.52 | -4.23 | -5.15 | -5.46 | -6.10 | -6.74 | -7.16 | -7.71 |
| 175° | -1.10 | -1.42 | -1.56 | -2.17 | -2.51 | -3.00 | -3.76 | -4.04 | -4.55 | -5.20 | -5.70 | -6.22 |
| 180° | -0.92 | -1.20 | -1.28 | -1.82 | -2.09 | -2.46 | -3.07 | -3.30 | -3.70 | -4.24 | -4.65 | -5.05 |
| 185° | -1.08 | -1.39 | -1.52 | -2.12 | -2.45 | -2.91 | -3.63 | -3.92 | -4.42 | -5.04 | -5.53 | -6.03 |
| 190° | -1.55 | -1.97 | -2.21 | -2.95 | -3.43 | -4.09 | -4.95 | -5.31 | -5.95 | -6.59 | -7.04 | -7.60 |
| 195° | -2.16 | -2.66 | -2.93 | -3.66 | -4.10 | -4.63 | -5.10 | -5.23 | -5.63 | -6.03 | -6.16 | -6.57 |
| 200° | -2.49 | -2.86 | -2.87 | -3.27 | -3.51 | -3.75 | -4.09 | -4.29 | -4.69 | -5.35 | -5.85 | -6.32 |
| 205° | -2.12 | -2.25 | -2.04 | -2.38 | -2.82 | -3.31 | -4.15 | -4.53 | -5.05 | -5.69 | -5.84 | -6.90 |
| 210° | -1.39 | -1.55 | -1.57 | -2.29 | -2.99 | -3.51 | -3.93 | -3.99 | -4.36 | -4.67 | -4.75 | -5.43 |
| 215° | -1.03 | -1.47 | -1.85 | -2.62 | -2.75 | -2.84 | -3.20 | -3.49 | -3.80 | -4.21 | -4.40 | -4.47 |
| 220° | -1.24 | -1.78 | -1.83 | -1.95 | -2.06 | -2.47 | -2.95 | -2.92 | -3.19 | -3.80 | -4.36 | -5.29 |
| 225° | -1.42 | -1.53 | -1.12 | -1.49 | -2.10 | -2.32 | -2.95 | -3.65 | -4.56 | -5.51 | -5.93 | -6.36 |
| 230° | -1.00 | -0.98 | -1.03 | -1.90 | -2.25 | -3.14 | -4.61 | -4.86 | -5.48 | -6.32 | -7.05 | -7.56 |
| 235° | -0.66 | -1.10 | -1.56 | -2.19 | -3.21 | -4.05 | -4.83 | -5.59 | -5.96 | -6.42 | -6.64 | -7.06 |
| 240° | -1.01 | -1.68 | -1.93 | -2.85 | -3.56 | -4.20 | -4.97 | -4.78 | -5.11 | -5.54 | -5.29 | -5.51 |
| 245° | -1.58 | -1.98 | -2.19 | -3.04 | -3.62 | -3.92 | -3.97 | -4.22 | -4.33 | -4.66 | -5.03 | -5.41 |
| 250° | -1.67 | -2.00 | -2.38 | -2.91 | -3.24 | -3.15 | -3.55 | -3.72 | -4.15 | -4.81 | -5.48 | -5.66 |
| 255° | -1.55 | -2.10 | -2.29 | -2.68 | -2.66 | -3.01 | -3.60 | -3.83 | -4.33 | -5.09 | -4.97 | -5.67 |
| 260° | -1.62 | -2.13 | -1.94 | -2.08 | -2.60 | -2.85 | -3.49 | -3.88 | -4.14 | -4.64 | -4.75 | -5.46 |
| 265° | -1.70 | -1.78 | -1.53 | -2.21 | -2.27 | -2.85 | -3.42 | -3.54 | -3.84 | -4.29 | -4.76 | -4.84 |
| 270° | -1.43 | -1.48 | -1.52 | -1.76 | -2.48 | -2.76 | -3.13 | -3.18 | -3.83 | -4.09 | -4.57 | -4.85 |
| 275° | -1.16 | -1.40 | -1.33 | -2.05 | -2.17 | -2.30 | -2.81 | -3.31 | -3.36 | -4.18 | -4.38 | -4.44 |
| 280° | -1.07 | -1.27 | -1.24 | -1.68 | -2.11 | -2.37 | -2.95 | -2.95 | -3.39 | -3.90 | -3.72 | -4.30 |
| 285° | -1.02 | -1.11 | -1.32 | -1.62 | -1.67 | -2.02 | -2.54 | -2.79 | -3.21 | -3.28 | -3.48 | -3.67 |
| 290° | -0.85 | -1.11 | -0.93 | -1.47 | -1.78 | -2.19 | -2.43 | -2.61 | -2.63 | -2.93 | -3.20 | -3.00 |
| 295° | -0.73 | -1.06 | -0.93 | -1.07 | -1.46 | -1.64 | -2.17 | -2.16 | -2.26 | -2.82 | -2.49 | -2.98 |
| 300° | -0.73 | -0.78 | -0.84 | -1.27 | -1.67 | -1.79 | -1.83 | -1.78 | -2.00 | -2.12 | -2.48 | -2.77 |
| 305° | -0.66 | -0.68 | -0.52 | -0.88 | -1.23 | -1.34 | -1.52 | -1.44 | -1.61 | -2.09 | -2.29 | -2.22 |
| 310° | -0.51 | -0.72 | -0.50 | -0.90 | -1.09 | -1.28 | -1.17 | -1.35 | -1.41 | -1.75 | -1.76 | -2.06 |
| 315° | -0.37 | -0.57 | -0.53 | -1.09 | -1.17 | -0.95 | -1.01 | -0.90 | -1.21 | -1.66 | -1.76 | -1.74 |
| 320° | -0.32 | -0.40 | -0.29 | -0.73 | -0.74 | -0.59 | -0.84 | -0.80 | -1.06 | -1.21 | -1.27 | -1.16 |
| 325° | -0.30 | -0.36 | -0.14 | -0.48 | -0.59 | -0.57 | -0.50 | -0.71 | -0.96 | -1.19 | -1.07 | -1.08 |
| 330° | -0.23 | -0.36 | -0.22 | -0.57 | -0.64 | -0.35 | -0.34 | -0.50 | -0.62 | -0.96 | -0.60 | -0.70 |
| 335° | -0.14 | -0.30 | -0.31 | -0.62 | -0.47 | -0.12 | -0.37 | -0.43 | -0.65 | -0.65 | -0.33 | -0.27 |
| 340° | -0.06 | -0.20 | -0.27 | -0.44 | -0.20 | -0.06 | -0.32 | -0.39 | -0.39 | -0.52 | -0.37 | -0.15 |
| 345° | -0.02 | -0.11 | -0.15 | -0.21 | -0.03 | -0.06 | -0.17 | -0.25 | -0.30 | -0.39 | -0.34 | -0.12 |
| 350° | 0.00 | -0.04 | -0.06 | -0.07 | 0.01 | -0.05 | -0.06 | -0.11 | -0.16 | -0.20 | -0.19 | -0.07 |
| 355° | 0.00 | -0.01 | -0.01 | -0.01 | 0.00 | -0.02 | -0.01 | -0.02 | -0.04 | -0.06 | -0.05 | -0.02 |

Table A.23 Directional response for Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer, measured in a plane parallel to the display and along the microphone's axis, 11200 Hz – 20000 Hz, in dB

| Angle | Frequency | | | | | | | | | | |
|-------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | 11200 Hz | 11800 Hz | 12500 Hz | 13200 Hz | 14000 Hz | 15000 Hz | 16000 Hz | 17000 Hz | 18000 Hz | 19000 Hz | 20000 Hz |
| 0° | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5° | -0.03 | -0.03 | -0.04 | -0.03 | -0.02 | -0.04 | -0.02 | -0.06 | -0.04 | -0.05 | -0.04 |
| 10° | -0.10 | -0.09 | -0.13 | -0.13 | -0.08 | -0.15 | -0.09 | -0.24 | -0.13 | -0.16 | -0.15 |
| 15° | -0.20 | -0.14 | -0.26 | -0.26 | -0.24 | -0.24 | -0.36 | -0.44 | -0.25 | -0.37 | -0.35 |
| 20° | -0.36 | -0.29 | -0.46 | -0.39 | -0.43 | -0.40 | -0.75 | -0.67 | -0.49 | -0.73 | -0.76 |
| 25° | -0.44 | -0.49 | -0.84 | -0.71 | -0.51 | -0.71 | -0.92 | -1.12 | -0.78 | -1.01 | -1.17 |
| 30° | -0.61 | -0.62 | -1.01 | -1.11 | -1.05 | -0.86 | -1.39 | -1.49 | -1.19 | -1.45 | -1.79 |
| 35° | -0.90 | -1.10 | -1.35 | -1.43 | -1.28 | -1.27 | -1.58 | -2.11 | -1.74 | -1.76 | -2.34 |
| 40° | -1.04 | -1.07 | -1.53 | -1.89 | -1.90 | -1.67 | -1.99 | -2.45 | -2.42 | -2.33 | -2.79 |
| 45° | -1.67 | -1.59 | -2.07 | -2.26 | -2.35 | -2.22 | -2.47 | -2.84 | -3.09 | -3.03 | -3.35 |
| 50° | -1.96 | -1.97 | -2.21 | -2.54 | -2.84 | -2.86 | -3.04 | -3.32 | -3.59 | -3.82 | -4.15 |
| 55° | -2.32 | -2.24 | -2.55 | -2.90 | -3.19 | -3.42 | -3.69 | -3.91 | -4.14 | -4.45 | -5.00 |
| 60° | -2.90 | -2.92 | -3.33 | -3.44 | -3.67 | -3.85 | -4.28 | -4.68 | -4.79 | -5.03 | -5.77 |
| 65° | -3.20 | -3.55 | -3.91 | -4.15 | -4.18 | -4.29 | -4.83 | -5.40 | -5.55 | -5.84 | -6.37 |
| 70° | -3.38 | -3.80 | -4.38 | -4.77 | -4.86 | -4.80 | -5.26 | -5.97 | -6.25 | -6.75 | -7.20 |
| 75° | -3.58 | -3.99 | -4.71 | -5.23 | -5.47 | -5.59 | -5.94 | -6.54 | -6.79 | -7.51 | -8.12 |
| 80° | -4.19 | -4.12 | -4.98 | -5.59 | -5.95 | -6.18 | -6.89 | -7.37 | -7.46 | -8.04 | -9.08 |
| 85° | -4.96 | -4.75 | -5.12 | -5.92 | -6.34 | -6.64 | -7.39 | -8.13 | -8.22 | -8.69 | -9.33 |
| 90° | -5.24 | -5.41 | -5.86 | -6.14 | -6.65 | -6.97 | -7.64 | -8.51 | -8.77 | -9.52 | -10.13 |
| 95° | -5.60 | -5.82 | -6.32 | -6.97 | -7.17 | -7.31 | -7.99 | -9.00 | -9.65 | -10.21 | -11.05 |
| 100° | -5.32 | -6.21 | -6.64 | -7.33 | -7.82 | -8.19 | -8.51 | -9.42 | -9.73 | -10.56 | -11.82 |
| 105° | -5.77 | -6.40 | -6.68 | -7.63 | -8.14 | -8.55 | -9.30 | -10.22 | -10.28 | -11.05 | -11.72 |
| 110° | -6.03 | -6.83 | -7.25 | -7.76 | -8.23 | -8.61 | -9.63 | -10.63 | -11.13 | -11.92 | -12.67 |
| 115° | -6.25 | -6.52 | -7.56 | -8.39 | -8.81 | -9.02 | -10.06 | -10.53 | -11.14 | -12.14 | -13.35 |
| 120° | -5.98 | -5.97 | -7.31 | -7.89 | -8.63 | -9.40 | -10.62 | -11.12 | -11.98 | -12.27 | -13.10 |
| 125° | -6.42 | -6.54 | -7.59 | -7.35 | -7.93 | -8.58 | -9.62 | -10.88 | -11.82 | -13.15 | -14.36 |
| 130° | -7.93 | -8.89 | -8.89 | -8.46 | -9.22 | -9.10 | -9.26 | -10.07 | -10.31 | -11.84 | -12.60 |
| 135° | -7.62 | -8.48 | -8.83 | -10.16 | -11.94 | -11.46 | -11.53 | -12.38 | -11.89 | -12.33 | -12.58 |
| 140° | -5.90 | -6.36 | -7.47 | -9.09 | -10.01 | -9.98 | -11.34 | -13.95 | -14.93 | -15.62 | -16.98 |
| 145° | -4.59 | -5.12 | -6.15 | -6.82 | -7.30 | -7.91 | -9.51 | -11.22 | -11.50 | -12.14 | -14.13 |
| 150° | -5.80 | -5.99 | -6.23 | -6.55 | -6.90 | -7.41 | -8.31 | -9.06 | -9.32 | -10.32 | -11.84 |
| 155° | -6.22 | -6.62 | -7.44 | -8.14 | -8.63 | -8.96 | -9.46 | -9.94 | -10.14 | -10.88 | -12.02 |
| 160° | -6.63 | -7.17 | -7.97 | -8.69 | -9.18 | -9.51 | -10.24 | -11.10 | -11.83 | -12.91 | -14.07 |
| 165° | -6.75 | -6.91 | -7.56 | -8.09 | -8.77 | -9.37 | -10.52 | -11.69 | -12.31 | -13.16 | -14.07 |
| 170° | -8.20 | -8.55 | -9.15 | -9.52 | -9.70 | -9.85 | -10.24 | -10.94 | -11.23 | -11.98 | -13.07 |
| 175° | -6.77 | -7.54 | -8.50 | -9.43 | -10.20 | -10.87 | -11.83 | -12.77 | -13.37 | -14.13 | -15.19 |
| 180° | -5.45 | -6.07 | -6.89 | -7.67 | -8.36 | -8.96 | -9.98 | -10.93 | -11.64 | -12.68 | -13.94 |
| 185° | -6.57 | -7.31 | -8.22 | -9.15 | -9.91 | -10.59 | -11.57 | -12.54 | -13.16 | -14.10 | -15.50 |
| 190° | -8.13 | -8.50 | -9.12 | -9.59 | -9.77 | -9.93 | -10.35 | -11.01 | -11.24 | -11.96 | -12.99 |
| 195° | -6.81 | -6.92 | -7.58 | -8.08 | -8.71 | -9.29 | -10.44 | -11.67 | -12.35 | -13.39 | -14.45 |
| 200° | -6.68 | -7.25 | -8.05 | -8.77 | -9.29 | -9.57 | -10.27 | -11.01 | -11.54 | -12.60 | -14.10 |
| 205° | -6.18 | -6.57 | -7.38 | -8.03 | -8.60 | -9.02 | -9.65 | -10.21 | -10.39 | -11.01 | -12.01 |
| 210° | -5.91 | -6.15 | -6.46 | -6.68 | -6.99 | -7.46 | -8.31 | -9.06 | -9.33 | -10.16 | -11.41 |
| 215° | -4.59 | -5.04 | -6.07 | -6.75 | -7.27 | -7.74 | -9.30 | -11.03 | -11.45 | -12.08 | -13.62 |
| 220° | -5.82 | -6.30 | -7.26 | -8.88 | -9.92 | -9.97 | -11.13 | -13.59 | -14.74 | -15.53 | -17.80 |
| 225° | -7.51 | -8.44 | -8.83 | -9.99 | -11.74 | -11.75 | -11.83 | -12.64 | -12.01 | -12.44 | -13.14 |
| 230° | -7.92 | -8.84 | -9.17 | -8.66 | -9.18 | -9.24 | -9.52 | -10.26 | -10.14 | -11.72 | -12.44 |
| 235° | -6.49 | -6.56 | -7.54 | -7.46 | -7.85 | -8.51 | -9.69 | -10.87 | -11.57 | -13.25 | -14.28 |
| 240° | -5.94 | -6.04 | -7.10 | -7.83 | -8.55 | -9.30 | -10.68 | -11.20 | -11.95 | -12.25 | -13.00 |
| 245° | -6.17 | -6.60 | -7.40 | -8.38 | -8.78 | -9.02 | -9.98 | -10.39 | -11.05 | -12.09 | -13.27 |
| 250° | -6.01 | -6.92 | -7.20 | -7.78 | -8.13 | -8.58 | -9.67 | -10.51 | -11.14 | -12.02 | -12.79 |
| 255° | -5.77 | -6.37 | -6.64 | -7.63 | -8.12 | -8.55 | -9.38 | -10.31 | -10.32 | -10.98 | -11.59 |
| 260° | -5.41 | -6.14 | -6.69 | -7.41 | -7.95 | -8.30 | -8.55 | -9.39 | -9.75 | -10.56 | -11.91 |
| 265° | -5.72 | -5.79 | -6.32 | -6.96 | -7.25 | -7.43 | -8.04 | -9.05 | -9.61 | -10.25 | -10.94 |
| 270° | -5.26 | -5.34 | -5.91 | -6.19 | -6.68 | -7.03 | -7.66 | -8.53 | -8.81 | -9.64 | -10.14 |
| 275° | -4.94 | -4.76 | -5.17 | -5.92 | -6.38 | -6.67 | -7.42 | -8.13 | -8.22 | -8.66 | -9.26 |
| 280° | -4.16 | -4.16 | -5.03 | -5.57 | -5.97 | -6.25 | -6.97 | -7.42 | -7.51 | -8.00 | -9.11 |
| 285° | -3.55 | -4.02 | -4.73 | -5.21 | -5.52 | -5.68 | -6.07 | -6.58 | -6.78 | -7.58 | -8.08 |
| 290° | -3.39 | -3.80 | -4.38 | -4.76 | -4.94 | -4.86 | -5.28 | -5.97 | -6.28 | -6.71 | -7.20 |
| 295° | -3.23 | -3.52 | -3.89 | -4.12 | -4.27 | -4.32 | -4.81 | -5.48 | -5.49 | -5.90 | -6.36 |
| 300° | -2.93 | -2.88 | -3.30 | -3.43 | -3.72 | -3.87 | -4.31 | -4.71 | -4.81 | -5.07 | -5.78 |
| 305° | -2.34 | -2.24 | -2.54 | -2.88 | -3.24 | -3.46 | -3.74 | -3.91 | -4.16 | -4.46 | -5.03 |
| 310° | -2.02 | -2.00 | -2.23 | -2.52 | -2.85 | -2.89 | -3.10 | -3.33 | -3.60 | -3.85 | -4.15 |
| 315° | -1.66 | -1.58 | -2.04 | -2.24 | -2.32 | -2.25 | -2.52 | -2.83 | -3.15 | -3.04 | -3.32 |
| 320° | -1.05 | -1.04 | -1.50 | -1.88 | -1.88 | -1.71 | -2.04 | -2.48 | -2.46 | -2.37 | -2.78 |
| 325° | -0.88 | -1.09 | -1.38 | -1.45 | -1.31 | -1.27 | -1.65 | -2.13 | -1.75 | -1.79 | -2.31 |
| 330° | -0.60 | -0.63 | -1.00 | -1.08 | -1.04 | -0.90 | -1.40 | -1.50 | -1.21 | -1.47 | -1.76 |
| 335° | -0.44 | -0.48 | -0.86 | -0.73 | -0.53 | -0.73 | -0.95 | -1.13 | -0.82 | -1.02 | -1.15 |
| 340° | -0.37 | -0.28 | -0.45 | -0.38 | -0.41 | -0.42 | -0.76 | -0.69 | -0.51 | -0.74 | -0.75 |
| 345° | -0.20 | -0.14 | -0.27 | -0.26 | -0.24 | -0.25 | -0.38 | -0.44 | -0.27 | -0.38 | -0.36 |
| 350° | -0.09 | -0.08 | -0.15 | -0.13 | -0.09 | -0.16 | -0.07 | -0.23 | -0.13 | -0.16 | -0.13 |
| 355° | -0.03 | -0.02 | -0.04 | -0.03 | -0.02 | -0.04 | -0.01 | -0.06 | -0.04 | -0.06 | -0.04 |

Table A.24 Directional response for Microphone Type 4191, Microphone Preamplicifier ZC-0032 and the analyzer with the Microphone Preamplicifier mounted directly on the analyzer, measured in a plane perpendicular to the display and along the microphone's axis, 500 Hz – 3550 Hz, in dB

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 500 Hz | 630 Hz | 800 Hz | 1000 Hz | 1250 Hz | 1600 Hz | 2000 Hz | 2240 Hz | 2500 Hz | 2800 Hz | 3150 Hz | 3550 Hz |
| 0° | -0.01 | -0.01 | -0.01 | 0.00 | 0.00 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 |
| 5° | 0.01 | 0.01 | -0.01 | 0.00 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.02 | -0.01 | -0.03 |
| 10° | 0.00 | 0.00 | 0.00 | 0.00 | -0.02 | -0.01 | -0.02 | 0.00 | -0.03 | -0.02 | -0.02 | -0.05 |
| 15° | 0.01 | 0.00 | 0.00 | 0.01 | -0.04 | 0.00 | -0.05 | 0.01 | -0.06 | -0.03 | -0.06 | -0.07 |
| 20° | 0.02 | 0.00 | 0.00 | 0.02 | -0.05 | -0.02 | -0.09 | 0.01 | -0.11 | -0.03 | -0.13 | -0.08 |
| 25° | 0.01 | 0.00 | 0.00 | 0.04 | -0.07 | -0.04 | -0.13 | 0.02 | -0.15 | -0.05 | -0.23 | -0.07 |
| 30° | 0.01 | 0.00 | -0.01 | 0.05 | -0.09 | -0.07 | -0.19 | 0.01 | -0.18 | -0.08 | -0.33 | -0.03 |
| 35° | -0.01 | 0.00 | -0.02 | 0.06 | -0.09 | -0.13 | -0.23 | -0.03 | -0.17 | -0.15 | -0.42 | -0.02 |
| 40° | 0.02 | 0.03 | -0.02 | 0.06 | -0.08 | -0.21 | -0.26 | -0.11 | -0.14 | -0.25 | -0.45 | -0.09 |
| 45° | 0.01 | 0.04 | -0.01 | 0.05 | -0.05 | -0.32 | -0.25 | -0.21 | -0.10 | -0.34 | -0.45 | -0.26 |
| 50° | 0.01 | 0.06 | 0.01 | 0.04 | -0.01 | -0.44 | -0.22 | -0.30 | -0.13 | -0.37 | -0.51 | -0.47 |
| 55° | -0.02 | 0.06 | 0.05 | 0.03 | 0.02 | -0.52 | -0.22 | -0.31 | -0.27 | -0.32 | -0.65 | -0.55 |
| 60° | -0.03 | 0.06 | 0.10 | 0.03 | 0.02 | -0.54 | -0.28 | -0.27 | -0.45 | -0.28 | -0.75 | -0.55 |
| 65° | -0.06 | 0.04 | 0.13 | 0.05 | 0.01 | -0.49 | -0.42 | -0.24 | -0.53 | -0.38 | -0.72 | -0.66 |
| 70° | -0.07 | 0.03 | 0.17 | 0.09 | -0.02 | -0.41 | -0.61 | -0.31 | -0.46 | -0.31 | -0.64 | -0.84 |
| 75° | -0.09 | 0.00 | 0.19 | 0.15 | -0.04 | -0.33 | -0.75 | -0.51 | -0.37 | -0.74 | -0.74 | -0.82 |
| 80° | -0.12 | -0.03 | 0.19 | 0.22 | -0.05 | -0.29 | -0.76 | -0.76 | -0.46 | -0.66 | -1.01 | -0.74 |
| 85° | -0.14 | -0.07 | 0.18 | 0.30 | -0.01 | -0.31 | -0.64 | -0.87 | -0.75 | -0.61 | -1.09 | -0.93 |
| 90° | -0.18 | -0.11 | 0.15 | 0.35 | 0.09 | -0.36 | -0.49 | -0.76 | -1.01 | -0.84 | -0.95 | -1.19 |
| 95° | -0.22 | -0.17 | 0.09 | 0.37 | 0.21 | -0.38 | -0.43 | -0.55 | -0.94 | -1.19 | -1.07 | -1.10 |
| 100° | -0.25 | -0.23 | 0.00 | 0.36 | 0.32 | -0.33 | -0.46 | -0.44 | -0.65 | -1.19 | -1.52 | -1.08 |
| 105° | -0.27 | -0.27 | -0.09 | 0.29 | 0.39 | -0.19 | -0.51 | -0.48 | -0.47 | -0.81 | -1.62 | -1.55 |
| 110° | -0.29 | -0.31 | -0.18 | 0.18 | 0.38 | -0.03 | -0.45 | -0.55 | -0.56 | -0.56 | -1.14 | -1.72 |
| 115° | -0.30 | -0.34 | -0.26 | 0.04 | 0.30 | 0.07 | -0.25 | -0.45 | -0.69 | -0.69 | -0.79 | -1.14 |
| 120° | -0.31 | -0.37 | -0.33 | -0.11 | 0.14 | 0.04 | -0.04 | -0.18 | -0.54 | -0.86 | -0.93 | -0.79 |
| 125° | -0.31 | -0.37 | -0.38 | -0.24 | -0.05 | -0.12 | 0.03 | 0.06 | -0.17 | -0.63 | -1.11 | -1.01 |
| 130° | -0.30 | -0.38 | -0.40 | -0.33 | -0.24 | -0.38 | -0.11 | 0.08 | 0.09 | -0.18 | -0.80 | -1.06 |
| 135° | -0.29 | -0.36 | -0.40 | -0.38 | -0.38 | -0.66 | -0.44 | -0.18 | 0.01 | 0.02 | -0.31 | -0.56 |
| 140° | -0.29 | -0.35 | -0.37 | -0.38 | -0.44 | -0.88 | -0.85 | -0.64 | -0.42 | -0.26 | -0.26 | -0.17 |
| 145° | -0.29 | -0.33 | -0.34 | -0.34 | -0.42 | -0.97 | -1.16 | -1.10 | -1.02 | -0.92 | -0.81 | -0.45 |
| 150° | -0.25 | -0.29 | -0.28 | -0.27 | -0.35 | -0.93 | -1.27 | -1.35 | -1.46 | -1.58 | -1.66 | -1.33 |
| 155° | -0.23 | -0.26 | -0.23 | -0.20 | -0.24 | -0.79 | -1.17 | -1.31 | -1.54 | -1.84 | -2.25 | -2.22 |
| 160° | -0.22 | -0.24 | -0.18 | -0.12 | -0.13 | -0.61 | -0.95 | -1.06 | -1.28 | -1.61 | -2.18 | -2.39 |
| 165° | -0.20 | -0.21 | -0.14 | -0.05 | -0.03 | -0.44 | -0.70 | -0.75 | -0.91 | -1.17 | -1.70 | -1.90 |
| 170° | -0.19 | -0.19 | -0.11 | 0.00 | 0.05 | -0.30 | -0.50 | -0.49 | -0.58 | -0.75 | -1.18 | -1.27 |
| 175° | -0.18 | -0.18 | -0.09 | 0.04 | 0.10 | -0.22 | -0.37 | -0.32 | -0.36 | -0.48 | -0.82 | -0.83 |
| 180° | -0.20 | -0.19 | -0.08 | 0.05 | 0.12 | -0.19 | -0.32 | -0.26 | -0.28 | -0.37 | -0.69 | -0.66 |
| 185° | -0.19 | -0.18 | -0.09 | 0.04 | 0.10 | -0.22 | -0.36 | -0.30 | -0.34 | -0.44 | -0.77 | -0.77 |
| 190° | -0.19 | -0.19 | -0.11 | 0.02 | 0.06 | -0.31 | -0.47 | -0.44 | -0.53 | -0.68 | -1.08 | -1.14 |
| 195° | -0.20 | -0.21 | -0.14 | -0.03 | -0.01 | -0.44 | -0.66 | -0.68 | -0.84 | -1.08 | -1.57 | -1.74 |
| 200° | -0.23 | -0.24 | -0.18 | -0.10 | -0.11 | -0.61 | -0.89 | -0.98 | -1.22 | -1.52 | -2.09 | -2.30 |
| 205° | -0.23 | -0.26 | -0.23 | -0.17 | -0.22 | -0.80 | -1.12 | -1.24 | -1.52 | -1.81 | -2.28 | -2.32 |
| 210° | -0.26 | -0.31 | -0.28 | -0.25 | -0.33 | -0.95 | -1.24 | -1.35 | -1.54 | -1.67 | -1.84 | -1.58 |
| 215° | -0.27 | -0.33 | -0.32 | -0.31 | -0.41 | -1.02 | -1.18 | -1.18 | -1.18 | -1.09 | -1.02 | -0.68 |
| 220° | -0.30 | -0.36 | -0.37 | -0.36 | -0.44 | -0.96 | -0.92 | -0.78 | -0.61 | -0.44 | -0.41 | -0.28 |
| 225° | -0.31 | -0.38 | -0.39 | -0.36 | -0.40 | -0.76 | -0.55 | -0.33 | -0.14 | -0.10 | -0.34 | -0.55 |
| 230° | -0.32 | -0.39 | -0.39 | -0.32 | -0.29 | -0.48 | -0.22 | -0.05 | 0.00 | -0.21 | -0.74 | -1.03 |
| 235° | -0.33 | -0.40 | -0.37 | -0.24 | -0.13 | -0.22 | -0.06 | -0.02 | -0.18 | -0.57 | -1.09 | -1.03 |
| 240° | -0.32 | -0.37 | -0.32 | -0.12 | 0.04 | -0.04 | -0.10 | -0.20 | -0.48 | -0.79 | -0.96 | -0.75 |
| 245° | -0.32 | -0.35 | -0.26 | 0.02 | 0.19 | 0.01 | -0.27 | -0.41 | -0.62 | -0.67 | -0.76 | -0.99 |
| 250° | -0.30 | -0.31 | -0.17 | 0.15 | 0.27 | -0.06 | -0.43 | -0.48 | -0.53 | -0.55 | -1.04 | -1.64 |
| 255° | -0.28 | -0.27 | -0.08 | 0.25 | 0.29 | -0.19 | -0.47 | -0.41 | -0.46 | -0.77 | -1.57 | -1.66 |
| 260° | -0.25 | -0.21 | 0.00 | 0.31 | 0.24 | -0.30 | -0.41 | -0.38 | -0.63 | -1.18 | -1.59 | -1.15 |
| 265° | -0.22 | -0.16 | 0.08 | 0.33 | 0.17 | -0.34 | -0.38 | -0.51 | -0.95 | -1.25 | -1.13 | -1.04 |
| 270° | -0.19 | -0.11 | 0.13 | 0.31 | 0.07 | -0.31 | -0.46 | -0.74 | -1.06 | -0.90 | -0.94 | -1.19 |
| 275° | -0.16 | -0.07 | 0.16 | 0.25 | 0.01 | -0.26 | -0.63 | -0.90 | -0.83 | -0.60 | -1.07 | -1.01 |
| 280° | -0.12 | -0.03 | 0.18 | 0.18 | -0.01 | -0.24 | -0.76 | -0.82 | -0.50 | -0.63 | -1.05 | -0.76 |
| 285° | -0.11 | -0.01 | 0.17 | 0.12 | 0.00 | -0.29 | -0.77 | -0.58 | -0.37 | -0.71 | -0.81 | -0.82 |
| 290° | -0.07 | 0.03 | 0.15 | 0.06 | 0.03 | -0.38 | -0.64 | -0.34 | -0.44 | -0.60 | -0.67 | -0.89 |
| 295° | -0.05 | 0.04 | 0.12 | 0.03 | 0.06 | -0.48 | -0.45 | -0.25 | -0.52 | -0.39 | -0.75 | -0.67 |
| 300° | -0.03 | 0.06 | 0.08 | 0.02 | 0.06 | -0.53 | -0.29 | -0.29 | -0.43 | -0.30 | -0.80 | -0.45 |
| 305° | 0.00 | 0.06 | 0.04 | 0.02 | 0.04 | -0.51 | -0.22 | -0.33 | -0.24 | -0.36 | -0.64 | -0.41 |
| 310° | 0.01 | 0.05 | 0.01 | 0.04 | 0.01 | -0.43 | -0.23 | -0.31 | -0.10 | -0.45 | -0.42 | -0.42 |
| 315° | 0.01 | 0.04 | -0.02 | 0.07 | -0.04 | -0.32 | -0.27 | -0.22 | -0.06 | -0.42 | -0.31 | -0.37 |
| 320° | 0.03 | 0.04 | -0.03 | 0.07 | -0.08 | -0.20 | -0.27 | -0.10 | -0.11 | -0.28 | -0.29 | -0.26 |
| 325° | 0.02 | 0.01 | -0.02 | 0.08 | -0.10 | -0.11 | -0.25 | -0.01 | -0.17 | -0.13 | -0.30 | -0.16 |
| 330° | 0.03 | 0.01 | -0.01 | 0.07 | -0.10 | -0.05 | -0.19 | 0.04 | -0.19 | -0.03 | -0.28 | -0.11 |
| 335° | 0.02 | 0.01 | 0.00 | 0.05 | -0.08 | -0.02 | -0.14 | 0.05 | -0.18 | 0.03 | -0.23 | -0.08 |
| 340° | 0.01 | 0.00 | 0.00 | 0.04 | -0.06 | 0.00 | -0.08 | 0.05 | -0.13 | 0.04 | -0.16 | -0.05 |
| 345° | 0.00 | -0.01 | 0.00 | 0.02 | -0.03 | 0.00 | -0.04 | 0.04 | -0.08 | 0.04 | -0.09 | -0.02 |
| 350° | 0.00 | 0.00 | 0.00 | 0.01 | -0.01 | 0.00 | -0.01 | 0.02 | -0.03 | 0.04 | -0.04 | 0.01 |
| 355° | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.02 | 0.00 | 0.02 |

Table A.25 Directional response for Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer, measured in a plane perpendicular to the display and along the microphone’s axis, 4000 Hz – 10600 Hz, in dB

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|
| | 4000 Hz | 4500 Hz | 5000 Hz | 5600 Hz | 6300 Hz | 7100 Hz | 8000 Hz | 8500 Hz | 9000 Hz | 9500 Hz | 10000 Hz | 10600 Hz |
| 0° | -0.01 | -0.01 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 |
| 5° | 0.00 | -0.02 | -0.02 | -0.06 | -0.05 | 0.00 | -0.03 | -0.06 | 0.01 | -0.03 | -0.03 | 0.02 |
| 10° | 0.01 | -0.03 | -0.03 | -0.13 | -0.11 | 0.01 | -0.10 | -0.09 | 0.04 | -0.10 | -0.07 | 0.04 |
| 15° | 0.01 | -0.06 | -0.05 | -0.23 | -0.22 | 0.02 | -0.17 | -0.10 | 0.02 | -0.29 | -0.15 | 0.00 |
| 20° | 0.00 | -0.12 | -0.06 | -0.31 | -0.35 | -0.07 | -0.14 | -0.11 | -0.16 | -0.62 | -0.27 | -0.21 |
| 25° | -0.04 | -0.19 | -0.05 | -0.31 | -0.39 | -0.27 | -0.09 | -0.32 | -0.59 | -0.84 | -0.37 | -0.51 |
| 30° | -0.13 | -0.26 | -0.05 | -0.27 | -0.32 | -0.43 | -0.28 | -0.64 | -0.84 | -0.75 | -0.57 | -0.66 |
| 35° | -0.24 | -0.30 | -0.14 | -0.40 | -0.41 | -0.40 | -0.70 | -0.57 | -0.84 | -1.00 | -1.23 | -0.90 |
| 40° | -0.33 | -0.34 | -0.33 | -0.71 | -0.86 | -0.61 | -0.67 | -0.64 | -1.25 | -1.56 | -1.30 | -1.04 |
| 45° | -0.35 | -0.42 | -0.47 | -0.81 | -1.05 | -1.03 | -0.84 | -1.17 | -1.19 | -1.65 | -1.47 | -1.69 |
| 50° | -0.31 | -0.56 | -0.49 | -0.68 | -0.94 | -0.99 | -1.12 | -1.11 | -1.52 | -2.00 | -1.96 | -1.82 |
| 55° | -0.36 | -0.74 | -0.56 | -0.97 | -1.40 | -1.43 | -1.17 | -1.53 | -1.86 | -1.92 | -2.35 | -2.29 |
| 60° | -0.57 | -0.78 | -0.73 | -1.23 | -1.50 | -1.63 | -1.77 | -1.53 | -1.99 | -2.69 | -2.21 | -2.57 |
| 65° | -0.77 | -0.77 | -0.83 | -1.12 | -1.43 | -1.61 | -1.74 | -2.22 | -2.26 | -2.61 | -2.97 | -2.76 |
| 70° | -0.80 | -1.00 | -0.97 | -1.40 | -1.92 | -2.12 | -2.35 | -2.20 | -2.91 | -3.00 | -3.00 | -3.34 |
| 75° | -0.90 | -1.24 | -1.02 | -1.51 | -1.71 | -1.92 | -2.29 | -2.80 | -2.89 | -3.76 | -3.32 | -3.46 |
| 80° | -1.09 | -1.24 | -1.24 | -1.57 | -2.07 | -2.51 | -2.74 | -2.83 | -3.50 | -3.64 | -4.23 | -3.80 |
| 85° | -1.02 | -1.39 | -1.48 | -1.81 | -2.15 | -2.29 | -2.83 | -3.04 | -3.64 | -4.12 | -4.10 | -4.68 |
| 90° | -1.05 | -1.52 | -1.50 | -2.00 | -2.29 | -2.65 | -3.00 | -3.46 | -3.59 | -4.51 | -4.44 | -4.65 |
| 95° | -1.38 | -1.44 | -1.73 | -2.18 | -2.62 | -2.73 | -3.34 | -3.35 | -4.22 | -4.41 | -4.66 | -4.95 |
| 100° | -1.42 | -1.75 | -1.68 | -2.27 | -2.69 | -2.96 | -3.24 | -3.74 | -4.13 | -4.64 | -4.97 | -4.97 |
| 105° | -1.32 | -1.88 | -1.90 | -2.42 | -2.89 | -3.20 | -3.75 | -3.74 | -4.19 | -4.93 | -5.10 | -5.34 |
| 110° | -1.77 | -1.79 | -2.20 | -2.55 | -2.95 | -3.16 | -3.82 | -4.31 | -4.69 | -5.08 | -5.09 | -5.73 |
| 115° | -1.93 | -2.26 | -2.07 | -2.84 | -3.22 | -3.50 | -3.88 | -4.05 | -4.90 | -5.56 | -5.70 | -5.69 |
| 120° | -1.19 | -2.24 | -2.47 | -2.77 | -3.42 | -3.66 | -4.24 | -4.59 | -4.97 | -5.33 | -5.85 | -6.24 |
| 125° | -0.92 | -1.40 | -2.17 | -3.14 | -3.37 | -3.84 | -4.42 | -4.77 | -5.39 | -6.11 | -5.97 | -6.24 |
| 130° | -1.29 | -1.37 | -1.39 | -2.36 | -3.52 | -3.66 | -4.49 | -5.00 | -5.80 | -6.24 | -6.45 | -6.60 |
| 135° | -1.14 | -1.70 | -1.62 | -1.87 | -2.41 | -3.37 | -4.17 | -4.61 | -5.28 | -6.24 | -6.80 | -6.98 |
| 140° | -0.48 | -1.17 | -1.72 | -2.40 | -2.68 | -2.55 | -3.40 | -3.97 | -4.77 | -5.41 | -5.75 | -6.47 |
| 145° | -0.31 | -0.62 | -0.99 | -1.90 | -2.83 | -3.28 | -3.43 | -3.72 | -4.13 | -4.58 | -4.67 | -5.14 |
| 150° | -1.04 | -1.00 | -0.88 | -1.25 | -1.85 | -2.57 | -3.57 | -4.09 | -4.88 | -5.41 | -5.26 | -5.27 |
| 155° | -2.22 | -2.23 | -1.95 | -1.97 | -2.03 | -2.06 | -2.61 | -3.04 | -3.78 | -4.61 | -5.11 | -5.50 |
| 160° | -2.81 | -3.25 | -3.32 | -3.70 | -3.80 | -3.57 | -3.45 | -3.54 | -3.83 | -4.25 | -4.51 | -4.69 |
| 165° | -2.38 | -3.01 | -3.41 | -4.34 | -5.04 | -5.65 | -6.00 | -6.19 | -6.56 | -6.82 | -6.86 | -6.98 |
| 170° | -1.60 | -2.13 | -2.45 | -3.29 | -3.95 | -4.80 | -5.76 | -6.34 | -7.26 | -8.04 | -8.67 | -9.69 |
| 175° | -1.04 | -1.44 | -1.61 | -2.24 | -2.66 | -3.14 | -3.77 | -4.16 | -4.84 | -5.45 | -5.88 | -6.41 |
| 180° | -0.81 | -1.16 | -1.27 | -1.82 | -2.14 | -2.46 | -2.93 | -3.23 | -3.78 | -4.28 | -4.60 | -4.90 |
| 185° | -0.95 | -1.33 | -1.49 | -2.09 | -2.48 | -2.89 | -3.46 | -3.85 | -4.49 | -5.07 | -5.51 | -5.86 |
| 190° | -1.44 | -1.93 | -2.23 | -3.01 | -3.60 | -4.36 | -5.27 | -5.86 | -6.78 | -7.59 | -8.17 | -8.85 |
| 195° | -2.17 | -2.79 | -3.22 | -4.13 | -4.88 | -5.76 | -6.39 | -6.75 | -7.25 | -7.68 | -7.57 | -7.80 |
| 200° | -2.74 | -3.26 | -3.45 | -3.96 | -4.30 | -4.20 | -3.99 | -4.03 | -4.29 | -4.63 | -4.71 | -4.86 |
| 205° | -2.43 | -2.56 | -2.28 | -2.37 | -2.50 | -2.29 | -2.67 | -3.03 | -3.72 | -4.42 | -4.82 | -5.20 |
| 210° | -1.34 | -1.31 | -1.09 | -1.45 | -1.95 | -2.38 | -3.44 | -4.05 | -4.95 | -5.49 | -5.40 | -5.61 |
| 215° | -0.50 | -0.75 | -1.00 | -1.89 | -2.63 | -3.43 | -3.62 | -3.74 | -3.94 | -4.24 | -4.46 | -4.69 |
| 220° | -0.48 | -1.14 | -1.66 | -2.45 | -2.78 | -2.58 | -2.79 | -3.24 | -4.32 | -5.44 | -5.87 | -6.37 |
| 225° | -1.07 | -1.68 | -1.71 | -1.90 | -2.28 | -2.74 | -4.19 | -4.94 | -5.51 | -6.13 | -6.53 | -6.92 |
| 230° | -1.30 | -1.37 | -1.29 | -2.15 | -3.18 | -4.11 | -4.41 | -4.82 | -5.84 | -6.55 | -6.60 | -6.65 |
| 235° | -0.91 | -1.21 | -1.94 | -3.15 | -3.70 | -3.66 | -4.58 | -5.02 | -5.34 | -6.09 | -6.33 | -6.48 |
| 240° | -1.02 | -2.03 | -2.66 | -2.91 | -3.36 | -4.02 | -4.02 | -4.43 | -5.30 | -5.68 | -6.13 | -6.39 |
| 245° | -1.80 | -2.43 | -2.09 | -2.90 | -3.41 | -3.32 | -4.06 | -4.39 | -5.06 | -5.63 | -5.33 | -5.81 |
| 250° | -1.91 | -1.81 | -2.14 | -2.72 | -3.00 | -3.49 | -3.83 | -4.16 | -4.39 | -5.33 | -5.74 | -5.61 |
| 255° | -1.35 | -1.82 | -2.14 | -2.43 | -3.11 | -3.19 | -3.54 | -3.91 | -4.77 | -4.99 | -5.17 | -5.22 |
| 260° | -1.32 | -1.92 | -1.66 | -2.46 | -2.85 | -2.94 | -3.55 | -3.80 | -4.27 | -4.67 | -4.95 | -5.40 |
| 265° | -1.45 | -1.46 | -1.85 | -2.31 | -2.53 | -3.04 | -3.19 | -3.50 | -4.03 | -4.78 | -4.83 | -4.89 |
| 270° | -1.14 | -1.54 | -1.68 | -1.98 | -2.63 | -2.57 | -2.94 | -3.44 | -3.93 | -4.49 | -4.46 | -5.14 |
| 275° | -0.99 | -1.59 | -1.38 | -1.97 | -2.19 | -2.39 | -2.91 | -3.18 | -3.67 | -4.27 | -4.73 | -4.23 |
| 280° | -1.16 | -1.21 | -1.32 | -1.86 | -2.07 | -2.37 | -2.68 | -2.90 | -3.72 | -4.01 | -4.05 | -4.01 |
| 285° | -0.98 | -1.09 | -1.26 | -1.45 | -1.83 | -2.07 | -2.30 | -3.01 | -3.08 | -3.89 | -3.50 | -3.72 |
| 290° | -0.73 | -1.10 | -1.06 | -1.47 | -1.86 | -1.97 | -2.53 | -2.36 | -3.16 | -3.17 | -3.29 | -3.40 |
| 295° | -0.66 | -0.98 | -0.78 | -1.23 | -1.52 | -1.71 | -1.81 | -2.43 | -2.40 | -2.92 | -3.01 | -2.80 |
| 300° | -0.64 | -0.83 | -0.76 | -1.18 | -1.48 | -1.72 | -1.89 | -1.70 | -2.29 | -2.55 | -2.38 | -2.66 |
| 305° | -0.54 | -0.61 | -0.68 | -1.05 | -1.36 | -1.30 | -1.36 | -1.68 | -1.84 | -2.22 | -2.40 | -2.47 |
| 310° | -0.42 | -0.49 | -0.53 | -0.77 | -1.17 | -1.03 | -1.17 | -1.22 | -1.72 | -2.02 | -1.93 | -1.91 |
| 315° | -0.31 | -0.48 | -0.40 | -0.79 | -1.11 | -1.16 | -0.98 | -1.25 | -1.19 | -1.79 | -1.73 | -1.74 |
| 320° | -0.18 | -0.45 | -0.33 | -0.74 | -0.80 | -0.59 | -0.72 | -0.79 | -1.30 | -1.47 | -1.47 | -1.17 |
| 325° | -0.06 | -0.37 | -0.20 | -0.57 | -0.52 | -0.41 | -0.72 | -0.59 | -0.93 | -1.22 | -1.14 | -0.99 |
| 330° | -0.02 | -0.24 | -0.08 | -0.41 | -0.51 | -0.49 | -0.35 | -0.70 | -0.72 | -0.96 | -0.67 | -0.60 |
| 335° | -0.01 | -0.13 | -0.03 | -0.30 | -0.48 | -0.31 | -0.12 | -0.43 | -0.61 | -0.78 | -0.54 | -0.54 |
| 340° | -0.02 | -0.05 | 0.00 | -0.19 | -0.32 | -0.10 | -0.13 | -0.15 | -0.41 | -0.46 | -0.36 | -0.17 |
| 345° | -0.02 | -0.01 | 0.00 | -0.08 | -0.15 | -0.01 | -0.16 | -0.03 | -0.22 | -0.22 | -0.20 | 0.05 |
| 350° | -0.01 | 0.00 | 0.01 | -0.01 | -0.03 | 0.00 | -0.10 | 0.02 | -0.10 | -0.09 | -0.10 | 0.03 |
| 355° | 0.00 | 0.01 | 0.02 | 0.03 | 0.01 | 0.00 | -0.02 | 0.03 | -0.03 | -0.01 | -0.03 | 0.00 |

Table A.26 Directional response for Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer, measured in a plane perpendicular to the display and along the microphone's axis, 11200 Hz – 20000 Hz, in dB

| Angle | Frequency | | | | | | | | | | |
|-------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | 11200 Hz | 11800 Hz | 12500 Hz | 13200 Hz | 14000 Hz | 15000 Hz | 16000 Hz | 17000 Hz | 18000 Hz | 19000 Hz | 20000 Hz |
| 0° | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.01 | -0.02 | -0.02 | -0.03 |
| 5° | -0.03 | -0.02 | 0.00 | -0.03 | -0.04 | -0.07 | -0.03 | -0.07 | -0.06 | -0.03 | -0.04 |
| 10° | -0.08 | -0.06 | -0.07 | -0.09 | -0.07 | -0.21 | -0.09 | -0.21 | -0.11 | -0.09 | -0.13 |
| 15° | -0.17 | -0.10 | -0.20 | -0.22 | -0.16 | -0.29 | -0.38 | -0.35 | -0.21 | -0.38 | -0.39 |
| 20° | -0.37 | -0.24 | -0.42 | -0.40 | -0.42 | -0.41 | -0.77 | -0.54 | -0.55 | -0.76 | -0.76 |
| 25° | -0.56 | -0.61 | -0.82 | -0.64 | -0.62 | -0.88 | -0.91 | -1.04 | -0.78 | -1.08 | -1.22 |
| 30° | -0.57 | -0.82 | -1.04 | -1.05 | -0.99 | -0.93 | -1.53 | -1.36 | -1.20 | -1.51 | -1.73 |
| 35° | -1.01 | -1.10 | -1.27 | -1.41 | -1.34 | -1.46 | -1.68 | -2.06 | -1.62 | -1.93 | -2.31 |
| 40° | -1.26 | -1.26 | -1.77 | -1.91 | -1.84 | -1.74 | -2.11 | -2.52 | -2.28 | -2.38 | -2.78 |
| 45° | -1.64 | -1.74 | -2.02 | -2.09 | -2.21 | -2.28 | -2.69 | -2.89 | -2.97 | -3.03 | -3.31 |
| 50° | -1.93 | -2.02 | -2.22 | -2.54 | -2.77 | -3.02 | -3.19 | -3.29 | -3.57 | -3.83 | -4.09 |
| 55° | -2.58 | -2.65 | -2.99 | -3.12 | -3.28 | -3.46 | -3.77 | -3.92 | -4.17 | -4.58 | -4.99 |
| 60° | -2.75 | -3.14 | -3.45 | -3.70 | -3.62 | -3.90 | -4.36 | -4.69 | -4.81 | -5.21 | -5.81 |
| 65° | -3.12 | -3.40 | -3.94 | -4.13 | -4.17 | -4.20 | -5.00 | -5.46 | -5.50 | -5.91 | -6.47 |
| 70° | -3.43 | -3.81 | -4.35 | -4.78 | -4.68 | -4.79 | -5.33 | -6.12 | -6.23 | -6.74 | -7.18 |
| 75° | -3.98 | -4.07 | -4.74 | -5.17 | -5.46 | -5.55 | -6.06 | -6.59 | -6.91 | -7.56 | -8.21 |
| 80° | -4.11 | -4.67 | -4.95 | -5.51 | -5.92 | -6.43 | -7.11 | -7.37 | -7.51 | -8.18 | -8.92 |
| 85° | -4.47 | -4.95 | -5.49 | -5.80 | -6.27 | -7.07 | -8.06 | -8.47 | -8.12 | -8.69 | -9.20 |
| 90° | -5.12 | -5.50 | -6.11 | -6.15 | -6.75 | -7.36 | -8.47 | -8.81 | -8.89 | -9.65 | -10.41 |
| 95° | -5.44 | -5.71 | -6.95 | -6.96 | -7.14 | -7.66 | -8.45 | -8.89 | -9.42 | -10.61 | -11.90 |
| 100° | -5.84 | -6.16 | -7.08 | -7.44 | -8.08 | -8.19 | -8.47 | -9.29 | -10.03 | -11.13 | -12.34 |
| 105° | -5.91 | -6.35 | -7.39 | -7.77 | -8.19 | -8.56 | -9.57 | -10.30 | -10.33 | -11.31 | -12.05 |
| 110° | -6.04 | -6.56 | -7.45 | -7.82 | -8.62 | -8.97 | -10.12 | -10.81 | -11.10 | -11.82 | -12.57 |
| 115° | -6.01 | -6.71 | -7.56 | -7.84 | -8.70 | -9.27 | -10.80 | -10.73 | -11.21 | -12.18 | -14.08 |
| 120° | -6.50 | -6.83 | -7.44 | -7.78 | -8.90 | -9.47 | -10.65 | -10.73 | -11.73 | -12.80 | -14.50 |
| 125° | -6.60 | -7.20 | -8.01 | -8.22 | -9.04 | -9.24 | -10.30 | -10.95 | -11.48 | -13.40 | -14.14 |
| 130° | -7.09 | -7.76 | -8.19 | -8.59 | -9.49 | -9.70 | -10.66 | -11.27 | -11.08 | -13.21 | -13.15 |
| 135° | -7.34 | -7.80 | -8.44 | -9.61 | -10.12 | -10.10 | -11.21 | -12.12 | -11.73 | -13.27 | -14.13 |
| 140° | -7.03 | -7.85 | -8.92 | -9.78 | -9.74 | -9.99 | -11.63 | -13.18 | -12.52 | -13.53 | -15.89 |
| 145° | -6.02 | -6.93 | -7.96 | -8.34 | -8.93 | -10.05 | -12.10 | -12.74 | -12.04 | -13.19 | -15.36 |
| 150° | -5.50 | -5.92 | -6.43 | -7.12 | -8.14 | -9.44 | -10.38 | -10.38 | -10.58 | -12.86 | -15.08 |
| 155° | -6.29 | -6.97 | -7.65 | -7.79 | -7.89 | -8.28 | -9.05 | -9.41 | -10.29 | -12.35 | -13.30 |
| 160° | -5.06 | -5.75 | -6.48 | -7.23 | -8.32 | -9.58 | -10.51 | -10.70 | -10.88 | -12.15 | -12.23 |
| 165° | -6.90 | -6.90 | -7.07 | -7.12 | -7.58 | -8.31 | -9.19 | -9.65 | -10.48 | -12.35 | -13.01 |
| 170° | -10.70 | -11.33 | -12.16 | -12.35 | -12.47 | -12.68 | -12.73 | -12.52 | -12.50 | -13.60 | -13.59 |
| 175° | -7.28 | -8.14 | -9.11 | -10.14 | -11.21 | -12.64 | -13.70 | -14.81 | -15.90 | -18.02 | -19.05 |
| 180° | -5.52 | -6.15 | -6.83 | -7.57 | -8.33 | -9.33 | -10.18 | -10.77 | -11.50 | -13.23 | -13.60 |
| 185° | -6.60 | -7.37 | -8.21 | -9.13 | -10.04 | -11.30 | -12.33 | -13.15 | -14.00 | -16.13 | -17.06 |
| 190° | -9.97 | -10.93 | -12.15 | -12.93 | -13.77 | -14.45 | -14.83 | -14.64 | -14.58 | -15.57 | -15.50 |
| 195° | -7.86 | -7.89 | -8.00 | -7.95 | -8.26 | -8.80 | -9.59 | -9.85 | -10.34 | -12.49 | -13.19 |
| 200° | -5.20 | -5.77 | -6.44 | -7.12 | -7.95 | -9.25 | -10.68 | -11.19 | -11.69 | -13.24 | -13.64 |
| 205° | -6.10 | -7.06 | -8.18 | -8.48 | -8.59 | -8.81 | -9.47 | -9.41 | -9.66 | -11.85 | -13.22 |
| 210° | -5.76 | -6.06 | -6.41 | -6.70 | -7.38 | -8.70 | -10.16 | -10.45 | -10.02 | -11.51 | -13.70 |
| 215° | -5.45 | -6.53 | -7.89 | -8.33 | -8.57 | -9.27 | -11.67 | -13.63 | -12.64 | -12.67 | -14.75 |
| 220° | -6.78 | -7.50 | -8.80 | -10.26 | -10.30 | -9.87 | -11.26 | -14.16 | -13.32 | -12.91 | -16.45 |
| 225° | -7.57 | -7.94 | -8.63 | -9.79 | -10.65 | -10.15 | -10.69 | -12.74 | -12.76 | -12.86 | -14.69 |
| 230° | -7.12 | -8.07 | -8.48 | -8.55 | -9.95 | -10.34 | -10.15 | -11.44 | -11.34 | -12.81 | -14.44 |
| 235° | -6.57 | -7.57 | -8.48 | -7.95 | -8.76 | -9.82 | -10.34 | -11.95 | -11.17 | -13.20 | -14.39 |
| 240° | -6.31 | -6.62 | -7.90 | -8.11 | -8.99 | -9.63 | -10.48 | -11.65 | -11.43 | -13.01 | -14.40 |
| 245° | -6.64 | -6.80 | -7.80 | -7.84 | -8.58 | -9.22 | -10.90 | -11.17 | -10.97 | -12.25 | -14.19 |
| 250° | -6.20 | -6.55 | -7.54 | -7.93 | -8.67 | -8.48 | -10.19 | -11.45 | -11.35 | -12.03 | -13.37 |
| 255° | -6.12 | -6.51 | -7.37 | -7.65 | -8.40 | -8.71 | -9.66 | -10.82 | -10.99 | -11.13 | -12.71 |
| 260° | -5.69 | -6.08 | -7.14 | -8.04 | -8.19 | -8.30 | -9.18 | -9.71 | -10.50 | -11.07 | -12.80 |
| 265° | -5.38 | -6.26 | -6.64 | -7.48 | -7.83 | -7.72 | -8.62 | -9.32 | -9.65 | -10.46 | -12.13 |
| 270° | -4.91 | -5.68 | -6.26 | -6.66 | -6.99 | -7.69 | -8.36 | -9.25 | -9.15 | -9.89 | -10.49 |
| 275° | -4.79 | -5.29 | -5.50 | -6.27 | -6.48 | -7.16 | -8.16 | -8.92 | -8.77 | -9.18 | -9.77 |
| 280° | -4.40 | -4.55 | -5.41 | -5.67 | -6.24 | -6.66 | -7.58 | -7.74 | -7.79 | -8.20 | -9.12 |
| 285° | -3.92 | -4.32 | -4.91 | -5.47 | -5.77 | -6.08 | -6.33 | -6.83 | -7.01 | -7.69 | -8.62 |
| 290° | -3.49 | -3.93 | -4.60 | -5.09 | -5.18 | -5.17 | -5.63 | -6.25 | -6.51 | -7.04 | -7.73 |
| 295° | -3.23 | -3.57 | -4.26 | -4.52 | -4.54 | -4.45 | -5.18 | -5.84 | -5.89 | -6.27 | -6.82 |
| 300° | -2.99 | -3.40 | -3.84 | -3.89 | -3.79 | -4.05 | -4.72 | -5.07 | -5.12 | -5.50 | -6.29 |
| 305° | -2.70 | -2.82 | -3.02 | -3.09 | -3.29 | -3.62 | -4.01 | -4.30 | -4.50 | -4.75 | -5.41 |
| 310° | -2.05 | -2.06 | -2.37 | -2.59 | -2.89 | -3.17 | -3.55 | -3.58 | -3.74 | -3.98 | -4.38 |
| 315° | -1.82 | -2.01 | -2.27 | -2.39 | -2.48 | -2.67 | -2.90 | -3.04 | -3.14 | -3.29 | -3.65 |
| 320° | -1.33 | -1.23 | -1.67 | -1.95 | -2.02 | -1.97 | -2.34 | -2.80 | -2.57 | -2.61 | -3.05 |
| 325° | -1.11 | -1.27 | -1.47 | -1.51 | -1.56 | -1.65 | -1.84 | -2.13 | -1.86 | -2.03 | -2.50 |
| 330° | -0.55 | -0.72 | -1.03 | -1.19 | -1.16 | -1.15 | -1.73 | -1.60 | -1.43 | -1.76 | -1.87 |
| 335° | -0.68 | -0.77 | -0.91 | -0.87 | -0.74 | -0.89 | -0.99 | -1.17 | -0.89 | -1.19 | -1.36 |
| 340° | -0.34 | -0.31 | -0.38 | -0.40 | -0.57 | -0.57 | -0.89 | -0.68 | -0.62 | -0.84 | -0.86 |
| 345° | -0.04 | -0.08 | -0.23 | -0.24 | -0.28 | -0.34 | -0.49 | -0.44 | -0.38 | -0.52 | -0.49 |
| 350° | 0.00 | -0.07 | -0.20 | -0.14 | -0.07 | -0.18 | -0.06 | -0.30 | -0.09 | -0.17 | -0.12 |
| 355° | 0.00 | -0.03 | -0.08 | -0.04 | 0.00 | -0.03 | 0.03 | -0.07 | 0.00 | -0.03 | -0.01 |

Table A.27 Sensitivity variations of Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer, at sound incidence angles within $\pm\theta^\circ$ from the reference direction

| Nominal Frequency | Exact Frequency | Max Variation $\pm 30^\circ$ dB | Max Variation $\pm 90^\circ$ dB | Max Variation $\pm 150^\circ$ dB |
|-------------------|-----------------|---------------------------------|---------------------------------|----------------------------------|
| 500 Hz | 501.187 Hz | 0.04 | 0.24 | 0.38 |
| 630 Hz | 630.957 Hz | 0.03 | 0.21 | 0.50 |
| 800 Hz | 794.328 Hz | 0.02 | 0.22 | 0.60 |
| 1000 Hz | 1000 Hz | 0.08 | 0.36 | 0.76 |
| 1250 Hz | 1258.93 Hz | 0.10 | 0.22 | 0.83 |
| 1600 Hz | 1584.89 Hz | 0.07 | 0.54 | 1.09 |
| 2000 Hz | 1995.26 Hz | 0.20 | 0.78 | 1.30 |
| 2240 Hz | 2238.72 Hz | 0.06 | 0.95 | 1.43 |
| 2500 Hz | 2511.89 Hz | 0.21 | 1.08 | 1.63 |
| 2800 Hz | 2818.38 Hz | 0.12 | 0.94 | 1.71 |
| 3150 Hz | 3162.28 Hz | 0.35 | 1.14 | 1.86 |
| 3550 Hz | 3548.13 Hz | 0.13 | 1.33 | 1.73 |
| 4000 Hz | 3981.07 Hz | 0.25 | 1.44 | 1.94 |
| 4500 Hz | 4466.84 Hz | 0.38 | 1.60 | 2.44 |
| 5000 Hz | 5011.87 Hz | 0.34 | 1.69 | 2.67 |
| 5600 Hz | 5623.41 Hz | 0.65 | 2.09 | 3.17 |
| 6300 Hz | 6309.57 Hz | 0.68 | 2.65 | 3.72 |
| 7100 Hz | 7079.46 Hz | 0.51 | 2.80 | 4.30 |
| 8000 Hz | 7943.28 Hz | 0.40 | 3.22 | 4.98 |
| 8500 Hz | 8413.95 Hz | 0.73 | 3.49 | 5.66 |
| 9000 Hz | 8912.51 Hz | 0.88 | 3.97 | 6.00 |
| 9500 Hz | 9440.61 Hz | 0.98 | 4.52 | 6.56 |
| 10000 Hz | 10000 Hz | 0.69 | 4.75 | 7.12 |
| 10600 Hz | 10592.5 Hz | 0.75 | 5.19 | 7.61 |
| 11200 Hz | 11220.2 Hz | 0.69 | 5.28 | 7.95 |
| 11800 Hz | 11885.0 Hz | 0.84 | 5.70 | 8.91 |
| 12500 Hz | 12589.3 Hz | 1.06 | 6.28 | 9.19 |
| 13200 Hz | 13335.2 Hz | 1.21 | 6.68 | 10.27 |
| 14000 Hz | 14125.4 Hz | 1.17 | 7.00 | 11.96 |
| 15000 Hz | 14962.4 Hz | 1.16 | 7.70 | 11.77 |
| 16000 Hz | 15848.9 Hz | 1.76 | 8.50 | 12.14 |
| 17000 Hz | 16788.0 Hz | 1.62 | 9.26 | 14.18 |
| 18000 Hz | 17782.8 Hz | 1.45 | 9.16 | 14.95 |
| 19000 Hz | 18836.5 Hz | 1.77 | 9.91 | 15.64 |
| 20000 Hz | 19952.6 Hz | 1.90 | 10.52 | 17.82 |

Table A.28 Influence of Windscreen UA-1650 on directional response, with or without the Microphone Pre-amplifier ZC-0032 connected to a microphone extension cable, 500 Hz – 3550 Hz

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 500 Hz | 630 Hz | 800 Hz | 1000 Hz | 1250 Hz | 1600 Hz | 2000 Hz | 2240 Hz | 2500 Hz | 2800 Hz | 3150 Hz | 3550 Hz |
| 0° | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 |
| 5° | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 | -0.01 | -0.01 |
| 10° | -0.01 | 0.00 | 0.00 | -0.01 | -0.01 | 0.00 | -0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 15° | 0.00 | 0.00 | 0.00 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | 0.00 | -0.01 | 0.01 | 0.00 |
| 20° | 0.00 | 0.00 | 0.00 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | 0.00 | 0.00 | 0.02 | 0.01 |
| 25° | -0.01 | -0.01 | 0.00 | -0.01 | -0.01 | -0.02 | -0.01 | -0.02 | 0.00 | 0.00 | 0.03 | 0.03 |
| 30° | -0.01 | -0.01 | 0.00 | -0.01 | -0.02 | -0.02 | -0.02 | -0.02 | -0.01 | 0.00 | 0.04 | 0.04 |
| 35° | -0.01 | -0.02 | -0.01 | -0.01 | -0.03 | -0.03 | -0.03 | -0.03 | -0.02 | 0.01 | 0.05 | 0.06 |
| 40° | 0.00 | -0.01 | -0.01 | -0.02 | -0.04 | -0.04 | -0.05 | -0.03 | -0.03 | 0.02 | 0.06 | 0.07 |
| 45° | -0.01 | -0.02 | -0.02 | -0.02 | -0.05 | -0.05 | -0.07 | -0.04 | -0.04 | 0.02 | 0.06 | 0.09 |
| 50° | 0.00 | -0.01 | -0.02 | -0.02 | -0.06 | -0.06 | -0.08 | -0.06 | -0.05 | 0.01 | 0.07 | 0.11 |
| 55° | -0.01 | -0.01 | -0.02 | -0.03 | -0.07 | -0.08 | -0.10 | -0.08 | -0.06 | -0.01 | 0.07 | 0.12 |
| 60° | -0.01 | -0.01 | -0.03 | -0.04 | -0.07 | -0.10 | -0.11 | -0.11 | -0.07 | -0.01 | 0.07 | 0.14 |
| 65° | -0.01 | -0.01 | -0.03 | -0.05 | -0.08 | -0.12 | -0.12 | -0.13 | -0.10 | -0.02 | 0.07 | 0.15 |
| 70° | -0.01 | -0.01 | -0.03 | -0.05 | -0.09 | -0.13 | -0.14 | -0.14 | -0.13 | -0.04 | 0.06 | 0.15 |
| 75° | -0.02 | -0.02 | -0.04 | -0.06 | -0.09 | -0.15 | -0.16 | -0.15 | -0.15 | -0.06 | 0.06 | 0.15 |
| 80° | -0.02 | -0.02 | -0.04 | -0.06 | -0.10 | -0.16 | -0.19 | -0.17 | -0.16 | -0.09 | 0.04 | 0.14 |
| 85° | -0.03 | -0.03 | -0.04 | -0.07 | -0.11 | -0.17 | -0.22 | -0.19 | -0.18 | -0.10 | 0.01 | 0.14 |
| 90° | -0.02 | -0.02 | -0.05 | -0.07 | -0.12 | -0.18 | -0.23 | -0.22 | -0.20 | -0.11 | -0.01 | 0.12 |
| 95° | -0.02 | -0.03 | -0.05 | -0.07 | -0.13 | -0.18 | -0.24 | -0.24 | -0.23 | -0.14 | -0.02 | 0.09 |
| 100° | -0.02 | -0.03 | -0.05 | -0.07 | -0.12 | -0.19 | -0.25 | -0.25 | -0.24 | -0.17 | -0.04 | 0.08 |
| 105° | -0.02 | -0.02 | -0.06 | -0.07 | -0.12 | -0.19 | -0.26 | -0.26 | -0.25 | -0.19 | -0.08 | 0.06 |
| 110° | -0.03 | -0.03 | -0.05 | -0.08 | -0.12 | -0.19 | -0.26 | -0.27 | -0.25 | -0.19 | -0.09 | 0.02 |
| 115° | -0.03 | -0.04 | -0.05 | -0.07 | -0.12 | -0.19 | -0.26 | -0.27 | -0.26 | -0.18 | -0.08 | 0.00 |
| 120° | -0.04 | -0.04 | -0.05 | -0.07 | -0.12 | -0.19 | -0.26 | -0.26 | -0.26 | -0.18 | -0.07 | 0.03 |
| 125° | -0.03 | -0.03 | -0.05 | -0.07 | -0.12 | -0.18 | -0.25 | -0.25 | -0.26 | -0.18 | -0.07 | 0.04 |
| 130° | -0.03 | -0.04 | -0.05 | -0.07 | -0.13 | -0.18 | -0.25 | -0.24 | -0.24 | -0.17 | -0.06 | 0.04 |
| 135° | -0.03 | -0.04 | -0.05 | -0.07 | -0.12 | -0.17 | -0.24 | -0.23 | -0.23 | -0.15 | -0.04 | 0.06 |
| 140° | -0.03 | -0.04 | -0.05 | -0.07 | -0.12 | -0.16 | -0.24 | -0.22 | -0.22 | -0.13 | -0.03 | 0.08 |
| 145° | -0.03 | -0.04 | -0.06 | -0.08 | -0.13 | -0.15 | -0.24 | -0.22 | -0.21 | -0.12 | -0.01 | 0.11 |
| 150° | -0.03 | -0.04 | -0.06 | -0.08 | -0.12 | -0.15 | -0.24 | -0.22 | -0.20 | -0.12 | 0.00 | 0.12 |
| 155° | -0.03 | -0.04 | -0.06 | -0.07 | -0.13 | -0.15 | -0.23 | -0.22 | -0.20 | -0.11 | 0.01 | 0.13 |
| 160° | -0.03 | -0.04 | -0.06 | -0.07 | -0.13 | -0.15 | -0.23 | -0.21 | -0.19 | -0.11 | 0.02 | 0.13 |
| 165° | -0.03 | -0.04 | -0.06 | -0.07 | -0.13 | -0.15 | -0.23 | -0.21 | -0.19 | -0.10 | 0.02 | 0.14 |
| 170° | -0.03 | -0.04 | -0.06 | -0.07 | -0.13 | -0.15 | -0.22 | -0.21 | -0.19 | -0.10 | 0.03 | 0.15 |
| 175° | -0.04 | -0.04 | -0.06 | -0.07 | -0.13 | -0.16 | -0.22 | -0.21 | -0.19 | -0.10 | 0.03 | 0.15 |
| 180° | -0.05 | -0.05 | -0.05 | -0.07 | -0.13 | -0.16 | -0.22 | -0.21 | -0.19 | -0.10 | 0.03 | 0.15 |
| 185° | -0.03 | -0.03 | -0.06 | -0.07 | -0.12 | -0.16 | -0.23 | -0.21 | -0.19 | -0.10 | 0.03 | 0.15 |
| 190° | -0.04 | -0.05 | -0.06 | -0.07 | -0.13 | -0.16 | -0.23 | -0.22 | -0.20 | -0.11 | 0.02 | 0.14 |
| 195° | -0.03 | -0.04 | -0.06 | -0.07 | -0.13 | -0.16 | -0.23 | -0.22 | -0.20 | -0.11 | 0.02 | 0.13 |
| 200° | -0.03 | -0.04 | -0.06 | -0.07 | -0.13 | -0.16 | -0.24 | -0.22 | -0.21 | -0.12 | 0.01 | 0.13 |
| 205° | -0.03 | -0.04 | -0.06 | -0.07 | -0.13 | -0.16 | -0.24 | -0.23 | -0.21 | -0.12 | 0.00 | 0.12 |
| 210° | -0.03 | -0.04 | -0.06 | -0.07 | -0.13 | -0.16 | -0.24 | -0.23 | -0.22 | -0.12 | 0.00 | 0.11 |
| 215° | -0.03 | -0.04 | -0.06 | -0.08 | -0.13 | -0.16 | -0.25 | -0.23 | -0.22 | -0.13 | -0.01 | 0.10 |
| 220° | -0.04 | -0.05 | -0.06 | -0.08 | -0.13 | -0.17 | -0.25 | -0.23 | -0.22 | -0.14 | -0.03 | 0.08 |
| 225° | -0.04 | -0.04 | -0.06 | -0.08 | -0.13 | -0.18 | -0.25 | -0.24 | -0.23 | -0.15 | -0.05 | 0.05 |
| 230° | -0.03 | -0.04 | -0.06 | -0.08 | -0.13 | -0.18 | -0.25 | -0.25 | -0.24 | -0.17 | -0.07 | 0.04 |
| 235° | -0.03 | -0.04 | -0.06 | -0.08 | -0.13 | -0.19 | -0.26 | -0.26 | -0.26 | -0.19 | -0.07 | 0.04 |
| 240° | -0.03 | -0.04 | -0.06 | -0.08 | -0.12 | -0.20 | -0.26 | -0.27 | -0.26 | -0.19 | -0.07 | 0.03 |
| 245° | -0.03 | -0.04 | -0.06 | -0.08 | -0.13 | -0.20 | -0.27 | -0.27 | -0.26 | -0.18 | -0.08 | 0.00 |
| 250° | -0.03 | -0.04 | -0.05 | -0.08 | -0.13 | -0.20 | -0.26 | -0.27 | -0.26 | -0.19 | -0.09 | 0.01 |
| 255° | -0.03 | -0.04 | -0.06 | -0.08 | -0.13 | -0.20 | -0.26 | -0.26 | -0.25 | -0.19 | -0.08 | 0.06 |
| 260° | -0.02 | -0.03 | -0.05 | -0.07 | -0.13 | -0.19 | -0.25 | -0.25 | -0.25 | -0.18 | -0.04 | 0.08 |
| 265° | -0.03 | -0.04 | -0.05 | -0.07 | -0.13 | -0.18 | -0.24 | -0.24 | -0.23 | -0.14 | -0.01 | 0.09 |
| 270° | -0.02 | -0.03 | -0.05 | -0.07 | -0.12 | -0.17 | -0.23 | -0.22 | -0.21 | -0.11 | 0.00 | 0.11 |
| 275° | -0.04 | -0.04 | -0.04 | -0.07 | -0.12 | -0.16 | -0.21 | -0.20 | -0.18 | -0.10 | 0.01 | 0.15 |
| 280° | -0.02 | -0.02 | -0.04 | -0.07 | -0.10 | -0.15 | -0.19 | -0.17 | -0.16 | -0.08 | 0.04 | 0.15 |
| 285° | -0.02 | -0.03 | -0.04 | -0.06 | -0.10 | -0.14 | -0.16 | -0.15 | -0.14 | -0.05 | 0.06 | 0.15 |
| 290° | -0.02 | -0.02 | -0.04 | -0.05 | -0.09 | -0.13 | -0.14 | -0.13 | -0.12 | -0.03 | 0.07 | 0.16 |
| 295° | -0.01 | -0.01 | -0.03 | -0.05 | -0.08 | -0.11 | -0.12 | -0.12 | -0.09 | -0.01 | 0.07 | 0.16 |
| 300° | -0.02 | -0.03 | -0.03 | -0.04 | -0.07 | -0.09 | -0.11 | -0.10 | -0.06 | 0.00 | 0.08 | 0.15 |
| 305° | -0.01 | -0.02 | -0.03 | -0.03 | -0.06 | -0.08 | -0.09 | -0.07 | -0.05 | 0.01 | 0.08 | 0.14 |
| 310° | -0.01 | -0.02 | -0.02 | -0.03 | -0.05 | -0.06 | -0.08 | -0.05 | -0.04 | 0.02 | 0.08 | 0.12 |
| 315° | -0.02 | -0.03 | -0.02 | -0.02 | -0.04 | -0.05 | -0.06 | -0.03 | -0.03 | 0.03 | 0.07 | 0.11 |
| 320° | 0.00 | -0.01 | -0.01 | -0.02 | -0.03 | -0.03 | -0.04 | -0.02 | -0.02 | 0.02 | 0.07 | 0.08 |
| 325° | -0.01 | -0.01 | -0.01 | -0.01 | -0.02 | -0.02 | -0.02 | -0.02 | 0.00 | 0.02 | 0.07 | 0.07 |
| 330° | -0.01 | -0.01 | 0.00 | -0.01 | -0.01 | -0.02 | -0.01 | -0.01 | 0.01 | 0.02 | 0.06 | 0.06 |
| 335° | 0.00 | -0.01 | 0.00 | 0.00 | -0.01 | -0.01 | 0.00 | -0.01 | 0.01 | 0.02 | 0.05 | 0.05 |
| 340° | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.03 | 0.04 |
| 345° | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.02 | 0.03 | 0.03 |
| 350° | -0.01 | -0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 |
| 355° | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 |

Table A.29 Influence of Windscreen UA-1650 on directional response, with or without the Microphone Preamplifier ZC-0032 connected to a microphone extension cable, 4000 Hz – 10600 Hz

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|
| | 4000 Hz | 4500 Hz | 5000 Hz | 5600 Hz | 6300 Hz | 7100 Hz | 8000 Hz | 8500 Hz | 9000 Hz | 9500 Hz | 10000 Hz | 10600 Hz |
| 0° | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.02 | -0.02 | -0.01 | -0.01 | -0.01 |
| 5° | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.02 | -0.02 | -0.01 | 0.00 | 0.00 | -0.02 |
| 10° | -0.01 | -0.01 | -0.02 | -0.01 | 0.01 | 0.00 | -0.06 | -0.04 | -0.02 | 0.02 | 0.00 | -0.05 |
| 15° | -0.01 | -0.02 | -0.03 | -0.01 | 0.03 | 0.02 | -0.11 | -0.10 | -0.03 | 0.06 | 0.01 | -0.08 |
| 20° | 0.00 | -0.03 | -0.06 | -0.02 | 0.06 | 0.05 | -0.20 | -0.18 | -0.05 | 0.08 | 0.03 | -0.10 |
| 25° | 0.00 | -0.04 | -0.09 | -0.03 | 0.09 | 0.10 | -0.27 | -0.26 | -0.08 | 0.10 | 0.05 | -0.11 |
| 30° | 0.01 | -0.05 | -0.13 | -0.06 | 0.10 | 0.14 | -0.31 | -0.36 | -0.17 | 0.06 | 0.07 | -0.11 |
| 35° | 0.02 | -0.06 | -0.16 | -0.08 | 0.12 | 0.19 | -0.34 | -0.50 | -0.28 | 0.03 | 0.12 | -0.07 |
| 40° | 0.03 | -0.07 | -0.19 | -0.11 | 0.15 | 0.28 | -0.37 | -0.56 | -0.38 | -0.04 | 0.08 | -0.05 |
| 45° | 0.04 | -0.07 | -0.24 | -0.18 | 0.14 | 0.34 | -0.32 | -0.62 | -0.54 | -0.17 | 0.06 | 0.03 |
| 50° | 0.06 | -0.08 | -0.28 | -0.24 | 0.11 | 0.35 | -0.25 | -0.65 | -0.59 | -0.30 | -0.03 | 0.00 |
| 55° | 0.09 | -0.07 | -0.30 | -0.27 | 0.10 | 0.43 | -0.14 | -0.58 | -0.67 | -0.40 | -0.11 | -0.01 |
| 60° | 0.11 | -0.06 | -0.31 | -0.34 | 0.02 | 0.42 | -0.04 | -0.51 | -0.64 | -0.47 | -0.25 | -0.08 |
| 65° | 0.12 | -0.05 | -0.33 | -0.40 | 0.00 | 0.41 | 0.05 | -0.40 | -0.61 | -0.48 | -0.30 | -0.20 |
| 70° | 0.14 | -0.03 | -0.33 | -0.40 | -0.04 | 0.35 | 0.11 | -0.34 | -0.51 | -0.47 | -0.32 | -0.23 |
| 75° | 0.15 | -0.01 | -0.32 | -0.43 | -0.10 | 0.29 | 0.10 | -0.28 | -0.48 | -0.40 | -0.32 | -0.22 |
| 80° | 0.15 | -0.01 | -0.32 | -0.44 | -0.10 | 0.24 | 0.01 | -0.28 | -0.46 | -0.39 | -0.25 | -0.19 |
| 85° | 0.14 | -0.01 | -0.33 | -0.45 | -0.12 | 0.23 | -0.02 | -0.35 | -0.46 | -0.40 | -0.24 | -0.13 |
| 90° | 0.14 | -0.02 | -0.35 | -0.47 | -0.12 | 0.22 | -0.17 | -0.36 | -0.51 | -0.39 | -0.24 | -0.08 |
| 95° | 0.12 | -0.04 | -0.38 | -0.50 | -0.15 | 0.26 | -0.15 | -0.42 | -0.53 | -0.42 | -0.25 | -0.08 |
| 100° | 0.07 | -0.08 | -0.42 | -0.55 | -0.16 | 0.28 | -0.22 | -0.46 | -0.54 | -0.45 | -0.27 | -0.11 |
| 105° | 0.05 | -0.13 | -0.47 | -0.60 | -0.20 | 0.32 | -0.21 | -0.46 | -0.60 | -0.49 | -0.31 | -0.18 |
| 110° | 0.03 | -0.17 | -0.55 | -0.68 | -0.23 | 0.33 | -0.22 | -0.52 | -0.63 | -0.57 | -0.42 | -0.23 |
| 115° | -0.01 | -0.20 | -0.62 | -0.77 | -0.33 | 0.32 | -0.22 | -0.57 | -0.76 | -0.69 | -0.49 | -0.31 |
| 120° | -0.01 | -0.25 | -0.65 | -0.84 | -0.42 | 0.25 | -0.26 | -0.66 | -0.86 | -0.83 | -0.67 | -0.33 |
| 125° | 0.02 | -0.23 | -0.68 | -0.89 | -0.47 | 0.16 | -0.37 | -0.82 | -1.06 | -1.03 | -0.76 | -0.42 |
| 130° | 0.03 | -0.20 | -0.64 | -0.88 | -0.52 | 0.10 | -0.43 | -0.95 | -1.27 | -1.25 | -0.96 | -0.62 |
| 135° | 0.05 | -0.18 | -0.60 | -0.79 | -0.45 | 0.09 | -0.40 | -0.94 | -1.31 | -1.31 | -1.08 | -0.76 |
| 140° | 0.08 | -0.15 | -0.57 | -0.77 | -0.40 | 0.12 | -0.35 | -0.85 | -1.12 | -1.13 | -0.93 | -0.75 |
| 145° | 0.10 | -0.11 | -0.52 | -0.71 | -0.36 | 0.13 | -0.32 | -0.79 | -0.99 | -0.86 | -0.64 | -0.52 |
| 150° | 0.13 | -0.07 | -0.46 | -0.65 | -0.30 | 0.17 | -0.28 | -0.73 | -0.92 | -0.75 | -0.47 | -0.38 |
| 155° | 0.15 | -0.05 | -0.43 | -0.60 | -0.25 | 0.20 | -0.23 | -0.63 | -0.76 | -0.59 | -0.38 | -0.31 |
| 160° | 0.16 | -0.03 | -0.41 | -0.57 | -0.21 | 0.22 | -0.19 | -0.53 | -0.63 | -0.45 | -0.24 | -0.26 |
| 165° | 0.16 | -0.02 | -0.39 | -0.55 | -0.20 | 0.25 | -0.14 | -0.48 | -0.55 | -0.35 | -0.17 | -0.20 |
| 170° | 0.17 | 0.00 | -0.38 | -0.53 | -0.21 | 0.27 | -0.11 | -0.44 | -0.48 | -0.29 | -0.17 | -0.17 |
| 175° | 0.18 | 0.01 | -0.36 | -0.52 | -0.21 | 0.27 | -0.10 | -0.41 | -0.45 | -0.27 | -0.15 | -0.19 |
| 180° | 0.18 | 0.01 | -0.37 | -0.53 | -0.22 | 0.27 | -0.11 | -0.41 | -0.45 | -0.29 | -0.16 | -0.21 |
| 185° | 0.17 | 0.00 | -0.37 | -0.54 | -0.23 | 0.26 | -0.13 | -0.44 | -0.48 | -0.32 | -0.19 | -0.23 |
| 190° | 0.16 | -0.01 | -0.39 | -0.56 | -0.24 | 0.25 | -0.15 | -0.48 | -0.52 | -0.34 | -0.21 | -0.21 |
| 195° | 0.15 | -0.03 | -0.41 | -0.58 | -0.23 | 0.25 | -0.15 | -0.50 | -0.57 | -0.37 | -0.20 | -0.21 |
| 200° | 0.14 | -0.04 | -0.43 | -0.59 | -0.23 | 0.24 | -0.18 | -0.55 | -0.66 | -0.48 | -0.27 | -0.28 |
| 205° | 0.13 | -0.05 | -0.45 | -0.61 | -0.27 | 0.20 | -0.24 | -0.64 | -0.77 | -0.60 | -0.37 | -0.30 |
| 210° | 0.12 | -0.08 | -0.48 | -0.66 | -0.32 | 0.19 | -0.29 | -0.73 | -0.92 | -0.75 | -0.47 | -0.37 |
| 215° | 0.10 | -0.12 | -0.53 | -0.73 | -0.37 | 0.16 | -0.32 | -0.79 | -1.01 | -0.88 | -0.63 | -0.49 |
| 220° | 0.07 | -0.15 | -0.58 | -0.79 | -0.40 | 0.13 | -0.35 | -0.85 | -1.14 | -1.15 | -0.93 | -0.72 |
| 225° | 0.04 | -0.18 | -0.61 | -0.81 | -0.46 | 0.10 | -0.39 | -0.95 | -1.34 | -1.34 | -1.10 | -0.74 |
| 230° | 0.03 | -0.20 | -0.65 | -0.89 | -0.52 | 0.10 | -0.43 | -0.96 | -1.30 | -1.30 | -1.01 | -0.64 |
| 235° | 0.03 | -0.24 | -0.70 | -0.91 | -0.48 | 0.14 | -0.36 | -0.85 | -1.13 | -1.09 | -0.81 | -0.43 |
| 240° | -0.01 | -0.26 | -0.67 | -0.87 | -0.44 | 0.24 | -0.28 | -0.68 | -0.91 | -0.89 | -0.70 | -0.33 |
| 245° | -0.02 | -0.20 | -0.63 | -0.81 | -0.35 | 0.30 | -0.21 | -0.57 | -0.78 | -0.72 | -0.50 | -0.30 |
| 250° | 0.03 | -0.18 | -0.57 | -0.71 | -0.27 | 0.30 | -0.20 | -0.51 | -0.66 | -0.61 | -0.45 | -0.23 |
| 255° | 0.06 | -0.15 | -0.49 | -0.62 | -0.22 | 0.30 | -0.19 | -0.47 | -0.62 | -0.52 | -0.33 | -0.18 |
| 260° | 0.07 | -0.08 | -0.43 | -0.57 | -0.18 | 0.27 | -0.20 | -0.46 | -0.56 | -0.49 | -0.29 | -0.10 |
| 265° | 0.11 | -0.05 | -0.39 | -0.52 | -0.16 | 0.27 | -0.15 | -0.43 | -0.55 | -0.45 | -0.26 | -0.06 |
| 270° | 0.14 | -0.03 | -0.36 | -0.48 | -0.13 | 0.23 | -0.14 | -0.36 | -0.54 | -0.42 | -0.26 | -0.07 |
| 275° | 0.14 | -0.01 | -0.34 | -0.46 | -0.12 | 0.25 | -0.01 | -0.35 | -0.48 | -0.42 | -0.26 | -0.12 |
| 280° | 0.15 | -0.01 | -0.32 | -0.44 | -0.10 | 0.26 | 0.04 | -0.29 | -0.48 | -0.42 | -0.27 | -0.19 |
| 285° | 0.16 | -0.01 | -0.32 | -0.43 | -0.09 | 0.32 | 0.11 | -0.29 | -0.50 | -0.43 | -0.33 | -0.21 |
| 290° | 0.15 | -0.02 | -0.33 | -0.40 | -0.03 | 0.36 | 0.12 | -0.35 | -0.53 | -0.49 | -0.33 | -0.21 |
| 295° | 0.14 | -0.03 | -0.33 | -0.39 | 0.02 | 0.43 | 0.05 | -0.40 | -0.63 | -0.50 | -0.30 | -0.19 |
| 300° | 0.12 | -0.05 | -0.31 | -0.33 | 0.05 | 0.43 | -0.01 | -0.52 | -0.66 | -0.49 | -0.25 | -0.07 |
| 305° | 0.10 | -0.06 | -0.29 | -0.26 | 0.12 | 0.45 | -0.14 | -0.59 | -0.69 | -0.41 | -0.11 | 0.00 |
| 310° | 0.08 | -0.07 | -0.26 | -0.23 | 0.13 | 0.39 | -0.24 | -0.65 | -0.61 | -0.30 | -0.03 | 0.00 |
| 315° | 0.06 | -0.06 | -0.22 | -0.17 | 0.16 | 0.37 | -0.31 | -0.63 | -0.54 | -0.17 | 0.06 | 0.03 |
| 320° | 0.05 | -0.05 | -0.17 | -0.10 | 0.17 | 0.29 | -0.37 | -0.56 | -0.38 | -0.04 | 0.08 | -0.05 |
| 325° | 0.03 | -0.04 | -0.14 | -0.06 | 0.14 | 0.20 | -0.34 | -0.49 | -0.27 | 0.04 | 0.13 | -0.07 |
| 330° | 0.02 | -0.03 | -0.11 | -0.03 | 0.12 | 0.16 | -0.30 | -0.35 | -0.16 | 0.07 | 0.08 | -0.10 |
| 335° | 0.02 | -0.02 | -0.07 | -0.01 | 0.11 | 0.12 | -0.26 | -0.24 | -0.07 | 0.11 | 0.06 | -0.09 |
| 340° | 0.02 | 0.00 | -0.04 | 0.01 | 0.09 | 0.07 | -0.18 | -0.16 | -0.03 | 0.11 | 0.05 | -0.08 |
| 345° | 0.01 | 0.01 | -0.01 | 0.01 | 0.06 | 0.04 | -0.09 | -0.08 | -0.01 | 0.08 | 0.03 | -0.06 |
| 350° | 0.01 | 0.01 | 0.01 | 0.02 | 0.04 | 0.02 | -0.03 | -0.03 | 0.01 | 0.05 | 0.02 | -0.03 |
| 355° | 0.01 | 0.01 | 0.01 | 0.02 | 0.03 | 0.02 | 0.00 | 0.00 | 0.02 | 0.03 | 0.02 | 0.00 |

Table A.30 Influence of Windscreen UA-1650 on directional response, with or without the Microphone Preamplifier ZC-0032 connected to a microphone extension cable, 11200 Hz – 20000 Hz

| Angle | Frequency | | | | | | | | | | |
|-------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | 11200 Hz | 11800 Hz | 12500 Hz | 13200 Hz | 14000 Hz | 15000 Hz | 16000 Hz | 17000 Hz | 18000 Hz | 19000 Hz | 20000 Hz |
| 0° | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.02 |
| 5° | -0.03 | -0.02 | 0.00 | -0.01 | -0.03 | -0.01 | 0.00 | -0.01 | -0.02 | -0.01 | -0.03 |
| 10° | -0.08 | -0.05 | 0.00 | -0.03 | -0.09 | -0.02 | 0.01 | -0.02 | -0.04 | -0.02 | -0.08 |
| 15° | -0.16 | -0.11 | 0.01 | -0.05 | -0.17 | -0.09 | 0.04 | -0.03 | -0.11 | -0.05 | -0.15 |
| 20° | -0.25 | -0.18 | 0.00 | -0.09 | -0.26 | -0.20 | 0.04 | -0.06 | -0.20 | -0.12 | -0.22 |
| 25° | -0.35 | -0.25 | -0.01 | -0.08 | -0.36 | -0.30 | -0.07 | -0.02 | -0.27 | -0.25 | -0.31 |
| 30° | -0.46 | -0.39 | -0.09 | -0.07 | -0.38 | -0.46 | -0.16 | -0.04 | -0.28 | -0.33 | -0.37 |
| 35° | -0.49 | -0.50 | -0.18 | -0.09 | -0.40 | -0.51 | -0.33 | -0.06 | -0.21 | -0.36 | -0.40 |
| 40° | -0.52 | -0.63 | -0.30 | -0.11 | -0.33 | -0.54 | -0.40 | -0.17 | -0.08 | -0.25 | -0.37 |
| 45° | -0.46 | -0.65 | -0.41 | -0.18 | -0.31 | -0.49 | -0.40 | -0.29 | -0.02 | -0.09 | -0.30 |
| 50° | -0.43 | -0.68 | -0.53 | -0.29 | -0.29 | -0.40 | -0.38 | -0.40 | -0.16 | -0.04 | -0.29 |
| 55° | -0.36 | -0.64 | -0.57 | -0.39 | -0.32 | -0.41 | -0.39 | -0.47 | -0.39 | -0.19 | -0.36 |
| 60° | -0.38 | -0.61 | -0.58 | -0.52 | -0.43 | -0.47 | -0.46 | -0.52 | -0.58 | -0.41 | -0.44 |
| 65° | -0.45 | -0.66 | -0.63 | -0.62 | -0.55 | -0.56 | -0.53 | -0.54 | -0.65 | -0.50 | -0.53 |
| 70° | -0.51 | -0.71 | -0.70 | -0.73 | -0.66 | -0.60 | -0.56 | -0.58 | -0.63 | -0.54 | -0.81 |
| 75° | -0.51 | -0.74 | -0.73 | -0.79 | -0.80 | -0.65 | -0.59 | -0.66 | -0.71 | -0.66 | -0.90 |
| 80° | -0.45 | -0.69 | -0.73 | -0.78 | -0.90 | -0.82 | -0.74 | -0.82 | -0.80 | -0.79 | -0.85 |
| 85° | -0.37 | -0.58 | -0.70 | -0.78 | -0.94 | -1.02 | -1.01 | -1.04 | -0.80 | -0.66 | -0.77 |
| 90° | -0.32 | -0.51 | -0.64 | -0.81 | -0.95 | -1.08 | -1.14 | -1.13 | -0.83 | -0.54 | -0.91 |
| 95° | -0.29 | -0.54 | -0.68 | -0.90 | -0.91 | -1.00 | -0.93 | -0.94 | -0.81 | -0.84 | -1.70 |
| 100° | -0.33 | -0.57 | -0.75 | -1.07 | -0.94 | -0.81 | -0.65 | -0.66 | -0.86 | -1.27 | -1.98 |
| 105° | -0.36 | -0.57 | -0.74 | -1.03 | -1.05 | -0.87 | -0.57 | -0.61 | -0.88 | -1.35 | -1.35 |
| 110° | -0.39 | -0.54 | -0.61 | -0.89 | -1.09 | -0.91 | -0.80 | -0.99 | -0.99 | -1.05 | -0.90 |
| 115° | -0.42 | -0.49 | -0.51 | -0.74 | -1.10 | -0.94 | -0.86 | -1.05 | -1.12 | -1.27 | -1.01 |
| 120° | -0.40 | -0.44 | -0.50 | -0.79 | -1.10 | -0.84 | -0.82 | -0.88 | -1.32 | -1.22 | -1.30 |
| 125° | -0.48 | -0.55 | -0.64 | -0.90 | -1.04 | -0.71 | -0.58 | -0.76 | -1.30 | -1.14 | -1.29 |
| 130° | -0.70 | -0.76 | -0.96 | -1.32 | -1.09 | -0.55 | -0.48 | -0.79 | -0.94 | -0.87 | -0.95 |
| 135° | -0.92 | -1.18 | -1.61 | -1.97 | -1.32 | -0.81 | -0.82 | -1.58 | -0.59 | -0.52 | -0.82 |
| 140° | -0.99 | -1.42 | -1.93 | -2.12 | -1.62 | -1.54 | -1.96 | -2.68 | -1.05 | -0.71 | -1.78 |
| 145° | -0.86 | -1.33 | -1.70 | -1.71 | -1.58 | -1.79 | -2.53 | -2.83 | -1.56 | -1.77 | -3.84 |
| 150° | -0.80 | -1.21 | -1.29 | -1.12 | -1.14 | -1.61 | -2.29 | -2.00 | -1.49 | -2.18 | -4.05 |
| 155° | -0.74 | -1.17 | -1.15 | -0.84 | -0.84 | -1.54 | -1.89 | -1.21 | -0.94 | -2.22 | -2.77 |
| 160° | -0.71 | -1.02 | -0.88 | -0.57 | -0.77 | -1.49 | -1.73 | -0.86 | -0.77 | -2.32 | -1.91 |
| 165° | -0.67 | -0.89 | -0.66 | -0.40 | -0.68 | -1.44 | -1.37 | -0.53 | -0.64 | -2.22 | -1.47 |
| 170° | -0.58 | -0.79 | -0.47 | -0.23 | -0.59 | -1.32 | -1.16 | -0.33 | -0.57 | -2.09 | -1.28 |
| 175° | -0.57 | -0.74 | -0.47 | -0.21 | -0.58 | -1.19 | -1.07 | -0.25 | -0.43 | -1.93 | -1.08 |
| 180° | -0.60 | -0.75 | -0.48 | -0.25 | -0.60 | -1.21 | -1.08 | -0.30 | -0.43 | -1.95 | -1.03 |
| 185° | -0.62 | -0.80 | -0.54 | -0.29 | -0.64 | -1.28 | -1.22 | -0.39 | -0.49 | -2.08 | -1.24 |
| 190° | -0.61 | -0.83 | -0.51 | -0.24 | -0.60 | -1.36 | -1.25 | -0.37 | -0.56 | -2.18 | -1.38 |
| 195° | -0.67 | -0.92 | -0.70 | -0.43 | -0.70 | -1.50 | -1.54 | -0.64 | -0.62 | -2.39 | -1.76 |
| 200° | -0.73 | -1.05 | -0.95 | -0.59 | -0.74 | -1.52 | -1.88 | -0.90 | -0.69 | -2.49 | -2.34 |
| 205° | -0.73 | -1.21 | -1.24 | -0.88 | -0.83 | -1.57 | -2.09 | -1.29 | -0.79 | -2.26 | -3.02 |
| 210° | -0.80 | -1.26 | -1.40 | -1.15 | -1.08 | -1.56 | -2.44 | -2.15 | -1.37 | -2.11 | -4.31 |
| 215° | -0.82 | -1.36 | -1.80 | -1.80 | -1.54 | -1.74 | -2.59 | -3.04 | -1.46 | -1.56 | -4.08 |
| 220° | -0.96 | -1.42 | -2.02 | -2.24 | -1.68 | -1.46 | -1.99 | -3.04 | -1.21 | -0.72 | -2.45 |
| 225° | -0.89 | -1.22 | -1.73 | -2.11 | -1.49 | -0.77 | -0.94 | -1.76 | -0.53 | -0.53 | -1.05 |
| 230° | -0.68 | -0.84 | -1.08 | -1.40 | -1.11 | -0.54 | -0.56 | -0.85 | -0.82 | -0.94 | -1.40 |
| 235° | -0.47 | -0.57 | -0.71 | -0.96 | -1.03 | -0.71 | -0.71 | -0.85 | -1.14 | -0.98 | -2.13 |
| 240° | -0.39 | -0.46 | -0.56 | -0.87 | -1.08 | -0.81 | -0.99 | -1.11 | -1.14 | -0.86 | -1.81 |
| 245° | -0.41 | -0.52 | -0.59 | -0.81 | -1.06 | -0.85 | -1.00 | -1.36 | -1.03 | -0.95 | -1.15 |
| 250° | -0.37 | -0.57 | -0.70 | -0.97 | -1.05 | -0.80 | -0.82 | -1.30 | -1.04 | -0.75 | -0.95 |
| 255° | -0.33 | -0.59 | -0.82 | -1.15 | -1.07 | -0.76 | -0.55 | -0.81 | -0.97 | -1.25 | -1.60 |
| 260° | -0.29 | -0.57 | -0.83 | -1.19 | -0.98 | -0.73 | -0.65 | -0.77 | -0.88 | -1.16 | -2.36 |
| 265° | -0.26 | -0.53 | -0.76 | -1.02 | -0.95 | -0.95 | -0.95 | -1.06 | -0.83 | -0.71 | -1.96 |
| 270° | -0.29 | -0.51 | -0.71 | -0.90 | -0.97 | -1.02 | -1.19 | -1.32 | -0.86 | -0.41 | -1.04 |
| 275° | -0.35 | -0.59 | -0.75 | -0.86 | -0.94 | -0.95 | -1.07 | -1.21 | -0.89 | -0.59 | -0.90 |
| 280° | -0.43 | -0.70 | -0.78 | -0.86 | -0.90 | -0.77 | -0.77 | -0.93 | -0.86 | -0.76 | -1.00 |
| 285° | -0.50 | -0.74 | -0.80 | -0.87 | -0.80 | -0.63 | -0.61 | -0.73 | -0.71 | -0.60 | -1.07 |
| 290° | -0.50 | -0.72 | -0.77 | -0.80 | -0.66 | -0.59 | -0.60 | -0.65 | -0.61 | -0.54 | -0.92 |
| 295° | -0.44 | -0.67 | -0.70 | -0.66 | -0.53 | -0.55 | -0.57 | -0.60 | -0.65 | -0.53 | -0.66 |
| 300° | -0.37 | -0.63 | -0.62 | -0.52 | -0.39 | -0.46 | -0.50 | -0.56 | -0.60 | -0.46 | -0.49 |
| 305° | -0.37 | -0.66 | -0.59 | -0.38 | -0.29 | -0.41 | -0.43 | -0.51 | -0.42 | -0.22 | -0.40 |
| 310° | -0.44 | -0.70 | -0.54 | -0.28 | -0.27 | -0.42 | -0.42 | -0.44 | -0.17 | -0.06 | -0.32 |
| 315° | -0.48 | -0.66 | -0.41 | -0.17 | -0.32 | -0.52 | -0.45 | -0.34 | -0.03 | -0.12 | -0.36 |
| 320° | -0.52 | -0.63 | -0.29 | -0.10 | -0.35 | -0.57 | -0.45 | -0.20 | -0.08 | -0.29 | -0.42 |
| 325° | -0.48 | -0.49 | -0.17 | -0.09 | -0.40 | -0.53 | -0.37 | -0.08 | -0.22 | -0.40 | -0.44 |
| 330° | -0.45 | -0.37 | -0.07 | -0.07 | -0.39 | -0.48 | -0.19 | -0.05 | -0.29 | -0.36 | -0.40 |
| 335° | -0.34 | -0.23 | 0.01 | -0.07 | -0.35 | -0.32 | -0.08 | -0.01 | -0.28 | -0.27 | -0.33 |
| 340° | -0.23 | -0.15 | 0.02 | -0.07 | -0.25 | -0.21 | 0.04 | -0.03 | -0.20 | -0.13 | -0.23 |
| 345° | -0.14 | -0.08 | 0.03 | -0.03 | -0.17 | -0.10 | 0.05 | -0.02 | -0.11 | -0.05 | -0.14 |
| 350° | -0.06 | -0.03 | 0.03 | -0.01 | -0.09 | -0.02 | 0.02 | -0.01 | -0.03 | -0.02 | -0.06 |
| 355° | -0.01 | 0.00 | 0.02 | 0.01 | -0.01 | 0.01 | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 |

Table A.31 Directional response for Windscreen UA-1650, Microphone Type 4191 and Microphone Preamplifier ZC-0032 with the Microphone Preamplifier connected to a microphone extension cable, 500 Hz – 3550 Hz

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 500 Hz | 630 Hz | 800 Hz | 1000 Hz | 1250 Hz | 1600 Hz | 2000 Hz | 2240 Hz | 2500 Hz | 2800 Hz | 3150 Hz | 3550 Hz |
| 0° | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 |
| 5° | 0.00 | 0.01 | 0.00 | -0.01 | -0.01 | -0.01 | 0.00 | 0.00 | -0.02 | -0.02 | -0.01 | -0.01 |
| 10° | 0.00 | 0.00 | 0.00 | -0.02 | -0.01 | -0.01 | 0.00 | -0.01 | -0.01 | -0.03 | -0.02 | -0.01 |
| 15° | 0.01 | 0.01 | -0.01 | -0.03 | -0.02 | -0.03 | -0.01 | -0.02 | -0.03 | -0.05 | -0.02 | -0.02 |
| 20° | 0.01 | 0.01 | 0.00 | -0.01 | -0.02 | -0.04 | -0.02 | -0.03 | -0.04 | -0.07 | -0.04 | -0.04 |
| 25° | 0.00 | 0.00 | 0.00 | -0.03 | -0.03 | -0.06 | -0.04 | -0.04 | -0.06 | -0.11 | -0.07 | -0.07 |
| 30° | 0.01 | 0.00 | 0.00 | -0.03 | -0.06 | -0.08 | -0.07 | -0.05 | -0.09 | -0.14 | -0.11 | -0.11 |
| 35° | 0.00 | -0.01 | -0.02 | -0.05 | -0.08 | -0.11 | -0.10 | -0.08 | -0.12 | -0.18 | -0.15 | -0.15 |
| 40° | 0.01 | -0.01 | -0.03 | -0.06 | -0.10 | -0.14 | -0.13 | -0.11 | -0.16 | -0.21 | -0.20 | -0.20 |
| 45° | -0.01 | -0.03 | -0.05 | -0.07 | -0.13 | -0.17 | -0.17 | -0.14 | -0.19 | -0.25 | -0.26 | -0.26 |
| 50° | -0.01 | -0.03 | -0.06 | -0.08 | -0.15 | -0.20 | -0.22 | -0.17 | -0.22 | -0.29 | -0.31 | -0.32 |
| 55° | -0.02 | -0.04 | -0.07 | -0.11 | -0.17 | -0.25 | -0.26 | -0.22 | -0.25 | -0.34 | -0.36 | -0.37 |
| 60° | -0.02 | -0.04 | -0.08 | -0.13 | -0.19 | -0.29 | -0.31 | -0.27 | -0.29 | -0.39 | -0.42 | -0.42 |
| 65° | -0.03 | -0.05 | -0.09 | -0.15 | -0.21 | -0.33 | -0.36 | -0.33 | -0.35 | -0.43 | -0.49 | -0.48 |
| 70° | -0.04 | -0.06 | -0.10 | -0.16 | -0.24 | -0.37 | -0.42 | -0.39 | -0.41 | -0.48 | -0.55 | -0.55 |
| 75° | -0.05 | -0.07 | -0.11 | -0.18 | -0.26 | -0.41 | -0.48 | -0.44 | -0.47 | -0.53 | -0.60 | -0.63 |
| 80° | -0.06 | -0.08 | -0.13 | -0.20 | -0.29 | -0.44 | -0.54 | -0.50 | -0.53 | -0.59 | -0.65 | -0.68 |
| 85° | -0.07 | -0.10 | -0.14 | -0.21 | -0.31 | -0.48 | -0.60 | -0.57 | -0.58 | -0.64 | -0.72 | -0.74 |
| 90° | -0.07 | -0.09 | -0.15 | -0.23 | -0.33 | -0.51 | -0.65 | -0.63 | -0.66 | -0.69 | -0.77 | -0.82 |
| 95° | -0.08 | -0.11 | -0.16 | -0.23 | -0.36 | -0.53 | -0.69 | -0.69 | -0.73 | -0.76 | -0.81 | -0.90 |
| 100° | -0.08 | -0.11 | -0.16 | -0.25 | -0.37 | -0.56 | -0.72 | -0.74 | -0.78 | -0.84 | -0.88 | -0.94 |
| 105° | -0.07 | -0.11 | -0.17 | -0.25 | -0.38 | -0.58 | -0.75 | -0.78 | -0.84 | -0.90 | -0.95 | -0.99 |
| 110° | -0.09 | -0.12 | -0.17 | -0.27 | -0.38 | -0.59 | -0.78 | -0.81 | -0.87 | -0.94 | -1.01 | -1.08 |
| 115° | -0.09 | -0.12 | -0.18 | -0.27 | -0.38 | -0.59 | -0.79 | -0.84 | -0.90 | -0.97 | -1.05 | -1.14 |
| 120° | -0.10 | -0.13 | -0.18 | -0.26 | -0.38 | -0.59 | -0.79 | -0.84 | -0.92 | -1.00 | -1.07 | -1.15 |
| 125° | -0.09 | -0.12 | -0.18 | -0.25 | -0.38 | -0.58 | -0.78 | -0.83 | -0.92 | -1.01 | -1.09 | -1.17 |
| 130° | -0.09 | -0.12 | -0.18 | -0.25 | -0.37 | -0.56 | -0.77 | -0.81 | -0.90 | -0.99 | -1.08 | -1.18 |
| 135° | -0.09 | -0.12 | -0.17 | -0.24 | -0.36 | -0.54 | -0.75 | -0.78 | -0.87 | -0.96 | -1.05 | -1.17 |
| 140° | -0.08 | -0.12 | -0.17 | -0.24 | -0.35 | -0.51 | -0.72 | -0.74 | -0.83 | -0.91 | -1.00 | -1.11 |
| 145° | -0.08 | -0.11 | -0.17 | -0.23 | -0.34 | -0.49 | -0.70 | -0.71 | -0.78 | -0.85 | -0.93 | -1.04 |
| 150° | -0.08 | -0.11 | -0.16 | -0.23 | -0.33 | -0.47 | -0.67 | -0.67 | -0.72 | -0.80 | -0.87 | -0.95 |
| 155° | -0.08 | -0.11 | -0.16 | -0.21 | -0.32 | -0.46 | -0.63 | -0.64 | -0.69 | -0.74 | -0.79 | -0.87 |
| 160° | -0.08 | -0.11 | -0.16 | -0.21 | -0.32 | -0.44 | -0.60 | -0.61 | -0.65 | -0.69 | -0.73 | -0.80 |
| 165° | -0.07 | -0.11 | -0.15 | -0.20 | -0.31 | -0.44 | -0.58 | -0.58 | -0.61 | -0.64 | -0.67 | -0.72 |
| 170° | -0.07 | -0.11 | -0.15 | -0.19 | -0.31 | -0.42 | -0.56 | -0.56 | -0.59 | -0.61 | -0.63 | -0.67 |
| 175° | -0.08 | -0.11 | -0.15 | -0.20 | -0.30 | -0.42 | -0.56 | -0.55 | -0.57 | -0.59 | -0.60 | -0.64 |
| 180° | -0.09 | -0.11 | -0.14 | -0.19 | -0.30 | -0.42 | -0.55 | -0.54 | -0.56 | -0.58 | -0.59 | -0.63 |
| 185° | -0.07 | -0.09 | -0.15 | -0.21 | -0.30 | -0.42 | -0.56 | -0.55 | -0.58 | -0.59 | -0.60 | -0.64 |
| 190° | -0.08 | -0.11 | -0.15 | -0.20 | -0.31 | -0.43 | -0.57 | -0.57 | -0.59 | -0.61 | -0.63 | -0.68 |
| 195° | -0.08 | -0.11 | -0.16 | -0.22 | -0.31 | -0.43 | -0.59 | -0.59 | -0.62 | -0.64 | -0.68 | -0.73 |
| 200° | -0.08 | -0.11 | -0.16 | -0.20 | -0.32 | -0.45 | -0.62 | -0.62 | -0.66 | -0.69 | -0.73 | -0.80 |
| 205° | -0.08 | -0.12 | -0.16 | -0.22 | -0.34 | -0.47 | -0.65 | -0.65 | -0.70 | -0.74 | -0.80 | -0.87 |
| 210° | -0.08 | -0.12 | -0.16 | -0.22 | -0.35 | -0.48 | -0.68 | -0.69 | -0.74 | -0.80 | -0.87 | -0.96 |
| 215° | -0.08 | -0.12 | -0.17 | -0.23 | -0.35 | -0.51 | -0.71 | -0.73 | -0.79 | -0.85 | -0.94 | -1.05 |
| 220° | -0.10 | -0.13 | -0.17 | -0.24 | -0.36 | -0.53 | -0.73 | -0.76 | -0.83 | -0.91 | -1.00 | -1.12 |
| 225° | -0.09 | -0.13 | -0.17 | -0.25 | -0.37 | -0.55 | -0.76 | -0.79 | -0.86 | -0.96 | -1.06 | -1.18 |
| 230° | -0.09 | -0.13 | -0.18 | -0.25 | -0.38 | -0.57 | -0.78 | -0.82 | -0.90 | -0.99 | -1.09 | -1.20 |
| 235° | -0.09 | -0.13 | -0.19 | -0.25 | -0.39 | -0.59 | -0.79 | -0.84 | -0.92 | -1.02 | -1.09 | -1.19 |
| 240° | -0.10 | -0.13 | -0.18 | -0.26 | -0.39 | -0.59 | -0.80 | -0.85 | -0.92 | -1.01 | -1.07 | -1.17 |
| 245° | -0.10 | -0.13 | -0.18 | -0.26 | -0.39 | -0.60 | -0.80 | -0.84 | -0.91 | -0.98 | -1.04 | -1.15 |
| 250° | -0.09 | -0.12 | -0.17 | -0.25 | -0.39 | -0.60 | -0.79 | -0.82 | -0.88 | -0.95 | -1.02 | -1.10 |
| 255° | -0.08 | -0.12 | -0.17 | -0.25 | -0.39 | -0.58 | -0.77 | -0.80 | -0.84 | -0.92 | -0.96 | -0.99 |
| 260° | -0.07 | -0.11 | -0.16 | -0.24 | -0.38 | -0.56 | -0.74 | -0.76 | -0.81 | -0.85 | -0.86 | -0.93 |
| 265° | -0.08 | -0.11 | -0.16 | -0.23 | -0.36 | -0.54 | -0.71 | -0.72 | -0.74 | -0.76 | -0.79 | -0.89 |
| 270° | -0.07 | -0.10 | -0.15 | -0.22 | -0.34 | -0.52 | -0.67 | -0.65 | -0.66 | -0.69 | -0.75 | -0.84 |
| 275° | -0.08 | -0.10 | -0.14 | -0.20 | -0.33 | -0.49 | -0.62 | -0.58 | -0.58 | -0.63 | -0.70 | -0.78 |
| 280° | -0.06 | -0.08 | -0.13 | -0.20 | -0.29 | -0.46 | -0.56 | -0.51 | -0.52 | -0.57 | -0.64 | -0.74 |
| 285° | -0.05 | -0.08 | -0.12 | -0.17 | -0.28 | -0.42 | -0.49 | -0.44 | -0.45 | -0.52 | -0.61 | -0.69 |
| 290° | -0.04 | -0.07 | -0.11 | -0.16 | -0.25 | -0.38 | -0.43 | -0.38 | -0.39 | -0.47 | -0.57 | -0.61 |
| 295° | -0.03 | -0.05 | -0.09 | -0.15 | -0.22 | -0.34 | -0.36 | -0.32 | -0.33 | -0.43 | -0.52 | -0.53 |
| 300° | -0.03 | -0.06 | -0.08 | -0.12 | -0.20 | -0.30 | -0.31 | -0.26 | -0.29 | -0.40 | -0.46 | -0.45 |
| 305° | -0.02 | -0.04 | -0.07 | -0.10 | -0.18 | -0.26 | -0.26 | -0.21 | -0.25 | -0.37 | -0.40 | -0.37 |
| 310° | -0.01 | -0.03 | -0.06 | -0.08 | -0.15 | -0.21 | -0.21 | -0.16 | -0.23 | -0.31 | -0.33 | -0.30 |
| 315° | -0.02 | -0.04 | -0.05 | -0.06 | -0.12 | -0.17 | -0.16 | -0.13 | -0.20 | -0.27 | -0.26 | -0.24 |
| 320° | 0.01 | -0.01 | -0.03 | -0.05 | -0.10 | -0.13 | -0.12 | -0.10 | -0.16 | -0.22 | -0.19 | -0.19 |
| 325° | 0.01 | -0.01 | -0.02 | -0.04 | -0.07 | -0.11 | -0.08 | -0.07 | -0.12 | -0.18 | -0.13 | -0.14 |
| 330° | 0.01 | 0.00 | 0.00 | -0.02 | -0.04 | -0.07 | -0.05 | -0.06 | -0.10 | -0.13 | -0.09 | -0.09 |
| 335° | 0.01 | 0.00 | 0.00 | 0.01 | -0.03 | -0.05 | -0.02 | -0.03 | -0.06 | -0.09 | -0.05 | -0.05 |
| 340° | 0.01 | 0.00 | 0.00 | 0.00 | -0.02 | -0.03 | 0.00 | -0.01 | -0.04 | -0.05 | -0.02 | -0.02 |
| 345° | 0.01 | 0.01 | 0.00 | 0.02 | 0.00 | -0.01 | 0.01 | 0.00 | -0.02 | -0.02 | 0.00 | 0.00 |
| 350° | 0.00 | -0.01 | 0.00 | 0.02 | 0.01 | 0.00 | 0.02 | 0.02 | 0.00 | 0.00 | 0.01 | 0.02 |
| 355° | 0.01 | 0.00 | 0.00 | 0.03 | 0.01 | 0.01 | 0.02 | 0.02 | 0.00 | 0.00 | 0.03 | 0.03 |

Table A.32 Directional response for Windscreen UA-1650, Microphone Type 4191 and Microphone Preampifier ZC-0032, with the Microphone Preampifier connected to a microphone extension cable, 4000 Hz – 10600 Hz

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|
| | 4000 Hz | 4500 Hz | 5000 Hz | 5600 Hz | 6300 Hz | 7100 Hz | 8000 Hz | 8500 Hz | 9000 Hz | 9500 Hz | 10000 Hz | 10600 Hz |
| 0° | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.02 | -0.02 | -0.01 | -0.01 | -0.01 |
| 5° | -0.02 | -0.03 | -0.02 | -0.04 | -0.01 | -0.02 | -0.04 | -0.04 | -0.04 | -0.01 | -0.01 | -0.05 |
| 10° | -0.03 | -0.06 | -0.04 | -0.08 | -0.01 | -0.04 | -0.12 | -0.11 | -0.13 | -0.03 | -0.09 | -0.12 |
| 15° | -0.05 | -0.10 | -0.07 | -0.12 | -0.02 | -0.09 | -0.24 | -0.20 | -0.26 | -0.05 | -0.19 | -0.21 |
| 20° | -0.08 | -0.18 | -0.14 | -0.19 | -0.05 | -0.16 | -0.43 | -0.37 | -0.45 | -0.14 | -0.31 | -0.36 |
| 25° | -0.10 | -0.26 | -0.25 | -0.26 | -0.09 | -0.26 | -0.62 | -0.57 | -0.65 | -0.31 | -0.43 | -0.56 |
| 30° | -0.15 | -0.35 | -0.40 | -0.34 | -0.20 | -0.38 | -0.78 | -0.85 | -0.89 | -0.63 | -0.53 | -0.85 |
| 35° | -0.19 | -0.44 | -0.57 | -0.41 | -0.33 | -0.50 | -0.91 | -1.22 | -1.14 | -0.98 | -0.66 | -1.10 |
| 40° | -0.24 | -0.52 | -0.77 | -0.49 | -0.47 | -0.58 | -1.07 | -1.50 | -1.41 | -1.35 | -1.03 | -1.31 |
| 45° | -0.30 | -0.58 | -0.98 | -0.66 | -0.65 | -0.65 | -1.17 | -1.71 | -1.86 | -1.63 | -1.50 | -1.48 |
| 50° | -0.38 | -0.66 | -1.17 | -0.90 | -0.81 | -0.81 | -1.38 | -1.84 | -2.26 | -1.95 | -1.92 | -1.96 |
| 55° | -0.47 | -0.74 | -1.28 | -1.16 | -0.93 | -0.91 | -1.62 | -1.95 | -2.54 | -2.42 | -2.11 | -2.56 |
| 60° | -0.54 | -0.85 | -1.36 | -1.48 | -1.15 | -1.10 | -1.81 | -2.23 | -2.62 | -2.88 | -2.48 | -2.93 |
| 65° | -0.61 | -0.99 | -1.47 | -1.68 | -1.45 | -1.28 | -1.90 | -2.47 | -2.90 | -3.10 | -2.93 | -3.22 |
| 70° | -0.68 | -1.11 | -1.62 | -1.74 | -1.82 | -1.51 | -2.03 | -2.58 | -3.25 | -3.42 | -3.20 | -3.63 |
| 75° | -0.72 | -1.20 | -1.83 | -1.82 | -2.13 | -1.81 | -2.33 | -2.68 | -3.38 | -3.89 | -3.53 | -3.86 |
| 80° | -0.78 | -1.27 | -2.03 | -1.95 | -2.24 | -2.18 | -2.73 | -3.05 | -3.39 | -4.05 | -4.10 | -4.04 |
| 85° | -0.85 | -1.30 | -2.17 | -2.20 | -2.32 | -2.47 | -2.97 | -3.59 | -3.77 | -3.96 | -4.35 | -4.53 |
| 90° | -0.92 | -1.37 | -2.26 | -2.43 | -2.43 | -2.67 | -3.27 | -3.85 | -4.37 | -4.29 | -4.30 | -4.83 |
| 95° | -1.00 | -1.44 | -2.30 | -2.59 | -2.66 | -2.78 | -3.46 | -4.02 | -4.67 | -4.84 | -4.68 | -4.99 |
| 100° | -1.10 | -1.54 | -2.39 | -2.70 | -2.85 | -2.91 | -3.79 | -4.26 | -4.79 | -5.10 | -5.21 | -5.38 |
| 105° | -1.16 | -1.64 | -2.49 | -2.77 | -2.98 | -3.01 | -3.96 | -4.51 | -5.08 | -5.29 | -5.50 | -5.73 |
| 110° | -1.21 | -1.71 | -2.62 | -2.88 | -3.07 | -3.10 | -4.06 | -4.69 | -5.35 | -5.61 | -5.81 | -6.08 |
| 115° | -1.30 | -1.77 | -2.72 | -2.97 | -3.18 | -3.16 | -4.12 | -4.81 | -5.61 | -5.89 | -6.06 | -6.43 |
| 120° | -1.35 | -1.85 | -2.79 | -3.04 | -3.25 | -3.24 | -4.20 | -4.97 | -5.79 | -6.16 | -6.35 | -6.56 |
| 125° | -1.36 | -1.88 | -2.86 | -3.11 | -3.28 | -3.30 | -4.30 | -5.12 | -6.01 | -6.39 | -6.49 | -6.76 |
| 130° | -1.37 | -1.89 | -2.88 | -3.14 | -3.35 | -3.35 | -4.28 | -5.16 | -6.12 | -6.46 | -6.52 | -6.93 |
| 135° | -1.37 | -1.89 | -2.88 | -3.11 | -3.34 | -3.40 | -4.22 | -5.08 | -6.05 | -6.36 | -6.41 | -6.79 |
| 140° | -1.32 | -1.86 | -2.86 | -3.11 | -3.36 | -3.46 | -4.24 | -5.02 | -5.89 | -6.20 | -6.22 | -6.55 |
| 145° | -1.24 | -1.75 | -2.76 | -3.02 | -3.33 | -3.51 | -4.30 | -5.07 | -5.89 | -6.05 | -6.12 | -6.39 |
| 150° | -1.14 | -1.62 | -2.61 | -2.86 | -3.19 | -3.43 | -4.25 | -5.03 | -5.91 | -6.01 | -6.11 | -6.44 |
| 155° | -1.03 | -1.49 | -2.45 | -2.65 | -2.98 | -3.26 | -4.06 | -4.79 | -5.65 | -5.72 | -5.93 | -6.36 |
| 160° | -0.92 | -1.36 | -2.30 | -2.46 | -2.74 | -3.01 | -3.78 | -4.42 | -5.27 | -5.31 | -5.48 | -5.99 |
| 165° | -0.84 | -1.25 | -2.17 | -2.28 | -2.55 | -2.75 | -3.47 | -4.07 | -4.86 | -4.87 | -5.01 | -5.49 |
| 170° | -0.77 | -1.15 | -2.06 | -2.14 | -2.40 | -2.54 | -3.21 | -3.77 | -4.51 | -4.52 | -4.66 | -5.07 |
| 175° | -0.74 | -1.10 | -1.99 | -2.06 | -2.30 | -2.41 | -3.05 | -3.57 | -4.28 | -4.31 | -4.42 | -4.83 |
| 180° | -0.72 | -1.08 | -1.97 | -2.04 | -2.27 | -2.37 | -2.99 | -3.50 | -4.21 | -4.26 | -4.36 | -4.78 |
| 185° | -0.74 | -1.10 | -2.00 | -2.08 | -2.31 | -2.41 | -3.06 | -3.56 | -4.29 | -4.36 | -4.50 | -4.90 |
| 190° | -0.78 | -1.16 | -2.07 | -2.18 | -2.40 | -2.53 | -3.21 | -3.75 | -4.53 | -4.61 | -4.76 | -5.13 |
| 195° | -0.86 | -1.25 | -2.19 | -2.31 | -2.53 | -2.70 | -3.42 | -4.02 | -4.88 | -4.98 | -5.10 | -5.50 |
| 200° | -0.95 | -1.37 | -2.34 | -2.47 | -2.70 | -2.93 | -3.73 | -4.40 | -5.32 | -5.43 | -5.53 | -5.91 |
| 205° | -1.05 | -1.49 | -2.50 | -2.64 | -2.92 | -3.18 | -4.04 | -4.79 | -5.71 | -5.80 | -5.85 | -6.16 |
| 210° | -1.15 | -1.63 | -2.66 | -2.82 | -3.13 | -3.36 | -4.24 | -5.04 | -5.95 | -6.03 | -6.03 | -6.31 |
| 215° | -1.25 | -1.76 | -2.80 | -2.99 | -3.27 | -3.47 | -4.30 | -5.09 | -5.99 | -6.13 | -6.16 | -6.36 |
| 220° | -1.34 | -1.85 | -2.88 | -3.08 | -3.31 | -3.49 | -4.25 | -5.06 | -6.04 | -6.34 | -6.36 | -6.51 |
| 225° | -1.39 | -1.89 | -2.90 | -3.09 | -3.34 | -3.46 | -4.23 | -5.10 | -6.21 | -6.51 | -6.45 | -6.59 |
| 230° | -1.40 | -1.89 | -2.92 | -3.14 | -3.32 | -3.38 | -4.28 | -5.10 | -6.16 | -6.51 | -6.44 | -6.70 |
| 235° | -1.37 | -1.89 | -2.91 | -3.10 | -3.22 | -3.32 | -4.23 | -5.02 | -6.04 | -6.45 | -6.36 | -6.58 |
| 240° | -1.37 | -1.87 | -2.82 | -3.01 | -3.15 | -3.26 | -4.19 | -4.89 | -5.88 | -6.29 | -6.18 | -6.31 |
| 245° | -1.33 | -1.77 | -2.73 | -2.92 | -3.08 | -3.25 | -4.12 | -4.78 | -5.71 | -5.92 | -5.81 | -6.15 |
| 250° | -1.24 | -1.69 | -2.64 | -2.83 | -3.04 | -3.23 | -4.03 | -4.63 | -5.42 | -5.61 | -5.75 | -6.04 |
| 255° | -1.16 | -1.63 | -2.53 | -2.78 | -2.97 | -3.10 | -3.87 | -4.47 | -5.23 | -5.43 | -5.59 | -5.79 |
| 260° | -1.11 | -1.53 | -2.46 | -2.74 | -2.80 | -2.94 | -3.76 | -4.33 | -5.03 | -5.23 | -5.18 | -5.33 |
| 265° | -1.03 | -1.48 | -2.40 | -2.60 | -2.57 | -2.86 | -3.53 | -4.11 | -4.80 | -4.83 | -4.67 | -5.03 |
| 270° | -0.97 | -1.43 | -2.33 | -2.38 | -2.38 | -2.83 | -3.23 | -3.80 | -4.47 | -4.37 | -4.41 | -4.88 |
| 275° | -0.93 | -1.35 | -2.20 | -2.15 | -2.32 | -2.61 | -2.84 | -3.57 | -3.99 | -4.08 | -4.40 | -4.58 |
| 280° | -0.85 | -1.28 | -2.02 | -1.96 | -2.28 | -2.22 | -2.67 | -3.19 | -3.59 | -4.05 | -4.18 | -4.22 |
| 285° | -0.77 | -1.18 | -1.83 | -1.89 | -2.11 | -1.82 | -2.41 | -2.74 | -3.45 | -3.98 | -3.72 | -3.98 |
| 290° | -0.68 | -1.09 | -1.68 | -1.80 | -1.74 | -1.58 | -2.06 | -2.53 | -3.43 | -3.64 | -3.26 | -3.67 |
| 295° | -0.60 | -0.98 | -1.56 | -1.67 | -1.36 | -1.40 | -1.82 | -2.49 | -3.22 | -3.22 | -2.86 | -3.29 |
| 300° | -0.52 | -0.89 | -1.45 | -1.41 | -1.11 | -1.19 | -1.72 | -2.42 | -2.84 | -2.89 | -2.45 | -2.96 |
| 305° | -0.45 | -0.79 | -1.33 | -1.10 | -0.94 | -0.90 | -1.70 | -2.13 | -2.57 | -2.49 | -2.06 | -2.55 |
| 310° | -0.37 | -0.72 | -1.16 | -0.86 | -0.83 | -0.75 | -1.51 | -1.87 | -2.29 | -2.05 | -1.80 | -2.06 |
| 315° | -0.32 | -0.63 | -0.95 | -0.65 | -0.66 | -0.65 | -1.23 | -1.66 | -1.99 | -1.66 | -1.42 | -1.65 |
| 320° | -0.27 | -0.54 | -0.72 | -0.49 | -0.47 | -0.64 | -1.01 | -1.46 | -1.57 | -1.31 | -1.04 | -1.44 |
| 325° | -0.21 | -0.44 | -0.52 | -0.41 | -0.30 | -0.61 | -0.82 | -1.24 | -1.24 | -0.95 | -0.71 | -1.13 |
| 330° | -0.17 | -0.34 | -0.35 | -0.33 | -0.15 | -0.49 | -0.69 | -0.92 | -0.94 | -0.64 | -0.58 | -0.79 |
| 335° | -0.12 | -0.23 | -0.22 | -0.24 | -0.06 | -0.34 | -0.57 | -0.64 | -0.66 | -0.35 | -0.43 | -0.49 |
| 340° | -0.08 | -0.14 | -0.11 | -0.16 | -0.01 | -0.23 | -0.42 | -0.42 | -0.44 | -0.18 | -0.27 | -0.30 |
| 345° | -0.06 | -0.07 | -0.03 | -0.09 | 0.01 | -0.12 | -0.24 | -0.24 | -0.25 | -0.09 | -0.12 | -0.19 |
| 350° | -0.03 | -0.01 | 0.01 | -0.03 | 0.03 | -0.05 | -0.12 | -0.12 | -0.09 | -0.05 | -0.01 | -0.11 |
| 355° | -0.01 | 0.02 | 0.04 | 0.00 | 0.03 | 0.00 | -0.02 | -0.04 | 0.01 | -0.02 | 0.07 | -0.05 |

Table A.33 Directional response for Windscreen UA-1650, Microphone Type 4191 and Microphone Preamplifier ZC-0032 with the Microphone Preamplifier connected to a microphone extension cable, 11200 Hz – 20000 Hz

| Angle | Frequency | | | | | | | | | | |
|-------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | 11200 Hz | 11800 Hz | 12500 Hz | 13200 Hz | 14000 Hz | 15000 Hz | 16000 Hz | 17000 Hz | 18000 Hz | 19000 Hz | 20000 Hz |
| 0° | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.02 |
| 5° | -0.06 | -0.04 | -0.04 | -0.04 | -0.08 | -0.02 | -0.04 | -0.05 | -0.07 | -0.08 | -0.06 |
| 10° | -0.21 | -0.13 | -0.10 | -0.16 | -0.23 | -0.10 | -0.09 | -0.19 | -0.24 | -0.25 | -0.27 |
| 15° | -0.42 | -0.25 | -0.21 | -0.35 | -0.43 | -0.28 | -0.18 | -0.41 | -0.55 | -0.53 | -0.59 |
| 20° | -0.70 | -0.43 | -0.43 | -0.63 | -0.65 | -0.65 | -0.43 | -0.76 | -0.96 | -0.92 | -0.99 |
| 25° | -1.02 | -0.64 | -0.71 | -0.87 | -0.92 | -1.15 | -0.86 | -1.03 | -1.34 | -1.37 | -1.41 |
| 30° | -1.31 | -1.03 | -1.11 | -1.09 | -1.25 | -1.80 | -1.25 | -1.31 | -1.69 | -1.86 | -1.93 |
| 35° | -1.53 | -1.50 | -1.43 | -1.41 | -1.74 | -2.20 | -1.77 | -1.65 | -2.19 | -2.49 | -2.60 |
| 40° | -1.84 | -2.03 | -1.74 | -1.91 | -2.06 | -2.53 | -2.46 | -2.37 | -2.62 | -2.82 | -3.12 |
| 45° | -2.14 | -2.34 | -2.23 | -2.38 | -2.35 | -3.07 | -3.05 | -3.07 | -2.83 | -3.21 | -3.81 |
| 50° | -2.39 | -2.69 | -2.89 | -2.72 | -2.90 | -3.56 | -3.32 | -3.83 | -3.77 | -3.86 | -4.54 |
| 55° | -2.63 | -3.11 | -3.25 | -3.38 | -3.39 | -3.95 | -4.06 | -4.60 | -4.62 | -4.45 | -5.36 |
| 60° | -3.24 | -3.51 | -3.66 | -4.08 | -3.85 | -4.64 | -4.68 | -5.14 | -5.48 | -5.82 | -6.14 |
| 65° | -3.88 | -3.91 | -4.47 | -4.34 | -4.81 | -5.01 | -5.20 | -6.04 | -6.12 | -6.51 | -7.21 |
| 70° | -4.22 | -4.44 | -5.04 | -5.14 | -5.27 | -5.69 | -5.86 | -6.32 | -7.06 | -7.52 | -8.01 |
| 75° | -4.60 | -4.78 | -5.54 | -5.77 | -6.06 | -6.29 | -6.47 | -7.14 | -7.71 | -8.17 | -9.12 |
| 80° | -4.94 | -5.10 | -5.82 | -6.27 | -6.65 | -7.35 | -7.24 | -7.89 | -8.62 | -8.79 | -9.90 |
| 85° | -5.04 | -5.70 | -5.89 | -6.82 | -7.03 | -8.23 | -8.17 | -9.05 | -8.78 | -9.87 | -10.39 |
| 90° | -5.31 | -5.96 | -6.70 | -6.81 | -7.77 | -8.34 | -9.10 | -9.51 | -10.10 | -9.95 | -11.22 |
| 95° | -5.65 | -5.99 | -7.18 | -7.73 | -7.87 | -8.87 | -9.03 | -10.10 | -10.44 | -11.28 | -12.85 |
| 100° | -6.06 | -6.44 | -7.18 | -8.18 | -8.65 | -9.23 | -9.48 | -9.95 | -11.05 | -12.14 | -13.90 |
| 105° | -6.31 | -6.95 | -7.76 | -8.23 | -8.78 | -9.71 | -9.81 | -10.61 | -11.37 | -12.58 | -13.67 |
| 110° | -6.57 | -7.00 | -7.93 | -8.76 | -9.27 | -9.88 | -10.13 | -11.40 | -12.22 | -13.01 | -13.63 |
| 115° | -7.02 | -7.27 | -7.93 | -8.65 | -9.67 | -10.57 | -10.67 | -11.68 | -12.32 | -13.49 | -14.31 |
| 120° | -7.18 | -7.57 | -8.42 | -9.06 | -9.73 | -10.49 | -10.75 | -12.12 | -13.26 | -13.70 | -14.64 |
| 125° | -7.29 | -7.62 | -8.53 | -9.40 | -10.13 | -10.77 | -10.43 | -11.89 | -13.20 | -14.04 | -15.27 |
| 130° | -7.62 | -7.96 | -8.86 | -9.69 | -9.92 | -10.66 | -10.65 | -12.33 | -13.25 | -13.61 | -14.93 |
| 135° | -7.67 | -8.29 | -9.65 | -10.53 | -10.24 | -10.83 | -11.28 | -12.83 | -12.85 | -13.60 | -14.95 |
| 140° | -7.48 | -8.15 | -9.64 | -10.46 | -10.45 | -11.60 | -12.49 | -14.11 | -13.20 | -13.43 | -15.77 |
| 145° | -7.32 | -8.00 | -9.16 | -9.74 | -9.98 | -11.28 | -12.30 | -13.95 | -13.71 | -14.52 | -17.73 |
| 150° | -7.41 | -8.12 | -8.86 | -9.23 | -9.57 | -11.01 | -11.93 | -12.43 | -12.89 | -14.35 | -17.24 |
| 155° | -7.37 | -8.22 | -8.89 | -9.14 | -9.49 | -11.25 | -12.05 | -11.98 | -12.35 | -14.25 | -15.84 |
| 160° | -7.08 | -7.87 | -8.45 | -8.74 | -9.33 | -11.11 | -11.96 | -12.01 | -12.59 | -14.74 | -15.44 |
| 165° | -6.58 | -7.27 | -7.74 | -8.07 | -8.71 | -10.44 | -10.99 | -11.18 | -12.10 | -14.39 | -14.68 |
| 170° | -6.07 | -6.72 | -7.03 | -7.34 | -8.01 | -9.59 | -10.03 | -10.14 | -11.13 | -13.38 | -13.51 |
| 175° | -5.78 | -6.37 | -6.67 | -6.92 | -7.57 | -8.94 | -9.44 | -9.44 | -10.26 | -12.51 | -12.49 |
| 180° | -5.72 | -6.26 | -6.52 | -6.79 | -7.43 | -8.78 | -9.27 | -9.26 | -9.96 | -12.23 | -12.18 |
| 185° | -5.83 | -6.40 | -6.66 | -6.91 | -7.61 | -9.01 | -9.60 | -9.45 | -10.12 | -12.58 | -12.68 |
| 190° | -6.08 | -6.69 | -6.90 | -7.23 | -8.01 | -9.55 | -10.08 | -9.87 | -10.82 | -13.43 | -13.51 |
| 195° | -6.49 | -7.17 | -7.55 | -8.00 | -8.68 | -10.24 | -10.92 | -10.86 | -11.68 | -14.39 | -14.51 |
| 200° | -6.92 | -7.72 | -8.25 | -8.62 | -9.11 | -10.67 | -11.72 | -11.64 | -12.01 | -14.73 | -15.41 |
| 205° | -7.19 | -8.15 | -8.72 | -8.98 | -9.27 | -10.90 | -11.97 | -11.87 | -12.00 | -14.37 | -16.09 |
| 210° | -7.31 | -8.15 | -8.76 | -9.16 | -9.49 | -10.75 | -12.22 | -12.65 | -12.68 | -14.17 | -17.46 |
| 215° | -7.17 | -8.12 | -9.14 | -9.84 | -9.92 | -10.88 | -12.68 | -13.65 | -12.94 | -13.93 | -17.62 |
| 220° | -7.23 | -8.23 | -9.44 | -10.35 | -10.21 | -10.91 | -12.43 | -13.90 | -13.17 | -13.55 | -16.44 |
| 225° | -7.34 | -8.17 | -9.28 | -10.44 | -10.35 | -10.51 | -11.62 | -12.91 | -12.65 | -13.39 | -15.00 |
| 230° | -7.39 | -7.88 | -8.82 | -9.91 | -9.96 | -10.29 | -11.21 | -11.82 | -12.80 | -13.69 | -15.45 |
| 235° | -7.16 | -7.58 | -8.40 | -9.28 | -9.80 | -10.39 | -10.84 | -11.86 | -13.22 | -13.80 | -15.88 |
| 240° | -6.89 | -7.37 | -8.07 | -9.14 | -9.76 | -10.43 | -11.03 | -11.90 | -12.79 | -13.00 | -15.21 |
| 245° | -6.77 | -7.38 | -8.06 | -8.99 | -9.51 | -10.16 | -10.68 | -11.62 | -12.31 | -12.89 | -14.24 |
| 250° | -6.62 | -7.30 | -7.93 | -8.78 | -9.08 | -9.61 | -10.15 | -11.42 | -12.13 | -12.40 | -13.82 |
| 255° | -6.31 | -6.95 | -7.61 | -8.51 | -8.77 | -9.44 | -9.68 | -10.59 | -11.66 | -12.43 | -13.70 |
| 260° | -5.98 | -6.49 | -7.26 | -8.36 | -8.49 | -9.02 | -9.58 | -9.96 | -10.93 | -11.92 | -14.31 |
| 265° | -5.69 | -6.07 | -7.06 | -7.88 | -7.91 | -8.94 | -9.11 | -9.85 | -10.48 | -11.19 | -13.16 |
| 270° | -5.34 | -5.92 | -6.69 | -7.07 | -7.76 | -8.23 | -9.29 | -9.55 | -10.18 | -9.78 | -11.40 |
| 275° | -5.11 | -5.74 | -5.94 | -6.91 | -6.99 | -8.00 | -8.38 | -8.98 | -9.00 | -9.63 | -10.53 |
| 280° | -4.98 | -5.11 | -5.73 | -6.41 | -6.54 | -7.48 | -7.14 | -8.00 | -8.66 | -8.65 | -10.01 |
| 285° | -4.53 | -4.74 | -5.53 | -5.86 | -6.16 | -6.25 | -6.63 | -7.03 | -7.78 | -8.02 | -9.39 |
| 290° | -4.13 | -4.45 | -4.99 | -5.38 | -5.19 | -5.81 | -5.89 | -6.31 | -7.10 | -7.46 | -8.07 |
| 295° | -3.80 | -3.90 | -4.59 | -4.40 | -4.80 | -5.08 | -5.32 | -5.91 | -6.17 | -6.64 | -7.51 |
| 300° | -3.21 | -3.59 | -3.75 | -4.02 | -3.95 | -4.65 | -4.63 | -5.25 | -5.56 | -5.94 | -6.22 |
| 305° | -2.76 | -3.18 | -3.13 | -3.58 | -3.29 | -4.11 | -4.07 | -4.61 | -4.71 | -4.59 | -5.54 |
| 310° | -2.53 | -2.58 | -2.90 | -2.80 | -2.92 | -3.66 | -3.30 | -3.87 | -3.91 | -3.87 | -4.60 |
| 315° | -2.10 | -2.24 | -2.32 | -2.37 | -2.43 | -3.22 | -3.00 | -3.10 | -2.91 | -3.35 | -3.97 |
| 320° | -1.65 | -2.09 | -1.67 | -2.02 | -2.04 | -2.68 | -2.55 | -2.43 | -2.64 | -2.85 | -3.25 |
| 325° | -1.38 | -1.61 | -1.30 | -1.56 | -1.72 | -2.29 | -1.89 | -1.65 | -2.31 | -2.57 | -2.73 |
| 330° | -1.28 | -1.04 | -1.08 | -1.13 | -1.30 | -1.87 | -1.34 | -1.25 | -1.74 | -1.94 | -2.04 |
| 335° | -1.08 | -0.58 | -0.76 | -0.85 | -0.97 | -1.23 | -0.91 | -1.05 | -1.32 | -1.37 | -1.47 |
| 340° | -0.77 | -0.33 | -0.47 | -0.62 | -0.69 | -0.73 | -0.44 | -0.79 | -0.98 | -0.91 | -1.04 |
| 345° | -0.47 | -0.18 | -0.23 | -0.35 | -0.44 | -0.38 | -0.18 | -0.44 | -0.60 | -0.52 | -0.63 |
| 350° | -0.22 | -0.06 | -0.08 | -0.16 | -0.22 | -0.16 | -0.05 | -0.16 | -0.27 | -0.24 | -0.26 |
| 355° | -0.06 | 0.02 | -0.01 | -0.03 | -0.04 | -0.06 | 0.01 | -0.01 | -0.08 | -0.06 | -0.04 |

Table A.34 Sensitivity variations for Windscreen UA-1650, Microphone Type 4191 and Microphone Preamplifier ZC-0032, with the Microphone Preamplifier connected to a microphone extension cable, at sound incidence angles within $\pm\theta^\circ$ from the reference direction

| Nominal Frequency | Exact Frequency | Max Variation $\pm 30^\circ$ dB | Max Variation $\pm 90^\circ$ dB | Max Variation $\pm 150^\circ$ dB |
|-------------------|-----------------|---------------------------------|---------------------------------|----------------------------------|
| 500 Hz | 501.187 Hz | 0.03 | 0.27 | 0.31 |
| 630 Hz | 630.957 Hz | 0.03 | 0.33 | 0.39 |
| 800 Hz | 794.328 Hz | 0.01 | 0.15 | 0.19 |
| 1000 Hz | 1000 Hz | 0.06 | 0.25 | 0.30 |
| 1250 Hz | 1258.93 Hz | 0.07 | 0.35 | 0.40 |
| 1600 Hz | 1584.89 Hz | 0.09 | 0.52 | 0.61 |
| 2000 Hz | 1995.26 Hz | 0.09 | 0.69 | 0.83 |
| 2240 Hz | 2238.72 Hz | 0.08 | 0.68 | 0.87 |
| 2500 Hz | 2511.89 Hz | 0.11 | 0.67 | 0.94 |
| 2800 Hz | 2818.38 Hz | 0.15 | 0.70 | 1.03 |
| 3150 Hz | 3162.28 Hz | 0.14 | 0.79 | 1.12 |
| 3550 Hz | 3548.13 Hz | 0.14 | 0.87 | 1.23 |
| 4000 Hz | 3981.07 Hz | 0.18 | 0.98 | 1.41 |
| 4500 Hz | 4466.84 Hz | 0.38 | 1.45 | 1.92 |
| 5000 Hz | 5011.87 Hz | 0.44 | 2.37 | 2.95 |
| 5600 Hz | 5623.41 Hz | 0.36 | 2.44 | 3.15 |
| 6300 Hz | 6309.57 Hz | 0.23 | 2.47 | 3.39 |
| 7100 Hz | 7079.46 Hz | 0.50 | 2.84 | 3.53 |
| 8000 Hz | 7943.28 Hz | 0.80 | 3.28 | 4.32 |
| 8500 Hz | 8413.95 Hz | 0.94 | 3.87 | 5.18 |
| 9000 Hz | 8912.51 Hz | 0.96 | 4.49 | 6.23 |
| 9500 Hz | 9440.61 Hz | 0.66 | 4.38 | 6.53 |
| 10000 Hz | 10000 Hz | 0.65 | 4.48 | 6.60 |
| 10600 Hz | 10592.5 Hz | 0.86 | 4.89 | 6.95 |
| 11200 Hz | 11220.2 Hz | 1.33 | 5.35 | 7.69 |
| 11800 Hz | 11885.0 Hz | 1.07 | 5.98 | 8.31 |
| 12500 Hz | 12589.3 Hz | 1.13 | 6.72 | 9.66 |
| 13200 Hz | 13335.2 Hz | 1.15 | 7.09 | 10.54 |
| 14000 Hz | 14125.4 Hz | 1.31 | 7.79 | 10.47 |
| 15000 Hz | 14962.4 Hz | 1.88 | 8.35 | 11.61 |
| 16000 Hz | 15848.9 Hz | 1.35 | 9.30 | 12.69 |
| 17000 Hz | 16788.0 Hz | 1.33 | 9.57 | 14.12 |
| 18000 Hz | 17782.8 Hz | 1.75 | 10.19 | 13.72 |
| 19000 Hz | 18836.5 Hz | 1.95 | 9.96 | 14.54 |
| 20000 Hz | 19952.6 Hz | 2.05 | 11.42 | 17.74 |

Table A.35 Directional response for Windscreen UA-1650, Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer, measured in a plane parallel to the display and along the microphone's axis, 500 Hz – 3550 Hz

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 500 Hz | 630 Hz | 800 Hz | 1000 Hz | 1250 Hz | 1600 Hz | 2000 Hz | 2240 Hz | 2500 Hz | 2800 Hz | 3150 Hz | 3550 Hz |
| 0° | 0.00 | 0.00 | -0.01 | 0.00 | 0.00 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 |
| 5° | 0.01 | 0.01 | -0.01 | 0.00 | 0.00 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 |
| 10° | 0.00 | 0.00 | -0.01 | 0.01 | -0.03 | -0.01 | -0.03 | 0.00 | -0.03 | 0.00 | -0.03 | -0.02 |
| 15° | 0.02 | 0.00 | -0.01 | 0.02 | -0.04 | -0.02 | -0.06 | 0.00 | -0.07 | 0.00 | -0.07 | -0.02 |
| 20° | 0.02 | 0.01 | -0.01 | 0.02 | -0.06 | -0.02 | -0.10 | 0.01 | -0.11 | 0.00 | -0.13 | -0.02 |
| 25° | 0.01 | 0.00 | -0.01 | 0.04 | -0.09 | -0.05 | -0.15 | 0.00 | -0.14 | -0.02 | -0.19 | -0.02 |
| 30° | 0.02 | 0.02 | -0.02 | 0.05 | -0.11 | -0.08 | -0.21 | -0.02 | -0.16 | -0.06 | -0.25 | -0.04 |
| 35° | 0.01 | 0.01 | -0.02 | 0.07 | -0.11 | -0.15 | -0.25 | -0.09 | -0.14 | -0.14 | -0.26 | -0.09 |
| 40° | 0.04 | 0.05 | -0.03 | 0.07 | -0.10 | -0.24 | -0.26 | -0.18 | -0.11 | -0.24 | -0.27 | -0.17 |
| 45° | 0.03 | 0.06 | -0.03 | 0.05 | -0.07 | -0.36 | -0.26 | -0.29 | -0.10 | -0.33 | -0.30 | -0.24 |
| 50° | 0.03 | 0.07 | -0.01 | 0.05 | -0.04 | -0.47 | -0.24 | -0.38 | -0.17 | -0.37 | -0.37 | -0.28 |
| 55° | 0.00 | 0.07 | 0.02 | 0.03 | 0.00 | -0.55 | -0.24 | -0.40 | -0.33 | -0.33 | -0.50 | -0.32 |
| 60° | -0.01 | 0.07 | 0.05 | 0.02 | 0.01 | -0.57 | -0.32 | -0.36 | -0.51 | -0.32 | -0.61 | -0.39 |
| 65° | -0.04 | 0.06 | 0.08 | 0.04 | 0.01 | -0.52 | -0.50 | -0.32 | -0.61 | -0.46 | -0.63 | -0.50 |
| 70° | -0.06 | 0.04 | 0.10 | 0.07 | -0.02 | -0.44 | -0.71 | -0.40 | -0.55 | -0.70 | -0.63 | -0.59 |
| 75° | -0.09 | 0.00 | 0.11 | 0.10 | -0.05 | -0.36 | -0.86 | -0.62 | -0.46 | -0.84 | -0.78 | -0.64 |
| 80° | -0.10 | -0.02 | 0.12 | 0.16 | -0.07 | -0.32 | -0.85 | -0.88 | -0.55 | -0.77 | -1.04 | -0.72 |
| 85° | -0.13 | -0.06 | 0.11 | 0.20 | -0.07 | -0.33 | -0.70 | -0.99 | -0.84 | -0.71 | -1.11 | -0.97 |
| 90° | -0.17 | -0.11 | 0.07 | 0.25 | -0.02 | -0.38 | -0.52 | -0.84 | -1.09 | -0.90 | -1.00 | -1.20 |
| 95° | -0.20 | -0.16 | 0.03 | 0.27 | 0.05 | -0.43 | -0.43 | -0.59 | -1.02 | -1.21 | -1.06 | -1.15 |
| 100° | -0.24 | -0.21 | -0.04 | 0.25 | 0.14 | -0.44 | -0.47 | -0.43 | -0.67 | -1.24 | -1.37 | -1.11 |
| 105° | -0.27 | -0.26 | -0.12 | 0.20 | 0.20 | -0.37 | -0.57 | -0.47 | -0.41 | -0.84 | -1.45 | -1.33 |
| 110° | -0.28 | -0.31 | -0.20 | 0.11 | 0.20 | -0.28 | -0.61 | -0.61 | -0.43 | -0.47 | -1.03 | -1.37 |
| 115° | -0.30 | -0.35 | -0.29 | 0.00 | 0.14 | -0.22 | -0.52 | -0.68 | -0.64 | -0.47 | -0.58 | -0.89 |
| 120° | -0.31 | -0.37 | -0.36 | -0.12 | 0.03 | -0.24 | -0.38 | -0.56 | -0.76 | -0.75 | -0.61 | -0.44 |
| 125° | -0.31 | -0.38 | -0.41 | -0.23 | -0.12 | -0.36 | -0.30 | -0.38 | -0.62 | -0.88 | -0.95 | -0.58 |
| 130° | -0.30 | -0.38 | -0.44 | -0.32 | -0.27 | -0.56 | -0.39 | -0.31 | -0.40 | -0.70 | -1.05 | -1.00 |
| 135° | -0.29 | -0.35 | -0.44 | -0.37 | -0.39 | -0.77 | -0.64 | -0.46 | -0.37 | -0.50 | -0.79 | -1.00 |
| 140° | -0.27 | -0.34 | -0.41 | -0.38 | -0.45 | -0.93 | -0.97 | -0.81 | -0.63 | -0.59 | -0.65 | -0.69 |
| 145° | -0.26 | -0.31 | -0.38 | -0.36 | -0.44 | -0.99 | -1.23 | -1.17 | -1.06 | -1.00 | -0.93 | -0.70 |
| 150° | -0.23 | -0.27 | -0.33 | -0.31 | -0.38 | -0.93 | -1.32 | -1.38 | -1.41 | -1.47 | -1.49 | -1.20 |
| 155° | -0.22 | -0.25 | -0.29 | -0.23 | -0.29 | -0.80 | -1.23 | -1.34 | -1.48 | -1.69 | -1.91 | -1.79 |
| 160° | -0.20 | -0.21 | -0.24 | -0.16 | -0.19 | -0.64 | -1.02 | -1.12 | -1.28 | -1.53 | -1.88 | -1.94 |
| 165° | -0.19 | -0.19 | -0.20 | -0.10 | -0.10 | -0.48 | -0.79 | -0.83 | -0.95 | -1.16 | -1.49 | -1.57 |
| 170° | -0.17 | -0.18 | -0.17 | -0.05 | -0.03 | -0.36 | -0.59 | -0.59 | -0.65 | -0.79 | -1.03 | -1.05 |
| 175° | -0.18 | -0.17 | -0.15 | -0.02 | 0.02 | -0.28 | -0.46 | -0.43 | -0.45 | -0.53 | -0.71 | -0.66 |
| 180° | -0.16 | -0.16 | -0.15 | 0.00 | 0.03 | -0.26 | -0.42 | -0.37 | -0.38 | -0.44 | -0.59 | -0.51 |
| 185° | -0.17 | -0.16 | -0.15 | -0.02 | 0.02 | -0.29 | -0.46 | -0.42 | -0.44 | -0.52 | -0.69 | -0.64 |
| 190° | -0.18 | -0.18 | -0.17 | -0.05 | -0.03 | -0.37 | -0.57 | -0.57 | -0.63 | -0.76 | -0.99 | -1.02 |
| 195° | -0.19 | -0.20 | -0.21 | -0.09 | -0.10 | -0.49 | -0.75 | -0.80 | -0.92 | -1.12 | -1.44 | -1.55 |
| 200° | -0.22 | -0.24 | -0.24 | -0.14 | -0.20 | -0.64 | -0.98 | -1.08 | -1.25 | -1.48 | -1.85 | -1.95 |
| 205° | -0.23 | -0.26 | -0.29 | -0.21 | -0.30 | -0.80 | -1.18 | -1.30 | -1.46 | -1.66 | -1.93 | -1.85 |
| 210° | -0.24 | -0.28 | -0.33 | -0.27 | -0.40 | -0.92 | -1.28 | -1.36 | -1.41 | -1.47 | -1.55 | -1.27 |
| 215° | -0.26 | -0.31 | -0.38 | -0.33 | -0.47 | -0.97 | -1.21 | -1.18 | -1.08 | -1.03 | -0.99 | -0.74 |
| 220° | -0.28 | -0.34 | -0.41 | -0.36 | -0.48 | -0.91 | -0.96 | -0.83 | -0.65 | -0.63 | -0.68 | -0.68 |
| 225° | -0.30 | -0.37 | -0.42 | -0.35 | -0.43 | -0.74 | -0.65 | -0.48 | -0.38 | -0.52 | -0.77 | -0.97 |
| 230° | -0.30 | -0.38 | -0.42 | -0.30 | -0.31 | -0.53 | -0.40 | -0.31 | -0.40 | -0.70 | -1.03 | -1.02 |
| 235° | -0.33 | -0.39 | -0.39 | -0.22 | -0.16 | -0.33 | -0.31 | -0.37 | -0.62 | -0.88 | -0.97 | -0.62 |
| 240° | -0.32 | -0.37 | -0.33 | -0.12 | 0.00 | -0.20 | -0.38 | -0.56 | -0.78 | -0.77 | -0.66 | -0.44 |
| 245° | -0.30 | -0.34 | -0.27 | 0.00 | 0.12 | -0.18 | -0.54 | -0.69 | -0.69 | -0.51 | -0.61 | -0.85 |
| 250° | -0.30 | -0.31 | -0.18 | 0.10 | 0.20 | -0.25 | -0.63 | -0.64 | -0.48 | -0.48 | -1.01 | -1.37 |
| 255° | -0.25 | -0.24 | -0.10 | 0.18 | 0.20 | -0.35 | -0.61 | -0.50 | -0.43 | -0.82 | -1.45 | -1.35 |
| 260° | -0.23 | -0.19 | -0.01 | 0.24 | 0.15 | -0.43 | -0.50 | -0.45 | -0.65 | -1.23 | -1.37 | -1.12 |
| 265° | -0.21 | -0.15 | 0.04 | 0.25 | 0.07 | -0.44 | -0.45 | -0.57 | -1.00 | -1.23 | -1.06 | -1.12 |
| 270° | -0.16 | -0.08 | 0.09 | 0.24 | 0.00 | -0.40 | -0.51 | -0.82 | -1.11 | -0.89 | -1.00 | -1.19 |
| 275° | -0.14 | -0.04 | 0.11 | 0.20 | -0.05 | -0.35 | -0.67 | -0.98 | -0.87 | -0.69 | -1.11 | -0.98 |
| 280° | -0.11 | -0.01 | 0.12 | 0.15 | -0.06 | -0.34 | -0.82 | -0.90 | -0.55 | -0.75 | -1.05 | -0.70 |
| 285° | -0.09 | 0.01 | 0.11 | 0.11 | -0.04 | -0.37 | -0.84 | -0.65 | -0.44 | -0.83 | -0.78 | -0.63 |
| 290° | -0.06 | 0.04 | 0.10 | 0.07 | -0.02 | -0.44 | -0.72 | -0.42 | -0.52 | -0.70 | -0.60 | -0.62 |
| 295° | -0.02 | 0.07 | 0.07 | 0.04 | 0.00 | -0.52 | -0.51 | -0.33 | -0.59 | -0.45 | -0.61 | -0.52 |
| 300° | -0.01 | 0.08 | 0.05 | 0.03 | 0.01 | -0.56 | -0.33 | -0.35 | -0.49 | -0.30 | -0.61 | -0.38 |
| 305° | 0.00 | 0.07 | 0.02 | 0.04 | 0.00 | -0.54 | -0.25 | -0.40 | -0.29 | -0.31 | -0.51 | -0.30 |
| 310° | 0.02 | 0.06 | -0.01 | 0.05 | -0.04 | -0.46 | -0.24 | -0.38 | -0.12 | -0.37 | -0.37 | -0.29 |
| 315° | 0.02 | 0.05 | -0.03 | 0.07 | -0.07 | -0.35 | -0.26 | -0.29 | -0.05 | -0.35 | -0.27 | -0.25 |
| 320° | 0.05 | 0.05 | -0.04 | 0.07 | -0.10 | -0.23 | -0.27 | -0.16 | -0.07 | -0.26 | -0.24 | -0.16 |
| 325° | 0.03 | 0.02 | -0.03 | 0.07 | -0.11 | -0.14 | -0.25 | -0.06 | -0.12 | -0.14 | -0.25 | -0.05 |
| 330° | 0.02 | 0.01 | -0.01 | 0.07 | -0.10 | -0.07 | -0.20 | 0.02 | -0.14 | -0.04 | -0.24 | 0.01 |
| 335° | 0.03 | 0.01 | -0.01 | 0.06 | -0.09 | -0.03 | -0.14 | 0.04 | -0.14 | 0.01 | -0.19 | 0.03 |
| 340° | 0.02 | 0.02 | 0.00 | 0.03 | -0.06 | -0.01 | -0.08 | 0.05 | -0.10 | 0.03 | -0.13 | 0.03 |
| 345° | 0.01 | 0.00 | 0.00 | 0.02 | -0.04 | 0.00 | -0.04 | 0.04 | -0.06 | 0.03 | -0.07 | 0.02 |
| 350° | 0.01 | 0.00 | 0.00 | 0.01 | -0.01 | 0.01 | -0.01 | 0.03 | -0.02 | 0.03 | -0.02 | 0.02 |
| 355° | 0.02 | 0.02 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.02 | 0.00 | 0.02 | 0.01 | 0.02 |

Table A.36 Directional response for Windscreen UA-1650, Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer, measured in a plane parallel to the display and along the microphone's axis, 4000 Hz – 10600 Hz

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|
| | 4000 Hz | 4500 Hz | 5000 Hz | 5600 Hz | 6300 Hz | 7100 Hz | 8000 Hz | 8500 Hz | 9000 Hz | 9500 Hz | 10000 Hz | 10600 Hz |
| 0° | -0.01 | -0.02 | -0.02 | -0.02 | -0.01 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 | -0.01 | -0.02 |
| 5° | -0.01 | -0.02 | -0.03 | -0.03 | -0.01 | -0.03 | -0.04 | -0.04 | -0.05 | -0.06 | -0.06 | -0.04 |
| 10° | -0.01 | -0.05 | -0.09 | -0.08 | 0.01 | -0.06 | -0.12 | -0.14 | -0.18 | -0.18 | -0.19 | -0.12 |
| 15° | -0.03 | -0.11 | -0.21 | -0.21 | -0.02 | -0.06 | -0.29 | -0.32 | -0.36 | -0.33 | -0.32 | -0.20 |
| 20° | -0.07 | -0.22 | -0.35 | -0.42 | -0.16 | -0.03 | -0.52 | -0.53 | -0.46 | -0.45 | -0.34 | -0.27 |
| 25° | -0.14 | -0.34 | -0.42 | -0.61 | -0.39 | -0.04 | -0.65 | -0.66 | -0.50 | -0.54 | -0.29 | -0.37 |
| 30° | -0.23 | -0.41 | -0.35 | -0.63 | -0.56 | -0.22 | -0.65 | -0.85 | -0.79 | -0.90 | -0.53 | -0.79 |
| 35° | -0.27 | -0.42 | -0.29 | -0.57 | -0.49 | -0.35 | -0.82 | -1.20 | -1.24 | -1.16 | -0.92 | -1.15 |
| 40° | -0.28 | -0.48 | -0.49 | -0.82 | -0.58 | -0.31 | -1.20 | -1.38 | -1.40 | -1.21 | -1.18 | -1.18 |
| 45° | -0.32 | -0.67 | -0.79 | -1.24 | -1.01 | -0.57 | -1.31 | -1.52 | -1.74 | -1.82 | -1.67 | -1.71 |
| 50° | -0.45 | -0.80 | -0.78 | -1.15 | -0.96 | -0.94 | -1.43 | -1.94 | -1.99 | -2.06 | -1.73 | -2.07 |
| 55° | -0.57 | -0.76 | -0.79 | -1.18 | -1.07 | -0.94 | -1.61 | -2.02 | -2.29 | -2.45 | -2.38 | -2.22 |
| 60° | -0.59 | -0.85 | -1.19 | -1.62 | -1.61 | -1.39 | -1.88 | -2.29 | -2.64 | -2.59 | -2.73 | -2.81 |
| 65° | -0.59 | -1.11 | -1.28 | -1.50 | -1.46 | -1.23 | -2.12 | -2.51 | -2.82 | -3.23 | -2.79 | -3.17 |
| 70° | -0.71 | -1.13 | -1.26 | -1.85 | -1.84 | -1.83 | -2.31 | -2.92 | -3.11 | -3.33 | -3.48 | -3.26 |
| 75° | -0.85 | -1.11 | -1.63 | -2.08 | -1.77 | -1.68 | -2.43 | -3.08 | -3.69 | -3.68 | -3.77 | -3.89 |
| 80° | -0.90 | -1.28 | -1.54 | -2.07 | -2.20 | -2.16 | -2.92 | -3.17 | -3.82 | -4.32 | -3.98 | -4.45 |
| 85° | -1.01 | -1.40 | -1.64 | -2.52 | -2.28 | -2.04 | -2.83 | -3.64 | -3.79 | -4.55 | -4.62 | -4.54 |
| 90° | -1.25 | -1.49 | -1.86 | -2.19 | -2.58 | -2.56 | -3.37 | -3.57 | -4.36 | -4.44 | -4.78 | -4.90 |
| 95° | -1.53 | -1.81 | -1.91 | -2.71 | -2.45 | -2.55 | -3.53 | -3.99 | -4.41 | -4.77 | -4.93 | -4.92 |
| 100° | -1.58 | -2.14 | -2.34 | -2.61 | -2.76 | -2.64 | -3.66 | -4.32 | -4.63 | -5.12 | -5.04 | -5.57 |
| 105° | -1.55 | -2.23 | -2.72 | -3.21 | -2.83 | -2.65 | -3.87 | -4.28 | -4.95 | -5.52 | -5.32 | -5.93 |
| 110° | -1.66 | -2.20 | -2.89 | -3.61 | -3.36 | -2.80 | -3.70 | -4.22 | -4.86 | -5.36 | -5.94 | -5.95 |
| 115° | -1.59 | -2.22 | -2.86 | -3.78 | -3.94 | -3.55 | -4.27 | -4.73 | -5.06 | -5.33 | -5.52 | -5.73 |
| 120° | -1.02 | -1.96 | -2.61 | -3.77 | -3.94 | -4.03 | -5.15 | -5.37 | -5.96 | -6.38 | -5.87 | -5.83 |
| 125° | -0.62 | -1.36 | -2.27 | -3.10 | -3.78 | -3.92 | -5.25 | -6.45 | -7.02 | -7.34 | -7.37 | -7.40 |
| 130° | -0.93 | -1.15 | -1.69 | -2.77 | -2.77 | -3.09 | -5.12 | -5.79 | -6.77 | -7.62 | -8.07 | -8.18 |
| 135° | -1.40 | -1.64 | -1.71 | -2.25 | -2.56 | -2.23 | -3.43 | -4.77 | -5.99 | -6.92 | -6.98 | -7.26 |
| 140° | -1.22 | -1.95 | -2.39 | -2.68 | -2.41 | -2.28 | -3.24 | -3.67 | -4.31 | -5.01 | -5.43 | -6.16 |
| 145° | -0.92 | -1.60 | -2.39 | -3.32 | -3.11 | -2.62 | -3.48 | -4.21 | -4.68 | -4.94 | -4.90 | -4.92 |
| 150° | -1.21 | -1.57 | -2.02 | -2.93 | -3.33 | -3.32 | -4.17 | -4.71 | -5.21 | -5.39 | -5.27 | -5.80 |
| 155° | -1.92 | -2.21 | -2.39 | -2.92 | -3.03 | -3.05 | -4.36 | -5.12 | -5.80 | -6.27 | -6.13 | -6.20 |
| 160° | -2.32 | -2.85 | -3.23 | -3.76 | -3.67 | -3.44 | -4.23 | -4.83 | -5.36 | -5.81 | -6.09 | -6.58 |
| 165° | -2.02 | -2.70 | -3.37 | -4.24 | -4.35 | -4.42 | -5.28 | -5.71 | -6.18 | -6.37 | -6.33 | -6.72 |
| 170° | -1.41 | -2.01 | -2.66 | -3.56 | -3.74 | -3.96 | -5.27 | -5.91 | -6.58 | -7.03 | -7.33 | -7.87 |
| 175° | -0.92 | -1.41 | -1.92 | -2.68 | -2.72 | -2.73 | -3.87 | -4.45 | -5.00 | -5.47 | -5.85 | -6.41 |
| 180° | -0.74 | -1.19 | -1.65 | -2.34 | -2.31 | -2.19 | -3.18 | -3.71 | -4.15 | -4.53 | -4.81 | -5.26 |
| 185° | -0.91 | -1.39 | -1.89 | -2.66 | -2.68 | -2.66 | -3.76 | -4.36 | -4.90 | -5.35 | -5.73 | -6.27 |
| 190° | -1.39 | -1.98 | -2.60 | -3.51 | -3.67 | -3.83 | -5.10 | -5.79 | -6.48 | -6.93 | -7.25 | -7.80 |
| 195° | -2.02 | -2.69 | -3.33 | -4.24 | -4.33 | -4.38 | -5.24 | -5.73 | -6.20 | -6.40 | -6.36 | -6.79 |
| 200° | -2.35 | -2.90 | -3.29 | -3.85 | -3.74 | -3.51 | -4.27 | -4.84 | -5.34 | -5.82 | -6.12 | -6.60 |
| 205° | -1.99 | -2.30 | -2.48 | -2.99 | -3.08 | -3.10 | -4.39 | -5.17 | -5.82 | -6.29 | -6.21 | -6.20 |
| 210° | -1.28 | -1.63 | -2.05 | -2.95 | -3.31 | -3.32 | -4.22 | -4.72 | -5.27 | -5.42 | -5.22 | -5.79 |
| 215° | -0.93 | -1.59 | -2.38 | -3.35 | -3.12 | -2.67 | -3.52 | -4.28 | -4.81 | -5.09 | -5.04 | -4.96 |
| 220° | -1.17 | -1.94 | -2.41 | -2.74 | -2.46 | -2.34 | -3.30 | -3.76 | -4.33 | -4.94 | -5.29 | -6.02 |
| 225° | -1.38 | -1.71 | -1.73 | -2.31 | -2.56 | -2.22 | -3.34 | -4.60 | -5.90 | -6.85 | -7.03 | -7.10 |
| 230° | -0.97 | -1.18 | -1.68 | -2.79 | -2.77 | -3.03 | -5.04 | -5.82 | -6.78 | -7.61 | -8.06 | -8.19 |
| 235° | -0.63 | -1.34 | -2.26 | -3.10 | -3.69 | -3.90 | -5.19 | -6.44 | -7.09 | -7.51 | -7.45 | -7.49 |
| 240° | -1.01 | -1.94 | -2.60 | -3.72 | -4.01 | -3.97 | -5.25 | -5.46 | -6.02 | -6.43 | -5.99 | -5.84 |
| 245° | -1.60 | -2.18 | -2.82 | -3.85 | -3.97 | -3.63 | -4.18 | -4.79 | -5.12 | -5.38 | -5.53 | -5.71 |
| 250° | -1.64 | -2.18 | -2.95 | -3.62 | -3.51 | -2.84 | -3.75 | -4.23 | -4.80 | -5.42 | -5.93 | -5.89 |
| 255° | -1.50 | -2.25 | -2.79 | -3.30 | -2.89 | -2.71 | -3.79 | -4.30 | -4.95 | -5.61 | -5.30 | -5.84 |
| 260° | -1.55 | -2.21 | -2.38 | -2.64 | -2.78 | -2.58 | -3.69 | -4.34 | -4.70 | -5.13 | -5.04 | -5.56 |
| 265° | -1.58 | -1.83 | -1.92 | -2.72 | -2.43 | -2.59 | -3.57 | -3.98 | -4.39 | -4.74 | -5.02 | -4.90 |
| 270° | -1.29 | -1.51 | -1.89 | -2.24 | -2.61 | -2.52 | -3.27 | -3.55 | -4.37 | -4.51 | -4.83 | -4.92 |
| 275° | -1.01 | -1.41 | -1.67 | -2.51 | -2.29 | -2.05 | -2.82 | -3.66 | -3.84 | -4.61 | -4.64 | -4.56 |
| 280° | -0.91 | -1.28 | -1.56 | -2.12 | -2.21 | -2.10 | -2.92 | -3.24 | -3.87 | -4.32 | -3.99 | -4.49 |
| 285° | -0.86 | -1.12 | -1.64 | -2.06 | -1.76 | -1.70 | -2.43 | -3.08 | -3.71 | -3.71 | -3.81 | -3.88 |
| 290° | -0.70 | -1.13 | -1.26 | -1.87 | -1.81 | -1.83 | -2.31 | -2.96 | -3.16 | -3.43 | -3.53 | -3.22 |
| 295° | -0.59 | -1.09 | -1.25 | -1.45 | -1.45 | -1.21 | -2.12 | -2.56 | -2.89 | -3.32 | -2.79 | -3.17 |
| 300° | -0.61 | -0.83 | -1.14 | -1.60 | -1.62 | -1.36 | -1.85 | -2.31 | -2.66 | -2.61 | -2.73 | -2.84 |
| 305° | -0.56 | -0.74 | -0.81 | -1.14 | -1.11 | -0.89 | -1.67 | -2.03 | -2.30 | -2.50 | -2.40 | -2.22 |
| 310° | -0.43 | -0.78 | -0.76 | -1.13 | -0.96 | -0.90 | -1.41 | -2.00 | -2.02 | -2.05 | -1.79 | -2.06 |
| 315° | -0.31 | -0.63 | -0.75 | -1.26 | -1.01 | -0.58 | -1.32 | -1.53 | -1.76 | -1.82 | -1.70 | -1.71 |
| 320° | -0.27 | -0.46 | -0.46 | -0.83 | -0.57 | -0.31 | -1.21 | -1.36 | -1.45 | -1.25 | -1.18 | -1.21 |
| 325° | -0.27 | -0.40 | -0.27 | -0.54 | -0.46 | -0.37 | -0.84 | -1.20 | -1.23 | -1.15 | -0.94 | -1.15 |
| 330° | -0.21 | -0.39 | -0.33 | -0.61 | -0.52 | -0.19 | -0.64 | -0.86 | -0.78 | -0.90 | -0.52 | -0.80 |
| 335° | -0.12 | -0.32 | -0.38 | -0.63 | -0.36 | 0.00 | -0.63 | -0.67 | -0.50 | -0.54 | -0.27 | -0.36 |
| 340° | -0.04 | -0.20 | -0.30 | -0.43 | -0.11 | 0.01 | -0.50 | -0.54 | -0.42 | -0.42 | -0.32 | -0.23 |
| 345° | 0.00 | -0.10 | -0.16 | -0.19 | 0.03 | -0.02 | -0.26 | -0.34 | -0.31 | -0.31 | -0.30 | -0.18 |
| 350° | 0.01 | -0.03 | -0.05 | -0.06 | 0.05 | -0.03 | -0.09 | -0.14 | -0.15 | -0.16 | -0.17 | -0.10 |
| 355° | 0.02 | 0.00 | 0.00 | 0.01 | 0.03 | 0.00 | 0.00 | -0.02 | -0.03 | -0.03 | -0.03 | -0.02 |

Table A.37 Directional response for Windscreen UA-1650, Microphone Type 4191, Microphone Preampifier ZC-0032 and the analyzer with the Microphone Preampifier mounted directly on the analyzer, measured in a plane parallel to the display and along the microphone's axis, 11200 Hz – 20000 Hz

| Angle | Frequency | | | | | | | | | | |
|-------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | 11200 Hz | 11800 Hz | 12500 Hz | 13200 Hz | 14000 Hz | 15000 Hz | 16000 Hz | 17000 Hz | 18000 Hz | 19000 Hz | 20000 Hz |
| 0° | -0.02 | -0.01 | -0.01 | -0.02 | -0.01 | -0.01 | -0.01 | -0.02 | -0.01 | -0.01 | -0.02 |
| 5° | -0.05 | -0.05 | -0.04 | -0.05 | -0.05 | -0.05 | -0.03 | -0.07 | -0.06 | -0.06 | -0.07 |
| 10° | -0.18 | -0.14 | -0.13 | -0.16 | -0.17 | -0.18 | -0.08 | -0.26 | -0.17 | -0.18 | -0.22 |
| 15° | -0.36 | -0.25 | -0.25 | -0.31 | -0.41 | -0.34 | -0.32 | -0.47 | -0.36 | -0.42 | -0.50 |
| 20° | -0.61 | -0.46 | -0.46 | -0.47 | -0.69 | -0.60 | -0.71 | -0.73 | -0.69 | -0.85 | -0.99 |
| 25° | -0.80 | -0.74 | -0.84 | -0.80 | -0.87 | -1.01 | -0.99 | -1.14 | -1.05 | -1.26 | -1.48 |
| 30° | -1.07 | -1.01 | -1.09 | -1.18 | -1.43 | -1.32 | -1.55 | -1.53 | -1.47 | -1.78 | -2.16 |
| 35° | -1.39 | -1.60 | -1.53 | -1.53 | -1.68 | -1.78 | -1.91 | -2.17 | -1.96 | -2.12 | -2.73 |
| 40° | -1.56 | -1.70 | -1.83 | -2.00 | -2.23 | -2.21 | -2.39 | -2.62 | -2.50 | -2.58 | -3.16 |
| 45° | -2.13 | -2.24 | -2.48 | -2.44 | -2.66 | -2.71 | -2.86 | -3.13 | -3.11 | -3.12 | -3.64 |
| 50° | -2.38 | -2.64 | -2.74 | -2.82 | -3.13 | -3.27 | -3.42 | -3.72 | -3.75 | -3.86 | -4.44 |
| 55° | -2.69 | -2.88 | -3.11 | -3.29 | -3.51 | -3.83 | -4.08 | -4.38 | -4.54 | -4.63 | -5.35 |
| 60° | -3.28 | -3.52 | -3.91 | -3.95 | -4.10 | -4.32 | -4.74 | -5.20 | -5.37 | -5.44 | -6.21 |
| 65° | -3.65 | -4.21 | -4.54 | -4.77 | -4.73 | -4.85 | -5.36 | -5.95 | -6.19 | -6.34 | -6.91 |
| 70° | -3.90 | -4.50 | -5.08 | -5.51 | -5.52 | -5.41 | -5.83 | -6.55 | -6.88 | -7.29 | -8.01 |
| 75° | -4.09 | -4.72 | -5.44 | -6.02 | -6.27 | -6.24 | -6.53 | -7.19 | -7.49 | -8.17 | -9.02 |
| 80° | -4.64 | -4.80 | -5.71 | -6.37 | -6.85 | -7.00 | -7.63 | -8.19 | -8.27 | -8.82 | -9.94 |
| 85° | -5.32 | -5.33 | -5.81 | -6.70 | -7.27 | -7.66 | -8.41 | -9.17 | -9.02 | -9.35 | -10.10 |
| 90° | -5.56 | -5.91 | -6.50 | -6.95 | -7.60 | -8.05 | -8.78 | -9.64 | -9.60 | -10.06 | -11.04 |
| 95° | -5.89 | -6.36 | -7.00 | -7.88 | -8.08 | -8.31 | -8.92 | -9.94 | -10.46 | -11.05 | -12.75 |
| 100° | -5.65 | -6.77 | -7.39 | -8.40 | -8.76 | -9.00 | -9.16 | -10.08 | -10.59 | -11.82 | -13.79 |
| 105° | -6.13 | -6.96 | -7.42 | -8.66 | -9.19 | -9.42 | -9.87 | -10.82 | -11.17 | -12.40 | -13.08 |
| 110° | -6.43 | -7.37 | -7.86 | -8.65 | -9.31 | -9.52 | -10.43 | -11.62 | -12.13 | -12.97 | -13.56 |
| 115° | -6.67 | -7.01 | -8.07 | -9.12 | -9.91 | -9.96 | -10.92 | -11.58 | -12.26 | -13.41 | -14.36 |
| 120° | -6.38 | -6.41 | -7.81 | -8.68 | -9.72 | -10.24 | -11.43 | -12.01 | -13.29 | -13.48 | -14.40 |
| 125° | -6.90 | -7.08 | -8.24 | -8.24 | -8.97 | -9.29 | -10.20 | -11.64 | -13.12 | -14.29 | -15.66 |
| 130° | -8.63 | -9.65 | -9.85 | -9.78 | -10.31 | -9.66 | -9.74 | -10.86 | -11.25 | -12.72 | -13.55 |
| 135° | -8.53 | -9.66 | -10.43 | -12.12 | -13.26 | -12.26 | -12.35 | -13.96 | -12.48 | -12.85 | -13.40 |
| 140° | -6.89 | -7.78 | -9.40 | -11.20 | -11.63 | -11.52 | -13.30 | -16.63 | -15.98 | -16.33 | -18.76 |
| 145° | -5.45 | -6.45 | -7.85 | -8.53 | -8.87 | -9.70 | -12.04 | -14.05 | -13.06 | -13.91 | -17.97 |
| 150° | -6.60 | -7.20 | -7.52 | -7.66 | -8.04 | -9.02 | -10.61 | -11.07 | -10.82 | -12.50 | -15.88 |
| 155° | -6.95 | -7.79 | -8.59 | -8.99 | -9.47 | -10.50 | -11.35 | -11.16 | -11.08 | -13.10 | -14.79 |
| 160° | -7.34 | -8.19 | -8.85 | -9.26 | -9.95 | -11.00 | -11.97 | -11.96 | -12.60 | -15.22 | -15.98 |
| 165° | -7.41 | -7.80 | -8.22 | -8.49 | -9.45 | -10.81 | -11.89 | -12.22 | -12.96 | -15.38 | -15.54 |
| 170° | -8.78 | -9.34 | -9.62 | -9.74 | -10.28 | -11.17 | -11.40 | -11.27 | -11.80 | -14.07 | -14.35 |
| 175° | -7.35 | -8.28 | -8.96 | -9.65 | -10.78 | -12.06 | -12.90 | -13.03 | -13.80 | -16.07 | -16.27 |
| 180° | -6.05 | -6.82 | -7.37 | -7.91 | -8.96 | -10.17 | -11.05 | -11.23 | -12.07 | -14.63 | -14.98 |
| 185° | -7.20 | -8.12 | -8.76 | -9.44 | -10.55 | -11.88 | -12.79 | -12.94 | -13.65 | -16.18 | -16.74 |
| 190° | -8.74 | -9.34 | -9.64 | -9.83 | -10.36 | -11.30 | -11.59 | -11.38 | -11.80 | -14.14 | -14.37 |
| 195° | -7.48 | -7.85 | -8.28 | -8.51 | -9.41 | -10.80 | -11.98 | -12.31 | -12.98 | -15.78 | -16.21 |
| 200° | -7.40 | -8.30 | -9.00 | -9.36 | -10.03 | -11.09 | -12.15 | -11.91 | -12.23 | -15.09 | -16.44 |
| 205° | -6.91 | -7.79 | -8.62 | -8.91 | -9.43 | -10.60 | -11.74 | -11.50 | -11.19 | -13.27 | -15.02 |
| 210° | -6.70 | -7.42 | -7.86 | -7.82 | -8.07 | -9.02 | -10.75 | -11.20 | -10.70 | -12.27 | -15.72 |
| 215° | -5.42 | -6.39 | -7.87 | -8.55 | -8.82 | -9.48 | -11.90 | -14.07 | -12.90 | -13.64 | -17.70 |
| 220° | -6.78 | -7.72 | -9.28 | -11.12 | -11.59 | -11.43 | -13.12 | -16.63 | -15.95 | -16.25 | -20.24 |
| 225° | -8.40 | -9.66 | -10.56 | -12.10 | -13.24 | -12.52 | -12.77 | -14.40 | -12.54 | -12.97 | -14.18 |
| 230° | -8.60 | -9.68 | -10.25 | -10.06 | -10.29 | -9.78 | -10.08 | -11.11 | -10.96 | -12.66 | -13.84 |
| 235° | -6.96 | -7.13 | -8.26 | -8.42 | -8.89 | -9.22 | -10.40 | -11.72 | -12.71 | -14.24 | -16.41 |
| 240° | -6.33 | -6.50 | -7.66 | -8.70 | -9.62 | -10.12 | -11.67 | -12.31 | -13.08 | -13.12 | -14.81 |
| 245° | -6.58 | -7.13 | -7.99 | -9.19 | -9.84 | -9.87 | -10.99 | -11.75 | -12.09 | -13.04 | -14.41 |
| 250° | -6.38 | -7.50 | -7.89 | -8.75 | -9.18 | -9.38 | -10.50 | -11.82 | -12.18 | -12.77 | -13.74 |
| 255° | -6.10 | -6.96 | -7.47 | -8.78 | -9.19 | -9.31 | -9.93 | -11.12 | -11.29 | -12.23 | -13.19 |
| 260° | -5.70 | -6.71 | -7.52 | -8.60 | -8.93 | -9.02 | -9.20 | -10.16 | -10.62 | -11.72 | -14.27 |
| 265° | -5.98 | -6.32 | -7.08 | -7.98 | -8.19 | -8.38 | -9.00 | -10.10 | -10.44 | -10.96 | -12.90 |
| 270° | -5.56 | -5.85 | -6.62 | -7.08 | -7.65 | -8.06 | -8.85 | -9.85 | -9.67 | -10.05 | -11.18 |
| 275° | -5.29 | -5.35 | -5.91 | -6.78 | -7.32 | -7.62 | -8.49 | -9.34 | -9.11 | -9.26 | -10.16 |
| 280° | -4.59 | -4.85 | -5.81 | -6.43 | -6.87 | -7.02 | -7.74 | -8.35 | -8.37 | -8.75 | -10.11 |
| 285° | -4.04 | -4.76 | -5.53 | -6.08 | -6.32 | -6.30 | -6.68 | -7.31 | -7.49 | -8.18 | -9.15 |
| 290° | -3.89 | -4.52 | -5.15 | -5.56 | -5.59 | -5.45 | -5.88 | -6.61 | -6.89 | -7.25 | -8.12 |
| 295° | -3.66 | -4.19 | -4.59 | -4.77 | -4.80 | -4.87 | -5.37 | -6.08 | -6.14 | -6.42 | -7.02 |
| 300° | -3.30 | -3.52 | -3.93 | -3.95 | -4.12 | -4.33 | -4.81 | -5.27 | -5.41 | -5.53 | -6.27 |
| 305° | -2.72 | -2.90 | -3.13 | -3.27 | -3.53 | -3.87 | -4.18 | -4.42 | -4.57 | -4.67 | -5.43 |
| 310° | -2.45 | -2.70 | -2.76 | -2.80 | -3.13 | -3.31 | -3.52 | -3.77 | -3.77 | -3.91 | -4.48 |
| 315° | -2.14 | -2.24 | -2.45 | -2.41 | -2.64 | -2.77 | -2.97 | -3.17 | -3.17 | -3.16 | -3.68 |
| 320° | -1.58 | -1.68 | -1.79 | -1.98 | -2.23 | -2.28 | -2.49 | -2.68 | -2.54 | -2.67 | -3.21 |
| 325° | -1.37 | -1.57 | -1.54 | -1.54 | -1.72 | -1.80 | -2.02 | -2.21 | -1.97 | -2.19 | -2.75 |
| 330° | -1.05 | -1.00 | -1.07 | -1.15 | -1.43 | -1.38 | -1.59 | -1.54 | -1.51 | -1.83 | -2.16 |
| 335° | -0.77 | -0.71 | -0.85 | -0.80 | -0.89 | -1.04 | -1.04 | -1.13 | -1.10 | -1.29 | -1.48 |
| 340° | -0.60 | -0.43 | -0.42 | -0.45 | -0.66 | -0.64 | -0.71 | -0.72 | -0.71 | -0.87 | -0.98 |
| 345° | -0.34 | -0.22 | -0.23 | -0.29 | -0.41 | -0.35 | -0.33 | -0.46 | -0.37 | -0.43 | -0.50 |
| 350° | -0.15 | -0.11 | -0.13 | -0.14 | -0.17 | -0.18 | -0.05 | -0.24 | -0.16 | -0.17 | -0.18 |
| 355° | -0.03 | -0.02 | -0.02 | -0.02 | -0.04 | -0.04 | 0.01 | -0.05 | -0.04 | -0.06 | -0.03 |

Table A.38 Directional response for Windscreen UA-1650, Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer, measured in a plane perpendicular to the display and along the microphone's axis, 500 Hz – 3550 Hz

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 500 Hz | 630 Hz | 800 Hz | 1000 Hz | 1250 Hz | 1600 Hz | 2000 Hz | 2240 Hz | 2500 Hz | 2800 Hz | 3150 Hz | 3550 Hz |
| 0° | 0.00 | 0.00 | -0.01 | 0.00 | 0.00 | -0.01 | -0.02 | -0.02 | -0.02 | -0.03 | -0.02 | -0.02 |
| 5° | 0.02 | 0.02 | -0.01 | 0.00 | -0.01 | -0.01 | -0.02 | -0.01 | -0.02 | -0.03 | -0.01 | -0.03 |
| 10° | -0.01 | 0.00 | -0.01 | 0.00 | -0.02 | -0.01 | -0.03 | -0.01 | -0.03 | -0.03 | -0.02 | -0.05 |
| 15° | 0.01 | 0.00 | 0.00 | 0.00 | -0.04 | -0.02 | -0.06 | 0.00 | -0.07 | -0.03 | -0.05 | -0.07 |
| 20° | 0.02 | 0.00 | 0.00 | 0.02 | -0.06 | -0.03 | -0.10 | 0.00 | -0.11 | -0.03 | -0.11 | -0.07 |
| 25° | 0.00 | -0.01 | 0.00 | 0.04 | -0.09 | -0.06 | -0.15 | 0.00 | -0.15 | -0.05 | -0.20 | -0.04 |
| 30° | 0.00 | -0.01 | -0.01 | 0.04 | -0.11 | -0.09 | -0.21 | -0.01 | -0.19 | -0.07 | -0.30 | 0.01 |
| 35° | -0.02 | -0.02 | -0.02 | 0.04 | -0.12 | -0.16 | -0.27 | -0.06 | -0.19 | -0.14 | -0.37 | 0.03 |
| 40° | 0.02 | 0.02 | -0.03 | 0.04 | -0.12 | -0.25 | -0.31 | -0.14 | -0.16 | -0.23 | -0.39 | -0.02 |
| 45° | 0.00 | 0.02 | -0.03 | 0.03 | -0.09 | -0.37 | -0.32 | -0.26 | -0.14 | -0.33 | -0.39 | -0.17 |
| 50° | 0.01 | 0.05 | 0.00 | 0.02 | -0.07 | -0.50 | -0.31 | -0.36 | -0.19 | -0.37 | -0.44 | -0.36 |
| 55° | -0.03 | 0.04 | 0.03 | 0.00 | -0.05 | -0.60 | -0.32 | -0.39 | -0.33 | -0.32 | -0.57 | -0.43 |
| 60° | -0.03 | 0.05 | 0.07 | -0.01 | -0.05 | -0.63 | -0.39 | -0.37 | -0.53 | -0.29 | -0.68 | -0.41 |
| 65° | -0.06 | 0.03 | 0.10 | 0.01 | -0.07 | -0.60 | -0.55 | -0.36 | -0.63 | -0.40 | -0.65 | -0.51 |
| 70° | -0.08 | 0.01 | 0.13 | 0.04 | -0.10 | -0.54 | -0.75 | -0.44 | -0.59 | -0.64 | -0.58 | -0.69 |
| 75° | -0.11 | -0.02 | 0.15 | 0.09 | -0.14 | -0.48 | -0.92 | -0.66 | -0.52 | -0.80 | -0.69 | -0.68 |
| 80° | -0.13 | -0.06 | 0.15 | 0.16 | -0.15 | -0.45 | -0.95 | -0.93 | -0.62 | -0.75 | -0.97 | -0.59 |
| 85° | -0.17 | -0.10 | 0.14 | 0.23 | -0.12 | -0.48 | -0.86 | -1.06 | -0.93 | -0.71 | -1.08 | -0.79 |
| 90° | -0.20 | -0.14 | 0.10 | 0.29 | -0.03 | -0.54 | -0.72 | -0.98 | -1.21 | -0.95 | -0.95 | -1.08 |
| 95° | -0.24 | -0.20 | 0.04 | 0.31 | 0.08 | -0.56 | -0.67 | -0.79 | -1.18 | -1.33 | -1.09 | -1.01 |
| 100° | -0.28 | -0.26 | -0.05 | 0.28 | 0.20 | -0.51 | -0.71 | -0.69 | -0.89 | -1.36 | -1.56 | -1.00 |
| 105° | -0.29 | -0.29 | -0.14 | 0.22 | 0.26 | -0.38 | -0.76 | -0.74 | -0.72 | -1.00 | -1.70 | -1.49 |
| 110° | -0.32 | -0.34 | -0.24 | 0.10 | 0.26 | -0.22 | -0.71 | -0.82 | -0.82 | -0.75 | -1.23 | -1.70 |
| 115° | -0.32 | -0.38 | -0.32 | -0.04 | 0.18 | -0.12 | -0.51 | -0.72 | -0.95 | -0.87 | -0.87 | -1.13 |
| 120° | -0.35 | -0.41 | -0.38 | -0.19 | 0.02 | -0.15 | -0.30 | -0.44 | -0.80 | -1.04 | -1.00 | -0.76 |
| 125° | -0.33 | -0.41 | -0.43 | -0.31 | -0.17 | -0.30 | -0.22 | -0.19 | -0.43 | -0.81 | -1.18 | -0.97 |
| 130° | -0.33 | -0.41 | -0.45 | -0.41 | -0.36 | -0.55 | -0.36 | -0.16 | -0.15 | -0.35 | -0.86 | -1.02 |
| 135° | -0.32 | -0.40 | -0.45 | -0.46 | -0.50 | -0.83 | -0.68 | -0.41 | -0.21 | -0.13 | -0.36 | -0.50 |
| 140° | -0.31 | -0.39 | -0.43 | -0.45 | -0.56 | -1.04 | -1.09 | -0.86 | -0.64 | -0.39 | -0.29 | -0.09 |
| 145° | -0.31 | -0.37 | -0.39 | -0.42 | -0.55 | -1.13 | -1.40 | -1.33 | -1.23 | -1.04 | -0.81 | -0.34 |
| 150° | -0.28 | -0.33 | -0.34 | -0.35 | -0.47 | -1.08 | -1.51 | -1.57 | -1.66 | -1.69 | -1.66 | -1.21 |
| 155° | -0.26 | -0.30 | -0.29 | -0.27 | -0.37 | -0.94 | -1.40 | -1.52 | -1.73 | -1.95 | -2.24 | -2.08 |
| 160° | -0.25 | -0.28 | -0.24 | -0.19 | -0.26 | -0.76 | -1.17 | -1.27 | -1.48 | -1.72 | -2.17 | -2.25 |
| 165° | -0.23 | -0.25 | -0.20 | -0.12 | -0.16 | -0.59 | -0.93 | -0.96 | -1.11 | -1.27 | -1.68 | -1.76 |
| 170° | -0.22 | -0.23 | -0.17 | -0.07 | -0.08 | -0.46 | -0.72 | -0.70 | -0.77 | -0.85 | -1.15 | -1.13 |
| 175° | -0.22 | -0.22 | -0.15 | -0.03 | -0.03 | -0.38 | -0.59 | -0.53 | -0.55 | -0.57 | -0.79 | -0.68 |
| 180° | -0.24 | -0.25 | -0.14 | -0.01 | -0.01 | -0.35 | -0.54 | -0.47 | -0.47 | -0.47 | -0.66 | -0.51 |
| 185° | -0.22 | -0.21 | -0.15 | -0.03 | -0.02 | -0.38 | -0.58 | -0.51 | -0.53 | -0.54 | -0.74 | -0.62 |
| 190° | -0.23 | -0.24 | -0.17 | -0.05 | -0.07 | -0.47 | -0.70 | -0.66 | -0.72 | -0.79 | -1.06 | -1.00 |
| 195° | -0.23 | -0.25 | -0.20 | -0.10 | -0.14 | -0.59 | -0.89 | -0.90 | -1.04 | -1.19 | -1.55 | -1.60 |
| 200° | -0.26 | -0.29 | -0.24 | -0.17 | -0.24 | -0.77 | -1.13 | -1.20 | -1.42 | -1.64 | -2.08 | -2.17 |
| 205° | -0.27 | -0.31 | -0.29 | -0.24 | -0.35 | -0.96 | -1.36 | -1.47 | -1.73 | -1.93 | -2.27 | -2.19 |
| 210° | -0.29 | -0.35 | -0.33 | -0.32 | -0.46 | -1.11 | -1.49 | -1.58 | -1.75 | -1.79 | -1.85 | -1.47 |
| 215° | -0.30 | -0.37 | -0.38 | -0.39 | -0.54 | -1.18 | -1.43 | -1.41 | -1.40 | -1.21 | -1.04 | -0.58 |
| 220° | -0.34 | -0.41 | -0.42 | -0.43 | -0.57 | -1.13 | -1.17 | -1.01 | -0.83 | -0.58 | -0.44 | -0.20 |
| 225° | -0.35 | -0.43 | -0.45 | -0.44 | -0.53 | -0.94 | -0.80 | -0.57 | -0.37 | -0.25 | -0.39 | -0.50 |
| 230° | -0.35 | -0.43 | -0.45 | -0.40 | -0.41 | -0.67 | -0.47 | -0.30 | -0.24 | -0.38 | -0.81 | -0.99 |
| 235° | -0.36 | -0.43 | -0.43 | -0.32 | -0.25 | -0.41 | -0.32 | -0.28 | -0.44 | -0.76 | -1.16 | -0.99 |
| 240° | -0.36 | -0.42 | -0.38 | -0.19 | -0.08 | -0.24 | -0.36 | -0.47 | -0.75 | -0.98 | -1.03 | -0.71 |
| 245° | -0.35 | -0.39 | -0.31 | -0.06 | 0.06 | -0.19 | -0.54 | -0.68 | -0.88 | -0.85 | -0.84 | -0.98 |
| 250° | -0.33 | -0.35 | -0.23 | 0.07 | 0.14 | -0.26 | -0.69 | -0.74 | -0.78 | -0.73 | -1.13 | -1.62 |
| 255° | -0.31 | -0.31 | -0.14 | 0.17 | 0.16 | -0.38 | -0.72 | -0.67 | -0.72 | -0.96 | -1.65 | -1.60 |
| 260° | -0.26 | -0.23 | -0.05 | 0.23 | 0.11 | -0.49 | -0.66 | -0.63 | -0.88 | -1.36 | -1.63 | -1.06 |
| 265° | -0.25 | -0.20 | 0.03 | 0.26 | 0.04 | -0.52 | -0.62 | -0.75 | -1.18 | -1.39 | -1.14 | -0.95 |
| 270° | -0.22 | -0.14 | 0.08 | 0.24 | -0.05 | -0.48 | -0.69 | -0.97 | -1.27 | -1.01 | -0.94 | -1.07 |
| 275° | -0.19 | -0.10 | 0.11 | 0.19 | -0.11 | -0.42 | -0.84 | -1.09 | -1.00 | -0.70 | -1.05 | -0.87 |
| 280° | -0.14 | -0.05 | 0.13 | 0.11 | -0.12 | -0.40 | -0.95 | -0.99 | -0.66 | -0.70 | -1.01 | -0.61 |
| 285° | -0.13 | -0.04 | 0.14 | 0.06 | -0.09 | -0.43 | -0.94 | -0.72 | -0.51 | -0.77 | -0.75 | -0.66 |
| 290° | -0.08 | 0.01 | 0.12 | 0.01 | -0.06 | -0.51 | -0.78 | -0.48 | -0.56 | -0.63 | -0.60 | -0.73 |
| 295° | -0.06 | 0.03 | 0.09 | -0.01 | -0.02 | -0.59 | -0.57 | -0.37 | -0.60 | -0.41 | -0.67 | -0.50 |
| 300° | -0.04 | 0.03 | 0.05 | -0.02 | -0.01 | -0.62 | -0.40 | -0.38 | -0.49 | -0.30 | -0.71 | -0.29 |
| 305° | -0.01 | 0.04 | 0.02 | -0.01 | -0.02 | -0.59 | -0.31 | -0.40 | -0.29 | -0.36 | -0.56 | -0.27 |
| 310° | 0.00 | 0.04 | -0.01 | 0.02 | -0.04 | -0.49 | -0.31 | -0.36 | -0.14 | -0.43 | -0.34 | -0.30 |
| 315° | -0.01 | 0.01 | -0.03 | 0.04 | -0.08 | -0.37 | -0.32 | -0.25 | -0.10 | -0.39 | -0.23 | -0.26 |
| 320° | 0.03 | 0.03 | -0.04 | 0.06 | -0.11 | -0.24 | -0.31 | -0.12 | -0.12 | -0.26 | -0.22 | -0.18 |
| 325° | 0.01 | 0.00 | -0.03 | 0.07 | -0.12 | -0.14 | -0.27 | -0.03 | -0.17 | -0.11 | -0.23 | -0.09 |
| 330° | 0.02 | 0.00 | -0.01 | 0.06 | -0.11 | -0.07 | -0.21 | 0.03 | -0.19 | -0.01 | -0.23 | -0.06 |
| 335° | 0.01 | 0.00 | 0.00 | 0.05 | -0.09 | -0.03 | -0.14 | 0.05 | -0.16 | 0.05 | -0.19 | -0.03 |
| 340° | 0.00 | 0.00 | 0.00 | 0.03 | -0.06 | -0.01 | -0.08 | 0.05 | -0.11 | 0.06 | -0.13 | -0.01 |
| 345° | 0.00 | 0.00 | 0.00 | 0.02 | -0.03 | 0.00 | -0.04 | 0.04 | -0.06 | 0.06 | -0.07 | 0.01 |
| 350° | 0.00 | -0.01 | 0.01 | 0.01 | -0.01 | 0.01 | 0.00 | 0.03 | -0.02 | 0.05 | -0.02 | 0.03 |
| 355° | 0.00 | 0.00 | 0.00 | 0.02 | 0.01 | 0.01 | 0.01 | 0.03 | 0.01 | 0.03 | 0.01 | 0.03 |

Table A.39 Directional response for Windscreen UA-1650, Microphone Type 4191, Microphone Preampfier ZC-0032 and the analyzer with the Microphone Preampfier mounted directly on the analyzer, measured in a plane perpendicular to the display and along the microphone's axis, 4000 Hz – 10600 Hz

| Angle | Frequency | | | | | | | | | | | |
|-------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|
| | 4000 Hz | 4500 Hz | 5000 Hz | 5600 Hz | 6300 Hz | 7100 Hz | 8000 Hz | 8500 Hz | 9000 Hz | 9500 Hz | 10000 Hz | 10600 Hz |
| 0° | -0.02 | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | -0.04 | -0.04 | -0.03 | -0.03 | -0.03 |
| 5° | -0.01 | -0.03 | -0.04 | -0.07 | -0.05 | -0.01 | -0.06 | -0.07 | 0.00 | -0.03 | -0.03 | 0.00 |
| 10° | 0.00 | -0.04 | -0.05 | -0.14 | -0.10 | 0.01 | -0.16 | -0.14 | 0.02 | -0.08 | -0.07 | -0.01 |
| 15° | 0.01 | -0.08 | -0.08 | -0.24 | -0.19 | 0.03 | -0.28 | -0.19 | -0.01 | -0.23 | -0.14 | -0.08 |
| 20° | 0.00 | -0.15 | -0.12 | -0.33 | -0.29 | -0.02 | -0.34 | -0.30 | -0.20 | -0.53 | -0.24 | -0.31 |
| 25° | -0.04 | -0.23 | -0.14 | -0.35 | -0.30 | -0.17 | -0.36 | -0.57 | -0.66 | -0.75 | -0.33 | -0.62 |
| 30° | -0.12 | -0.31 | -0.18 | -0.33 | -0.22 | -0.29 | -0.59 | -1.00 | -1.01 | -0.69 | -0.50 | -0.77 |
| 35° | -0.22 | -0.36 | -0.30 | -0.48 | -0.29 | -0.21 | -1.04 | -1.07 | -1.12 | -0.97 | -1.11 | -0.97 |
| 40° | -0.30 | -0.41 | -0.52 | -0.82 | -0.71 | -0.33 | -1.05 | -1.20 | -1.63 | -1.61 | -1.22 | -1.09 |
| 45° | -0.30 | -0.49 | -0.71 | -0.99 | -0.91 | -0.69 | -1.15 | -1.79 | -1.73 | -1.82 | -1.41 | -1.66 |
| 50° | -0.24 | -0.64 | -0.78 | -0.92 | -0.82 | -0.64 | -1.37 | -1.76 | -2.11 | -2.30 | -1.99 | -1.82 |
| 55° | -0.27 | -0.81 | -0.86 | -1.24 | -1.30 | -1.01 | -1.32 | -2.11 | -2.53 | -2.32 | -2.47 | -2.30 |
| 60° | -0.46 | -0.84 | -1.04 | -1.57 | -1.48 | -1.21 | -1.81 | -2.04 | -2.62 | -3.16 | -2.46 | -2.65 |
| 65° | -0.65 | -0.81 | -1.17 | -1.52 | -1.43 | -1.21 | -1.69 | -2.62 | -2.86 | -3.09 | -3.27 | -2.96 |
| 70° | -0.66 | -1.03 | -1.30 | -1.80 | -1.96 | -1.77 | -2.24 | -2.54 | -3.42 | -3.47 | -3.33 | -3.56 |
| 75° | -0.75 | -1.26 | -1.34 | -1.94 | -1.81 | -1.63 | -2.19 | -3.08 | -3.37 | -4.16 | -3.64 | -3.68 |
| 80° | -0.94 | -1.25 | -1.56 | -2.00 | -2.17 | -2.28 | -2.73 | -3.12 | -3.95 | -4.03 | -4.48 | -4.00 |
| 85° | -0.88 | -1.39 | -1.81 | -2.26 | -2.27 | -2.06 | -2.85 | -3.39 | -4.10 | -4.52 | -4.34 | -4.81 |
| 90° | -0.91 | -1.55 | -1.86 | -2.47 | -2.40 | -2.43 | -3.17 | -3.82 | -4.11 | -4.90 | -4.68 | -4.73 |
| 95° | -1.27 | -1.48 | -2.11 | -2.68 | -2.77 | -2.46 | -3.49 | -3.77 | -4.75 | -4.84 | -4.91 | -5.03 |
| 100° | -1.35 | -1.83 | -2.10 | -2.82 | -2.85 | -2.67 | -3.46 | -4.20 | -4.67 | -5.10 | -5.24 | -5.09 |
| 105° | -1.27 | -2.02 | -2.36 | -3.02 | -3.08 | -2.88 | -3.96 | -4.20 | -4.79 | -5.41 | -5.41 | -5.52 |
| 110° | -1.74 | -1.95 | -2.75 | -3.23 | -3.18 | -2.83 | -4.03 | -4.82 | -5.33 | -5.65 | -5.50 | -5.96 |
| 115° | -1.94 | -2.46 | -2.68 | -3.61 | -3.55 | -3.18 | -4.10 | -4.62 | -5.66 | -6.25 | -6.19 | -6.00 |
| 120° | -1.20 | -2.49 | -3.13 | -3.61 | -3.85 | -3.41 | -4.50 | -5.26 | -5.84 | -6.16 | -6.53 | -6.57 |
| 125° | -0.90 | -1.63 | -2.86 | -4.03 | -3.85 | -3.67 | -4.79 | -5.59 | -6.45 | -7.14 | -6.74 | -6.66 |
| 130° | -1.26 | -1.56 | -2.03 | -3.24 | -4.04 | -3.56 | -4.92 | -5.95 | -7.07 | -7.49 | -7.42 | -7.22 |
| 135° | -1.09 | -1.88 | -2.22 | -2.67 | -2.86 | -3.28 | -4.57 | -5.55 | -6.59 | -7.54 | -7.88 | -7.74 |
| 140° | -0.40 | -1.32 | -2.29 | -3.17 | -3.08 | -2.43 | -3.75 | -4.81 | -5.90 | -6.54 | -6.68 | -7.22 |
| 145° | -0.21 | -0.73 | -1.50 | -2.61 | -3.19 | -3.15 | -3.76 | -4.51 | -5.12 | -5.44 | -5.31 | -5.66 |
| 150° | -0.91 | -1.07 | -1.34 | -1.90 | -2.15 | -2.40 | -3.85 | -4.82 | -5.81 | -6.16 | -5.73 | -5.65 |
| 155° | -2.07 | -2.28 | -2.38 | -2.57 | -2.27 | -1.86 | -2.85 | -3.67 | -4.54 | -5.20 | -5.48 | -5.82 |
| 160° | -2.65 | -3.29 | -3.73 | -4.27 | -4.01 | -3.34 | -3.63 | -4.08 | -4.47 | -4.70 | -4.75 | -4.95 |
| 165° | -2.21 | -3.03 | -3.81 | -4.88 | -5.25 | -5.40 | -6.14 | -6.66 | -7.10 | -7.17 | -7.03 | -7.18 |
| 170° | -1.43 | -2.13 | -2.83 | -3.82 | -4.16 | -4.52 | -5.87 | -6.78 | -7.75 | -8.33 | -8.84 | -9.86 |
| 175° | -0.86 | -1.43 | -1.97 | -2.76 | -2.87 | -2.87 | -3.87 | -4.58 | -5.29 | -5.73 | -6.03 | -6.59 |
| 180° | -0.64 | -1.15 | -1.64 | -2.34 | -2.36 | -2.20 | -3.03 | -3.65 | -4.23 | -4.56 | -4.76 | -5.11 |
| 185° | -0.78 | -1.33 | -1.86 | -2.63 | -2.71 | -2.64 | -3.59 | -4.29 | -4.97 | -5.39 | -5.70 | -6.10 |
| 190° | -1.27 | -1.93 | -2.62 | -3.57 | -3.84 | -4.11 | -5.42 | -6.34 | -7.30 | -7.93 | -8.38 | -9.05 |
| 195° | -2.03 | -2.81 | -3.63 | -4.71 | -5.11 | -5.51 | -6.54 | -7.24 | -7.82 | -8.05 | -7.77 | -8.01 |
| 200° | -2.61 | -3.30 | -3.88 | -4.55 | -4.53 | -3.97 | -4.17 | -4.57 | -4.94 | -5.10 | -4.98 | -5.15 |
| 205° | -2.30 | -2.61 | -2.73 | -2.98 | -2.76 | -2.08 | -2.90 | -3.66 | -4.48 | -5.02 | -5.19 | -5.50 |
| 210° | -1.22 | -1.39 | -1.57 | -2.11 | -2.27 | -2.19 | -3.73 | -4.78 | -5.87 | -6.24 | -5.87 | -5.98 |
| 215° | -0.40 | -0.86 | -1.53 | -2.62 | -3.00 | -3.27 | -3.94 | -4.53 | -4.95 | -5.12 | -5.09 | -5.18 |
| 220° | -0.42 | -1.29 | -2.24 | -3.24 | -3.17 | -2.45 | -3.14 | -4.09 | -5.47 | -6.59 | -6.80 | -7.09 |
| 225° | -1.03 | -1.86 | -2.31 | -2.71 | -2.74 | -2.65 | -4.58 | -5.89 | -6.86 | -7.47 | -7.62 | -7.66 |
| 230° | -1.26 | -1.57 | -1.94 | -3.04 | -3.70 | -4.00 | -4.84 | -5.77 | -7.14 | -7.84 | -7.61 | -7.29 |
| 235° | -0.88 | -1.45 | -2.64 | -4.06 | -4.18 | -3.52 | -4.94 | -5.87 | -6.46 | -7.18 | -7.14 | -6.91 |
| 240° | -1.03 | -2.29 | -3.32 | -3.78 | -3.80 | -3.78 | -4.30 | -5.11 | -6.21 | -6.57 | -6.83 | -6.72 |
| 245° | -1.82 | -2.63 | -2.72 | -3.70 | -3.76 | -3.02 | -4.27 | -4.96 | -5.85 | -6.35 | -5.83 | -6.11 |
| 250° | -1.88 | -1.99 | -2.71 | -3.43 | -3.27 | -3.18 | -4.03 | -4.67 | -5.05 | -5.94 | -6.19 | -5.84 |
| 255° | -1.30 | -1.97 | -2.63 | -3.05 | -3.33 | -2.88 | -3.73 | -4.38 | -5.39 | -5.51 | -5.49 | -5.40 |
| 260° | -1.25 | -2.00 | -2.09 | -3.03 | -3.03 | -2.67 | -3.75 | -4.26 | -4.83 | -5.16 | -5.24 | -5.51 |
| 265° | -1.34 | -1.51 | -2.24 | -2.83 | -2.69 | -2.77 | -3.34 | -3.93 | -4.58 | -5.23 | -5.10 | -4.95 |
| 270° | -1.00 | -1.57 | -2.04 | -2.46 | -2.76 | -2.34 | -3.08 | -3.81 | -4.47 | -4.91 | -4.72 | -5.21 |
| 275° | -0.85 | -1.59 | -1.72 | -2.43 | -2.32 | -2.14 | -2.92 | -3.53 | -4.15 | -4.69 | -4.99 | -4.35 |
| 280° | -1.01 | -1.22 | -1.64 | -2.30 | -2.17 | -2.11 | -2.64 | -3.19 | -4.20 | -4.44 | -4.32 | -4.20 |
| 285° | -0.82 | -1.10 | -1.58 | -1.88 | -1.92 | -1.75 | -2.19 | -3.30 | -3.58 | -4.32 | -3.83 | -3.93 |
| 290° | -0.57 | -1.12 | -1.39 | -1.87 | -1.89 | -1.61 | -2.41 | -2.71 | -3.69 | -3.67 | -3.62 | -3.62 |
| 295° | -0.52 | -1.01 | -1.11 | -1.62 | -1.50 | -1.28 | -1.76 | -2.83 | -3.02 | -3.42 | -3.31 | -2.99 |
| 300° | -0.52 | -0.88 | -1.07 | -1.51 | -1.42 | -1.28 | -1.90 | -2.23 | -2.94 | -3.03 | -2.63 | -2.73 |
| 305° | -0.44 | -0.68 | -0.97 | -1.31 | -1.24 | -0.85 | -1.50 | -2.27 | -2.52 | -2.63 | -2.51 | -2.46 |
| 310° | -0.33 | -0.55 | -0.79 | -1.00 | -1.04 | -0.64 | -1.41 | -1.87 | -2.33 | -2.32 | -1.95 | -1.91 |
| 315° | -0.25 | -0.54 | -0.62 | -0.96 | -0.95 | -0.80 | -1.29 | -1.88 | -1.74 | -1.95 | -1.67 | -1.72 |
| 320° | -0.13 | -0.50 | -0.50 | -0.84 | -0.63 | -0.31 | -1.09 | -1.35 | -1.68 | -1.51 | -1.39 | -1.22 |
| 325° | -0.03 | -0.41 | -0.34 | -0.62 | -0.38 | -0.21 | -1.07 | -1.08 | -1.20 | -1.18 | -1.01 | -1.06 |
| 330° | 0.01 | -0.27 | -0.19 | -0.44 | -0.39 | -0.33 | -0.64 | -1.05 | -0.88 | -0.89 | -0.59 | -0.70 |
| 335° | 0.01 | -0.15 | -0.10 | -0.31 | -0.37 | -0.19 | -0.37 | -0.67 | -0.68 | -0.67 | -0.47 | -0.63 |
| 340° | 0.00 | -0.06 | -0.04 | -0.18 | -0.24 | -0.03 | -0.31 | -0.31 | -0.44 | -0.35 | -0.31 | -0.25 |
| 345° | -0.01 | 0.00 | -0.01 | -0.07 | -0.09 | 0.03 | -0.25 | -0.11 | -0.23 | -0.14 | -0.16 | -0.01 |
| 350° | 0.00 | 0.01 | 0.02 | 0.01 | 0.01 | 0.02 | -0.13 | -0.01 | -0.09 | -0.05 | -0.08 | 0.00 |
| 355° | 0.01 | 0.02 | 0.03 | 0.04 | 0.04 | 0.02 | -0.02 | 0.04 | -0.01 | 0.01 | 0.00 | 0.00 |

Table A.40 Directional response for Windscreen UA-1650, Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer, measured in a plane perpendicular to the display and along the microphone's axis, 11200 Hz – 20000 Hz

| Angle | Frequency | | | | | | | | | | |
|-------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | 11200 Hz | 11800 Hz | 12500 Hz | 13200 Hz | 14000 Hz | 15000 Hz | 16000 Hz | 17000 Hz | 18000 Hz | 19000 Hz | 20000 Hz |
| 0° | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | -0.04 |
| 5° | -0.05 | -0.04 | -0.01 | -0.04 | -0.07 | -0.08 | -0.03 | -0.08 | -0.07 | -0.03 | -0.07 |
| 10° | -0.16 | -0.11 | -0.07 | -0.12 | -0.16 | -0.23 | -0.07 | -0.23 | -0.15 | -0.12 | -0.21 |
| 15° | -0.33 | -0.20 | -0.19 | -0.27 | -0.33 | -0.38 | -0.33 | -0.38 | -0.32 | -0.43 | -0.54 |
| 20° | -0.62 | -0.41 | -0.42 | -0.49 | -0.68 | -0.62 | -0.73 | -0.59 | -0.75 | -0.88 | -0.99 |
| 25° | -0.91 | -0.86 | -0.83 | -0.72 | -0.97 | -1.18 | -0.98 | -1.06 | -1.05 | -1.33 | -1.53 |
| 30° | -1.03 | -1.21 | -1.13 | -1.13 | -1.37 | -1.39 | -1.68 | -1.40 | -1.48 | -1.84 | -2.09 |
| 35° | -1.50 | -1.60 | -1.46 | -1.50 | -1.73 | -1.96 | -2.00 | -2.12 | -1.84 | -2.29 | -2.71 |
| 40° | -1.77 | -1.89 | -2.07 | -2.02 | -2.18 | -2.27 | -2.51 | -2.69 | -2.36 | -2.63 | -3.15 |
| 45° | -2.10 | -2.39 | -2.43 | -2.27 | -2.52 | -2.77 | -3.09 | -3.18 | -2.99 | -3.12 | -3.61 |
| 50° | -2.35 | -2.70 | -2.75 | -2.83 | -3.06 | -3.42 | -3.56 | -3.69 | -3.73 | -3.87 | -4.38 |
| 55° | -2.94 | -3.28 | -3.56 | -3.51 | -3.61 | -3.86 | -4.17 | -4.38 | -4.57 | -4.77 | -5.35 |
| 60° | -3.14 | -3.74 | -4.03 | -4.21 | -4.05 | -4.37 | -4.82 | -5.21 | -5.39 | -5.61 | -6.24 |
| 65° | -3.57 | -4.06 | -4.58 | -4.75 | -4.72 | -4.76 | -5.53 | -6.00 | -6.15 | -6.41 | -7.00 |
| 70° | -3.94 | -4.52 | -5.04 | -5.51 | -5.34 | -5.39 | -5.89 | -6.70 | -6.86 | -7.28 | -7.99 |
| 75° | -4.50 | -4.81 | -5.47 | -5.95 | -6.25 | -6.20 | -6.66 | -7.24 | -7.62 | -8.22 | -9.12 |
| 80° | -4.56 | -5.36 | -5.69 | -6.29 | -6.82 | -7.26 | -7.85 | -8.19 | -8.31 | -8.96 | -9.77 |
| 85° | -4.84 | -5.53 | -6.18 | -6.58 | -7.21 | -8.09 | -9.07 | -9.51 | -8.92 | -9.35 | -9.97 |
| 90° | -5.44 | -6.01 | -6.76 | -6.96 | -7.71 | -8.44 | -9.61 | -9.94 | -9.72 | -10.19 | -11.31 |
| 95° | -5.73 | -6.25 | -7.64 | -7.86 | -8.05 | -8.66 | -9.38 | -9.83 | -10.23 | -11.45 | -13.60 |
| 100° | -6.16 | -6.73 | -7.83 | -8.51 | -9.02 | -8.99 | -9.12 | -9.96 | -10.89 | -12.40 | -14.32 |
| 105° | -6.27 | -6.91 | -8.13 | -8.80 | -9.25 | -9.43 | -10.14 | -10.90 | -11.21 | -12.65 | -13.41 |
| 110° | -6.43 | -7.10 | -8.06 | -8.71 | -9.71 | -9.88 | -10.92 | -11.80 | -12.09 | -12.87 | -13.47 |
| 115° | -6.43 | -7.20 | -8.07 | -8.58 | -9.80 | -10.21 | -11.66 | -11.79 | -12.33 | -13.45 | -15.09 |
| 120° | -6.89 | -7.28 | -7.94 | -8.57 | -9.99 | -10.31 | -11.46 | -11.61 | -13.04 | -14.02 | -15.79 |
| 125° | -7.09 | -7.75 | -8.65 | -9.12 | -10.08 | -9.95 | -10.88 | -11.71 | -12.78 | -14.54 | -15.43 |
| 130° | -7.79 | -8.52 | -9.15 | -9.91 | -10.59 | -10.25 | -11.14 | -12.06 | -12.02 | -14.08 | -14.10 |
| 135° | -8.26 | -8.98 | -10.05 | -11.57 | -11.43 | -10.91 | -12.03 | -13.70 | -12.32 | -13.79 | -14.95 |
| 140° | -8.02 | -9.26 | -10.86 | -11.89 | -11.36 | -11.53 | -13.59 | -15.86 | -13.56 | -14.23 | -17.67 |
| 145° | -6.88 | -8.26 | -9.66 | -10.05 | -10.51 | -11.84 | -14.64 | -15.57 | -13.60 | -14.96 | -19.20 |
| 150° | -6.30 | -7.14 | -7.72 | -8.24 | -9.29 | -11.04 | -12.67 | -12.38 | -12.08 | -15.04 | -19.12 |
| 155° | -7.02 | -8.15 | -8.81 | -8.63 | -8.73 | -9.82 | -10.94 | -10.62 | -11.23 | -14.57 | -16.07 |
| 160° | -5.78 | -6.77 | -7.36 | -7.81 | -9.10 | -11.07 | -12.24 | -11.56 | -11.65 | -14.47 | -14.14 |
| 165° | -7.57 | -7.79 | -7.72 | -7.52 | -8.26 | -9.75 | -10.56 | -10.18 | -11.12 | -14.58 | -14.48 |
| 170° | -11.29 | -12.12 | -12.63 | -12.58 | -13.05 | -14.00 | -13.88 | -12.84 | -13.07 | -15.69 | -14.86 |
| 175° | -7.85 | -8.88 | -9.58 | -10.36 | -11.79 | -13.83 | -14.77 | -15.06 | -16.33 | -19.95 | -20.12 |
| 180° | -6.12 | -6.90 | -7.31 | -7.81 | -8.92 | -10.54 | -11.26 | -11.07 | -11.93 | -15.18 | -14.63 |
| 185° | -7.23 | -8.17 | -8.75 | -9.42 | -10.68 | -12.58 | -13.54 | -13.54 | -14.49 | -18.21 | -18.30 |
| 190° | -10.59 | -11.76 | -12.67 | -13.17 | -14.36 | -15.81 | -16.07 | -15.01 | -15.14 | -17.76 | -16.88 |
| 195° | -8.53 | -8.81 | -8.70 | -8.38 | -8.96 | -10.30 | -11.12 | -10.49 | -10.96 | -14.88 | -14.94 |
| 200° | -5.93 | -6.83 | -7.39 | -7.70 | -8.69 | -10.77 | -12.56 | -12.09 | -12.38 | -15.73 | -15.98 |
| 205° | -6.83 | -8.27 | -9.42 | -9.36 | -9.42 | -10.39 | -11.56 | -10.70 | -10.45 | -14.11 | -16.24 |
| 210° | -6.56 | -7.32 | -7.80 | -7.85 | -8.46 | -10.26 | -12.59 | -12.60 | -11.39 | -13.63 | -18.02 |
| 215° | -6.27 | -7.89 | -9.69 | -10.14 | -10.12 | -11.01 | -14.26 | -16.67 | -14.10 | -14.23 | -18.83 |
| 220° | -7.74 | -8.92 | -10.82 | -12.49 | -11.98 | -11.33 | -13.25 | -17.20 | -14.53 | -13.63 | -18.89 |
| 225° | -8.46 | -9.16 | -10.36 | -11.90 | -12.15 | -10.93 | -11.63 | -14.49 | -13.29 | -13.40 | -15.73 |
| 230° | -7.80 | -8.91 | -9.57 | -9.95 | -11.06 | -10.89 | -10.71 | -12.29 | -12.15 | -13.75 | -15.84 |
| 235° | -7.03 | -8.14 | -9.15 | -8.91 | -9.80 | -10.53 | -11.05 | -12.80 | -12.31 | -14.18 | -16.52 |
| 240° | -6.70 | -7.09 | -8.46 | -8.98 | -10.06 | -10.44 | -11.47 | -12.77 | -12.57 | -13.87 | -16.21 |
| 245° | -7.05 | -7.33 | -8.39 | -8.65 | -9.63 | -10.07 | -11.90 | -12.53 | -12.00 | -13.20 | -15.33 |
| 250° | -6.57 | -7.12 | -8.24 | -8.90 | -9.72 | -9.28 | -11.01 | -12.75 | -12.39 | -12.78 | -14.32 |
| 255° | -6.45 | -7.10 | -8.19 | -8.80 | -9.47 | -9.47 | -10.21 | -11.63 | -11.97 | -12.37 | -14.31 |
| 260° | -5.98 | -6.64 | -7.97 | -9.23 | -9.17 | -9.03 | -9.83 | -10.48 | -11.37 | -12.23 | -15.17 |
| 265° | -5.65 | -6.79 | -7.40 | -8.50 | -8.78 | -8.67 | -9.57 | -10.38 | -10.47 | -11.16 | -14.09 |
| 270° | -5.21 | -6.19 | -6.97 | -7.56 | -7.96 | -8.71 | -9.56 | -10.57 | -10.00 | -10.30 | -11.53 |
| 275° | -5.13 | -5.88 | -6.25 | -7.13 | -7.43 | -8.11 | -9.23 | -10.12 | -9.66 | -9.78 | -10.67 |
| 280° | -4.83 | -5.25 | -6.20 | -6.54 | -7.15 | -7.43 | -8.35 | -8.67 | -8.65 | -8.96 | -10.12 |
| 285° | -4.41 | -5.06 | -5.71 | -6.34 | -6.57 | -6.71 | -6.94 | -7.55 | -7.72 | -8.29 | -9.69 |
| 290° | -3.99 | -4.65 | -5.37 | -5.88 | -5.84 | -5.77 | -6.23 | -6.90 | -7.13 | -7.58 | -8.65 |
| 295° | -3.66 | -4.24 | -4.96 | -5.18 | -5.06 | -4.99 | -5.75 | -6.44 | -6.53 | -6.80 | -7.48 |
| 300° | -3.36 | -4.03 | -4.46 | -4.42 | -4.19 | -4.51 | -5.22 | -5.64 | -5.72 | -5.95 | -6.78 |
| 305° | -3.07 | -3.48 | -3.61 | -3.47 | -3.58 | -4.03 | -4.44 | -4.81 | -4.92 | -4.97 | -5.81 |
| 310° | -2.49 | -2.76 | -2.90 | -2.87 | -3.17 | -3.59 | -3.97 | -4.02 | -3.91 | -4.04 | -4.71 |
| 315° | -2.29 | -2.68 | -2.68 | -2.56 | -2.81 | -3.18 | -3.35 | -3.38 | -3.16 | -3.41 | -4.01 |
| 320° | -1.85 | -1.86 | -1.96 | -2.05 | -2.37 | -2.53 | -2.79 | -3.01 | -2.65 | -2.90 | -3.48 |
| 325° | -1.60 | -1.76 | -1.63 | -1.59 | -1.97 | -2.18 | -2.21 | -2.21 | -2.08 | -2.43 | -2.94 |
| 330° | -1.00 | -1.09 | -1.10 | -1.26 | -1.54 | -1.63 | -1.92 | -1.65 | -1.73 | -2.11 | -2.27 |
| 335° | -1.01 | -0.99 | -0.90 | -0.93 | -1.09 | -1.21 | -1.07 | -1.18 | -1.17 | -1.46 | -1.69 |
| 340° | -0.57 | -0.46 | -0.36 | -0.46 | -0.82 | -0.79 | -0.84 | -0.72 | -0.82 | -0.97 | -1.08 |
| 345° | -0.18 | -0.16 | -0.20 | -0.28 | -0.45 | -0.44 | -0.43 | -0.46 | -0.49 | -0.57 | -0.63 |
| 350° | -0.06 | -0.10 | -0.17 | -0.16 | -0.15 | -0.20 | -0.04 | -0.30 | -0.12 | -0.19 | -0.17 |
| 355° | 0.00 | -0.02 | -0.06 | -0.03 | -0.01 | -0.03 | 0.05 | -0.06 | 0.01 | -0.02 | -0.01 |

Table A.41 Sensitivity variations of Windscreen UA-1650, Microphone Type 4191, Microphone Preamplifier ZC-0032 and the analyzer with the Microphone Preamplifier mounted directly on the analyzer, at sound incidence angles within $\pm\theta^\circ$ from the reference direction

| Nominal Frequency | Exact Frequency | Max Variation $\pm 30^\circ$ dB | Max Variation $\pm 90^\circ$ dB | Max Variation $\pm 150^\circ$ dB |
|-------------------|-----------------|---------------------------------|---------------------------------|----------------------------------|
| 500 Hz | 501.187 Hz | 0.05 | 0.43 | 0.59 |
| 630 Hz | 630.957 Hz | 0.06 | 0.39 | 0.70 |
| 800 Hz | 794.328 Hz | 0.03 | 0.19 | 0.61 |
| 1000 Hz | 1000 Hz | 0.07 | 0.31 | 0.77 |
| 1250 Hz | 1258.93 Hz | 0.12 | 0.17 | 0.83 |
| 1600 Hz | 1584.89 Hz | 0.10 | 0.65 | 1.19 |
| 2000 Hz | 1995.26 Hz | 0.23 | 0.97 | 1.52 |
| 2240 Hz | 2238.72 Hz | 0.07 | 1.14 | 1.63 |
| 2500 Hz | 2511.89 Hz | 0.21 | 1.29 | 1.78 |
| 2800 Hz | 2818.38 Hz | 0.14 | 1.07 | 1.85 |
| 3150 Hz | 3162.28 Hz | 0.32 | 1.14 | 1.87 |
| 3550 Hz | 3548.13 Hz | 0.10 | 1.24 | 1.74 |
| 4000 Hz | 3981.07 Hz | 0.25 | 1.31 | 1.97 |
| 4500 Hz | 4466.84 Hz | 0.44 | 1.62 | 2.66 |
| 5000 Hz | 5011.87 Hz | 0.45 | 2.07 | 3.36 |
| 5600 Hz | 5623.41 Hz | 0.68 | 2.56 | 4.10 |
| 6300 Hz | 6309.57 Hz | 0.61 | 2.82 | 4.23 |
| 7100 Hz | 7079.46 Hz | 0.36 | 2.59 | 4.06 |
| 8000 Hz | 7943.28 Hz | 0.69 | 3.40 | 5.29 |
| 8500 Hz | 8413.95 Hz | 1.09 | 3.86 | 6.49 |
| 9000 Hz | 8912.51 Hz | 1.05 | 4.51 | 7.18 |
| 9500 Hz | 9440.61 Hz | 0.93 | 4.94 | 7.88 |
| 10000 Hz | 10000 Hz | 0.62 | 5.02 | 8.10 |
| 10600 Hz | 10592.5 Hz | 0.83 | 5.24 | 8.23 |
| 11200 Hz | 11220.2 Hz | 1.10 | 5.59 | 8.66 |
| 11800 Hz | 11885.0 Hz | 1.24 | 6.22 | 9.71 |
| 12500 Hz | 12589.3 Hz | 1.16 | 7.00 | 10.89 |
| 13200 Hz | 13335.2 Hz | 1.29 | 7.60 | 12.53 |
| 14000 Hz | 14125.4 Hz | 1.57 | 7.99 | 13.29 |
| 15000 Hz | 14962.4 Hz | 1.66 | 8.74 | 12.55 |
| 16000 Hz | 15848.9 Hz | 1.96 | 9.66 | 14.69 |
| 17000 Hz | 16788.0 Hz | 1.68 | 10.60 | 17.23 |
| 18000 Hz | 17782.8 Hz | 1.75 | 10.03 | 16.00 |
| 19000 Hz | 18836.5 Hz | 2.14 | 10.33 | 16.36 |
| 20000 Hz | 19952.6 Hz | 2.32 | 11.57 | 20.29 |

Table A.42 Microphone Type 4191 is not specified together with Outdoor Microphone Kit UA-1404

Table A.43 Microphone Type 4191 is not specified together with Outdoor Microphone Kit UA-1404

Table A.44 Microphone Type 4191 is not specified together with Outdoor Microphone Kit UA-1404

Table A.45 Microphone Type 4191 is not specified together with Outdoor Microphone Kit UA-1404

Table A.46 Microphone Type 4191 is not specified together with Outdoor Microphone Kit UA-1404

Table A.47 Microphone Type 4191 is not specified together with Outdoor Microphone Kit UA-1404

Table A.48 Microphone Type 4191 is not specified together with Outdoor Microphone Kit UA-1404

A.6 Periodic Testing of Acoustical Frequency Responses

This section gives the adjustment 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. See Table A.49 and Table A.50 to view the data.

Table A.49 *Acoustical test with Multifunction Acoustic Calibrator Type 4226. Adjustment data that must be applied to the readings of the analyzer in order to obtain equivalent sound levels that would be displayed in response to plane progressive sinusoidal sound waves incident from the reference direction*

| Nominal Frequency | Correction Data For Preamplifier Connected to an Extension Cable | Expanded Uncertainty | Correction Data For Preamplifier Mounted Directly on the analyzer | Expanded Uncertainty |
|-------------------|--|----------------------|---|----------------------|
| Hz | dB | dB | dB | dB |
| 31.5 | 0.00 | 0.30 | 0.00 | 0.32 |
| 63 | 0.00 | 0.06 | 0.00 | 0.12 |
| 125 | 0.00 | 0.05 | 0.00 | 0.11 |
| 250 | 0.00 | 0.05 | 0.06 | 0.11 |
| 500 | 0.05 | 0.05 | 0.27 | 0.11 |
| 1000 | 0.12 | 0.05 | 0.03 | 0.11 |
| 2000 | 0.32 | 0.09 | 0.22 | 0.14 |
| 4000 | 0.99 | 0.11 | 1.03 | 0.19 |
| 8000 | 3.14 | 0.22 | 2.95 | 0.30 |
| 12500 | 6.21 | 0.27 | 6.18 | 0.34 |
| 16000 | 7.49 | 0.32 | 7.45 | 0.38 |

Table A.50 *Acoustical test with Electrostatic Actuator UA-0033. Adjustment data that must be applied to the readings of the analyzer in order to obtain equivalent sound levels that would be displayed in response to plane progressive sinusoidal sound waves incident from the reference direction.*

| Nominal Frequency | Exact Frequency | Correction Data For Preamplifier Connected to an Extension Cable | Expanded Uncertainty | Correction Data For Preamplifier Mounted Directly on the analyzer | Expanded Uncertainty |
|-------------------|-----------------|--|----------------------|---|----------------------|
| Hz | Hz | dB | dB | dB | dB |
| 31.5 | 31.6228 | 0.00 | 0.02 | 0.00 | 0.10 |
| 63 | 63.0957 | 0.00 | 0.02 | 0.00 | 0.10 |
| 125 | 125.893 | 0.00 | 0.02 | 0.00 | 0.10 |
| 250 | 251.189 | 0.00 | 0.02 | 0.07 | 0.10 |
| 500 | 501.187 | 0.02 | 0.02 | 0.25 | 0.10 |
| 1000 | 1000 | 0.10 | 0.02 | 0.01 | 0.10 |
| 2000 | 1995.26 | 0.31 | 0.05 | 0.21 | 0.11 |
| 4000 | 3981.07 | 1.03 | 0.08 | 1.06 | 0.17 |
| 8000 | 7943.28 | 3.33 | 0.09 | 3.14 | 0.22 |
| 12500 | 12589.3 | 6.67 | 0.11 | 6.64 | 0.23 |
| 16000 | 15848.9 | 8.21 | 0.12 | 8.18 | 0.23 |

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HEADQUARTERS: Brüel & Kjær Sound & Vibration Measurement A/S · DK-2850 Nærum · Denmark
Telephone: +45 7741 2000 · Fax: +45 4580 1405 · www.bksv.com · info@bksv.com

Local representatives and service organisations worldwide

