Metrologia 2014 **51** *Tech. Suppl.* 09002

Final Report
on the CIPM Key Comparison
CCAUV.V-K2

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Version of

February 17, 2014

Contents

1 — Introduction

This report presents the results of the third CIPM comparison in the area of vibration, which in this case means sinusoidal acceleration. It has the status of a Draft B and is submitted to the CCAUV for approval. The comparison was originaly supposed to build the foundation of subsequent regional key comparisons over the coming years. However, its value for that purpose is limited due to several shortcomings that became apparent during the analysis.

The report defines a key comparison reference value (RV) for those cases, where applicable, and reports the respective Degrees of Equivalence (see Sections 8 and 9).

The Technical Protocol (see Appendix A) specifies in detail the aim and the task of the comparison, the conditions of measurement, the transfer standards used, measurement instructions and other items. A brief survey is given in the following sections.

The monitoring data documenting the poor stability of one of the transducers are reported in part in Section 6 and the whole set is tabulated in Appendix B.

2 — Participants

Fifteen national metrology institutes or designated institutes from all RMOs took part in this comparison. They are listed in chronological order of measurement in Table 2.1.

Table 2.1: List of participants and actual schedule of CCAUV.V-K2.

Laboratory name	Acronym	Country	Country Code	RMO	Calibration week
Physikalisch-Technische Bundesanstalt	PTB	Germany	DE	EURAMET	24.-28. Aug. 2009 week 0
Czech Metrology Institute	CMI	Czech Republic	CZ	EURAMET	4
National Metrology Institute of South Africa	NMISA	South Africa	ZA	AFRIMET	10
Danish Primary Laboratory of Acoustics	DPLA	Denmark	DK	EURAMET	16
Centro Español de Metrologa	CEM	Spain	ES	EURAMET	24
Glówny Urzad Miar	GUM	Poland	PL	EURAMET	30
Bundesamt für Metrologie	METAS	Switzerland	CH	EURAMET	36
National Metrology Institute of Japan	NMIJ	Japan	JP	APMP	42
Korea Research Institute of Standards and Science	KRISS	Korea	KR	APMP	57
Laboratoire national de Métrology et d'essais	LNE	France	F	EURAMET	65
National Institute of Metrology of China	NIM	China (PR)	C	APMP	74
Centro Nacional de Metrologia	CENAM	Mexico	MX	SIM	80
National Institute of Metrology, Quality and Technology	INMETRO	Brazil	BR	SIM	93
Ulusal Metroloji Enstitüsü	UME	Turkey	TR	EURAMET	104
D.I. Mendelejev Institute for Metrology	VNIIM	Russia	RU	COOMET	118

3 — Task and Purpose of the Comparison

In the field of vibration and shock, this third key comparison[1] (CCAUV.V-K2) was organized in order to compare measurements of sinusoidal linear accelerations in the frequency range from 10 Hz to 10 kHz. Moreover, the calibration and measurement capabilities (CMCs) of the NMIs for primary accelerometer calibration, i.e. measurement of charge sensitivity and voltage sensitivity of accelerometers, were to be examined and compared, the latter under the assumption that the results of charge sensitivity of amplifiers provide sufficient information to support CMCs for both charge and voltage sensitivity. .

During the circulation period from August 2009 to December 2011, 15 national metrology institutes (NMIs) from all five regional metrology organizations (RMOs) calibrated two accelerometers as transfer standards. It was the task of the comparison to measure the complex charge sensitivity of two accelerometer standards (one of single-ended design and one of back-to-back design) at different frequencies specified in the technical protocol (TP) (see Appendix A). The magnitude of the complex charge sensitivity was calculated as the ratio of the amplitude of the accelerometer output charge to the amplitude of the acceleration at its reference surface. The reference surface was defined as the base surface (mounting surface) of the accelerometer of single-ended design (SE), and the top surface of the accelerometer of back-to-back design (BB). The charge sensitivity was given in pico-coulombs per metre per second squared: pC/(m/s^2). A calibrated charge amplifier was used to measure the output charge of the accelerometer standards, applying the electrical calibration method specified in the TP.

For the calibration of the two accelerometers, all NMIs applied laser interferometry in compliance with the international standards ISO 16063-1:1998 [1] and ISO 16063-11:1999 [2], in order to cover the entire frequency range chosen, within a specified range of the acceleration amplitude with specified uncertainties. Although the TP left the option to apply other methods with similar known uncertainties, no other method (e.g. the reciprocity method) was applied.

[1]prior comparisons were CCAUV.V-K1 and CCAUV.V-K1.1

4 — Transfer Standards as Artefacts

For the purpose of the comparison, the pilot laboratory monitored two accelerometers kindly provided by the manufacturer to the pilot laboratory for this KC for about $1\frac{1}{2}$ years prior to the start of the comparison measurements.

- One transfer standard accelerometer (single-ended), type 8305-001 SN 2571390 (manufacturer: Brüel & Kjaer) named SE-transducer subsequently.
- One reference standard accelerometer (back-to-back), type 8305 S SN 2602106 (manufacturer: Brüel & Kjaer) named BB-transducer subsequently.

5 — Circulation of the Artefacts

A star type circulation was used for this comparison, i.e. between the measurements at each participant's laboratory the pilot laboratory checked the artefacts for stability (see Section 6) and the state of the mounting surface. If the quality of the mounting surface was degraded the artefacts were re-lapped in order to provide optimum conditions for the following participant. The investigation of the long-term stability was continued throughout the circulation period, whenever the artefacts returned to the pilot laboratory The results of the PTB stability measurements and other individual data of the transfer standards are given in section 6 and appendix B.

6 — Results of the Monitoring Measurements

The artefacts were monitored by the pilot laboratory during the whole comparison. Due to the star-type circulation a monitoring measurement was performed between each of the participant's measurements. The subsequent diagrams (Fig. 6.1) depict the stability of the artefacts over time (in weeks) for the duration of the comparison for some frequencies. The shakers employed by the participants used armatures of different materials. It was found that the measured sensitivities of the SE accelerometer differed depending on the type of armature of the shaker. However, the armature material did not have a measurable effect on the sensitivities of the BB accelerometer. For the SE stability results shown here, the measurements on the beryllium armature were selected.

The visual inspection of the graphed results already indicates that the BB sensor was not as stable as the single-ended. In order to quantify the stability or instability somehow, the following procedure was performed to define an ε_n-value. For every frequency the standard deviation of all monitoring measurements $x_{\mathrm{mon},i}$ by the pilot laboratory was calculated and divided by the expanded combined measurement uncertainty U_{mon} of the pilot laboratory.

$$\varepsilon_n(f) = \frac{\sqrt{\sum \left(x_{\mathrm{mon},i}(f) - \bar{x}_{\mathrm{mon}}(f)\right)^2}}{U_{\mathrm{mon}}(f))} \tag{6.1}$$

For a reasonable assumption of a stable artefact the large majority of the measurements (frequencies) should produce $\varepsilon_n \leq 1$. This ε_n value is charted in Figure 6.2.

During the 8th meeting of the CCAUV in June 2012 these stability issues were presented to the participants of the comparison in an ad-hoc meeting. After some discussion an agreement was reached to not rely on the non-stable magnitude results of the BB transducer, but to report the measurement results of the participants and the monitoring data of the pilot laboratory. Beyond the instability of the BB transducer the issue of the dependency of the SE transducer's sensitivity on the armature material of the shaker posed a complication in the evaluation of the data (c.f. [3], [4]). The set of participants could not be partitioned in two groups, as was originaly hoped.

It was decided in the ad-hoc meeting to limit the evaluation of SE-sensor results to frequencies below and including 5kHz. Beyond these frequencies it was expected that the systematic effect of the material of the shaker armature would make a comparison with low uncertainties unfeasible.

In a subsequent trial to evaluate the SE results up to 10 kHz the results reported by PTB for this transducer using two vibration exciters of different armature materials were averaged. With these mean results included as PTB (mean) in the figures, the evaluation appeared feasible. According to this process the following evaluations will subsequently be done in this report:

sensor	result	frequency range
SE	Magnitude	10 Hz to 10 kHz
SE	Phase	10 Hz to 10 kHz
BB	Phase	10 Hz to 10 kHz

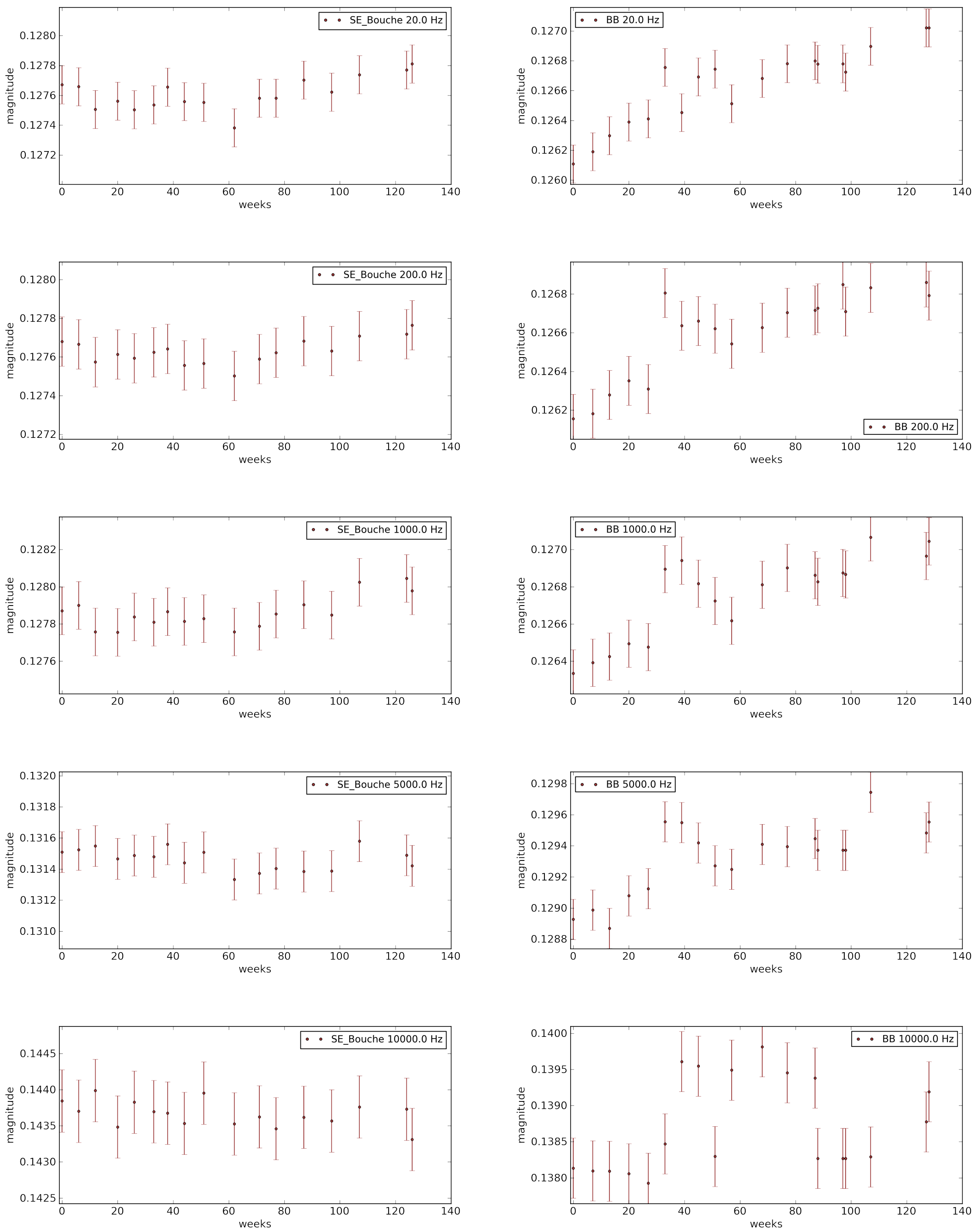

Figure 6.1: Graphical representation of the monitoring measurement results for the two artefacts, SE (left column, on beryllium), BB (right column).

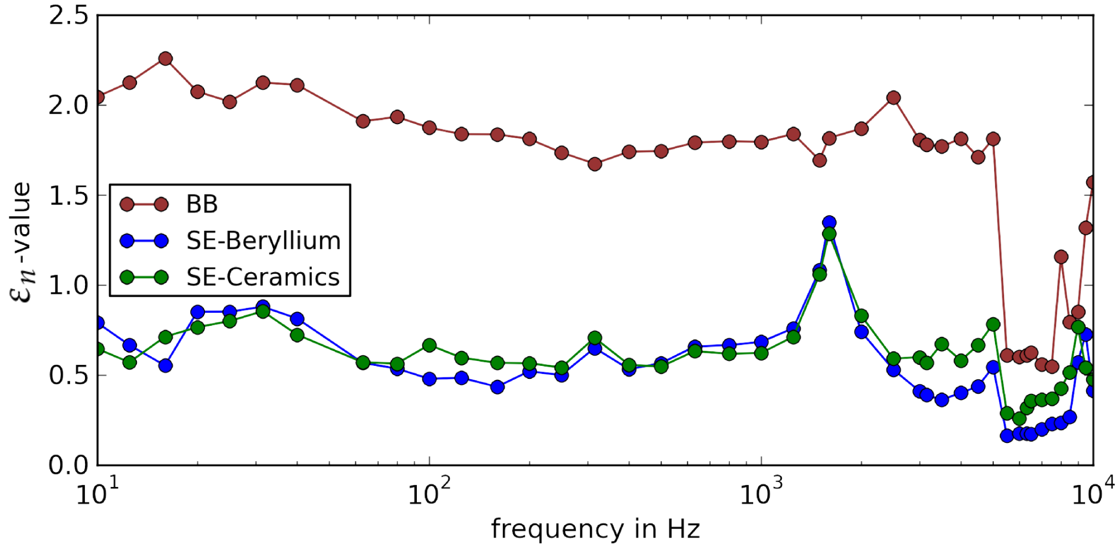

Figure 6.2: ε_n value versus frequency for the two artefacts, single-ended (blue and green) and back-to-back (red).

7 — Results of the Participants

The following sections report the results submitted by the participants of the comparison to the pilot laboratory using the reporting spreadsheet. All results are reported here, although not all could be evaluated according to the stability problems of the BB. The results presented for magnitude are actually given in pC/(m/s^2) and for phase shift in °.

7.1 Results for the Magnitude of the Complex Sensitivity

7.1.1 The Single-Ended Accelerometer (SN 2571390)

Table 7.1: Reported participants' results for the magnitude of the SE with relative expanded uncertainties ($k = 2$)

f	PTB mean		CMI		NMISA		DPLA		CEM	
in Hz	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %
10	0.12764	0.1	0.12750	0.2	0.12793	0.5	0.12771	0.4	0.12768	0.4
12.5	0.12767	0.1	0.12760	0.2	0.12776	0.5	0.12760	0.4	0.12766	0.4
16	0.12767	0.1	0.12760	0.2	0.12787	0.5	0.12757	0.4	0.12755	0.4
20	0.12767	0.1	0.12770	0.2	0.12801	0.5	0.12757	0.4	0.12759	0.4
25	0.12765	0.1	0.12770	0.2	0.12801	0.5	0.12761	0.4	0.12771	0.4
31.5	0.12766	0.1	0.12770	0.2	0.12792	0.5	0.12761	0.4	0.12774	0.4
40	0.12765	0.1	0.12770	0.2	0.12792	0.5	0.12759	0.4	0.12771	0.4
63	0.12760	0.1	0.12770	0.2	0.12796	0.5	0.12762	0.4	0.12769	0.4
80	0.12760	0.1	0.12770	0.2	0.12795	0.5	0.12762	0.4	0.12770	0.4
100	0.12757	0.1	0.12770	0.2	0.12795	0.5	0.12762	0.4	0.12770	0.4
125	0.12763	0.1	0.12770	0.2	0.12798	0.5	0.12761	0.4	0.12770	0.4
160	0.12765	0.1	0.12770	0.2	0.12775	0.5	0.12759	0.4	0.12770	0.4
200	0.12768	0.1	0.12770	0.2	0.12776	0.5	0.12776	0.4	0.12770	0.4
250	0.12771	0.1	0.12780	0.2	0.12779	0.5	0.12762	0.4	0.12770	0.4
315	0.12772	0.1	0.12780	0.3	0.12780	0.5	0.12761	0.4	0.12770	0.4
400	0.12773	0.1	0.12780	0.3	0.12780	0.5	0.12770	0.4	0.12770	0.4
500	0.12773	0.1	0.12790	0.3	0.12775	0.5	0.12768	0.4	0.12770	0.4
630	0.12777	0.1	0.12790	0.3	0.12774	0.5	0.12771	0.4	0.12770	0.4
800	0.12779	0.1	0.12800	0.3	0.12778	0.5	0.12777	0.4	0.12790	0.4
1000	0.12786	0.1	0.12810	0.3	0.12777	0.5	0.12782	0.4	0.12780	0.4
1250	0.12796	0.1	0.12820	0.3	0.12785	0.8	0.12792	0.4	0.12788	0.4
1500	0.12808	0.1	0.12840	0.3	0.12791	0.8	0.12802	0.4	0.12798	0.4
1600	0.12812	0.1	0.12840	0.3	0.12799	0.8	0.12805	0.4	0.12802	0.4
2000	0.12834	0.1	0.12870	0.4	0.12814	0.8	0.12833	0.4	0.12810	0.4
2500	0.12869	0.1	0.12920	0.4	0.12843	0.8	0.12860	0.4	0.12830	0.4
3000	0.12903	0.1	0.12970	0.4	0.12877	0.8	0.12902	0.4	0.12900	0.4
3150	0.12915	0.1	0.12990	0.4	0.12892	0.8	0.12916	0.4	0.12910	0.4
3500	0.12954	0.1	0.13020	0.4	0.12920	0.8	0.12944	0.4	0.12940	0.4
4000	0.13000	0.1	0.13090	0.4	0.12970	0.8	0.13001	0.4	0.13000	0.4
4500	0.13063	0.1	0.13150	0.4	0.13027	0.8	0.13065	0.6	0.13060	0.4
5000	0.13132	0.1	0.13200	0.4	0.13089	1.2	0.13142	0.6	0.13120	0.4
5500	0.13212	0.3	0.13280	0.4	0.13164	1.2	0.13214	0.6	0.13200	0.8
6000	0.13292	0.3	0.13330	0.4	0.13242	1.2	0.13291	0.6	0.13280	0.8
6300	0.13342	0.3	0.13390	0.4	0.13294	1.2	0.13357	0.6	0.13330	0.8
6500	0.13376	0.3	0.13430	0.4	0.13331	1.2	0.13382	1	0.13360	0.8
7000	0.13478	0.3	0.13500	0.4	0.13420	1.2	0.13467	1	0.13460	0.8
7500	0.13608	0.3	0.13640	0.4	0.13540	1.2	0.13617	1	0.13590	0.8
8000	0.13722	0.3	0.13760	0.4	0.13647	1.2	0.13715	1	0.13700	0.8
8500	0.13841	0.3	0.13840	0.4	0.13769	1.2	0.13868	1	0.13830	0.8
9000	0.14004	0.3	0.13960	0.4	0.13931	1.2	0.14211	1.5	0.13990	0.8
9500	0.14145	0.3	0.14110	0.4	0.14016	1.2	0.14144	1	0.14060	0.8
10000	0.14303	0.3	0.14290	0.4	0.14185	1.2	0.14269	1	0.14250	0.8

(continued) Reported participants' results for the magnitude of the SE with relative expanded uncertainties ($k = 2$)

f	GUM		METAS		NMIJ		KRISS		LNE	
in Hz	X_i in $\frac{pC}{m/s^2}$	U_{rel,X_i} in %	X_i in $\frac{pC}{m/s^2}$	U_{rel,X_i} in %	X_i in $\frac{pC}{m/s^2}$	U_{rel,X_i} in %	X_i in $\frac{pC}{m/s^2}$	U_{rel,X_i} in %	X_i in $\frac{pC}{m/s^2}$	U_{rel,X_i} in %
10	0.12790	0.6	0.12804	0.22	0.12816	1.3	0.12690	0.39	0.12772	0.3
12.5	0.12789	0.6	0.12801	0.22	0.12804	0.58	0.12693	0.36	0.12774	0.3
16	0.12796	0.6	0.12798	0.22	0.12786	0.42	0.12704	0.36	0.12775	0.3
20	0.12786	0.5	0.12797	0.19	0.12786	0.4	0.12686	0.41	0.12781	0.3
25	0.12787	0.5	0.12792	0.19	0.12780	0.39	0.12702	0.41	0.12770	0.3
31.5	0.12787	0.5	0.12790	0.19	0.12774	0.39	0.12707	0.36	0.12770	0.3
40	0.12788	0.5	0.12789	0.19	0.12771	0.39	0.12715	0.36	0.12768	0.3
63	0.12782	0.5	0.12785	0.19	0.12772	0.39	0.12726	0.36	0.12763	0.3
80	0.12784	0.5	0.12784	0.19	0.12768	0.39	0.12734	0.36	0.12771	0.3
100	0.12790	0.5	0.12782	0.19	0.12768	0.39	0.12736	0.37	0.12769	0.3
125	0.12788	0.5	0.12781	0.19	0.12768	0.39	0.12741	0.39	0.12769	0.3
160	0.12785	0.5	0.12779	0.19	0.12765	0.39	0.12737	0.53	0.12772	0.3
200	0.12773	0.5	0.12779	0.2	0.12769	0.39	0.12748	0.57	0.12774	0.3
250	0.12777	0.5	0.12786	0.21	0.12766	0.39	0.12750	0.38	0.12771	0.3
315	0.12780	0.5	0.12799	0.22	0.12779	0.39	0.12752	0.38	0.12771	0.3
400	0.12776	0.5	0.12802	0.22	0.12767	0.39	0.12759	0.41	0.12773	0.3
500	0.12780	0.5	0.12793	0.2	0.12782	0.39	0.12764	0.46	0.12774	0.3
630	0.12785	0.5	0.12793	0.2	0.12783	0.39	0.12768	0.42	0.12780	0.3
800	0.12792	0.5	0.12797	0.2	0.12788	0.39	0.12768	0.41	0.12783	0.3
1000	0.12794	0.5	0.12801	0.23	0.12797	0.39	0.12776	0.41	0.12789	0.3
1250	0.12803	0.5	0.12809	0.23	0.12822	0.39	0.12779	0.41	0.12797	0.3
1500	0.12813	0.5	0.12817	0.23	0.12846	0.39	0.12785	0.42	0.12809	0.3
1600	0.12819	0.5	0.12818	0.23	0.12823	0.4	0.12795	0.42	0.12812	0.3
2000	0.12842	0.5	0.12840	0.23	0.12869	0.4	0.12821	0.41	0.12832	0.3
2500	0.12876	0.5	0.12872	0.23	0.12895	0.4	0.12839	0.47	0.12865	0.3
3000	0.12917	0.5	0.12910	0.23	0.12959	0.4	0.12873	0.49	0.12901	0.3
3150	0.12932	0.5	0.12922	0.23	0.12954	0.39	0.12891	0.55	0.12915	0.3
3500	0.12969	0.5	0.12948	0.23	0.12987	0.39	0.12967	0.65	0.12949	0.3
4000	0.13027	0.5	0.13001	0.23	0.13070	0.39	0.12998	0.56	0.12998	0.3
4500	0.13081	0.5	0.13057	0.23	0.13113	0.39	0.13111	0.49	0.13055	0.3
5000	0.13152	0.6	0.13131	0.23	0.13178	0.39			0.13122	0.6
5500	0.13217	1.1	0.13198	0.68	0.13279	0.39			0.13197	0.6
6000	0.13324	1.1	0.13273	0.68	0.13359	0.4			0.13274	0.6
6300	0.13383	1.1	0.13328	0.68	0.13413	0.4			0.13349	0.6
6500	0.13410	1.1	0.13352	0.68	0.13449	0.39			0.13345	0.6
7000	0.13524	1.1	0.13426	0.68	0.13552	0.4			0.13442	1
7500	0.13645	1.1	0.13591	0.68	0.13716	0.4			0.13566	1
8000	0.13792	1.1	0.13669	0.68	0.13846	0.41			0.13684	1
8500	0.13919	1.1	0.13817	0.68	0.13976	0.4			0.13793	1
9000	0.14029	1.1	0.13983	0.68	0.14097	0.41			0.13896	1
9500	0.14298	1.1	0.13975	0.68	0.14237	0.42			0.14162	1
10000	0.14436	1.3	0.14201	0.68	0.14422	0.48			0.14272	1

(continued) Reported participants' results for the magnitude of the SE with relative expanded uncertainties ($k = 2$)

f	NIM		CENAM		INMETRO		UME		VNIIM	
in Hz	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %
10	0.12767	0.4	0.12764	0.3	0.12775	0.24	0.12788	0.5	0.12739	1
12.5	0.12775	0.4	0.12761	0.3	0.12781	0.24	0.12788	0.5	0.12742	1
16	0.12786	0.4	0.12769	0.3	0.12778	0.24	0.12792	0.5	0.12747	1
20	0.12784	0.4	0.12768	0.3	0.12778	0.24	0.12781	0.5	0.12756	0.5
25	0.12784	0.4	0.12770	0.3	0.12779	0.24	0.12758	0.5	0.12767	0.5
31.5	0.12785	0.4	0.12771	0.3	0.12779	0.24	0.12761	0.5	0.12769	0.5
40	0.12785	0.4	0.12769	0.3	0.12777	0.24	0.12761	0.5	0.12773	0.5
63	0.12784	0.4	0.12767	0.3	0.12777	0.24	0.12767	0.5	0.12776	0.5
80	0.12790	0.4	0.12766	0.3	0.12777	0.24	0.12770	0.5	0.12776	0.5
100	0.12790	0.4	0.12766	0.3	0.12777	0.24	0.12768	0.5	0.12779	0.5
125	0.12789	0.4	0.12769	0.3	0.12776	0.24	0.12761	0.5	0.12779	0.5
160	0.12788	0.4	0.12767	0.3	0.12775	0.24	0.12751	0.5	0.12783	0.5
200	0.12787	0.4	0.12768	0.3	0.12778	0.24	0.12756	0.5	0.12786	0.5
250	0.12790	0.4	0.12767	0.3	0.12780	0.24	0.12760	0.5	0.12785	0.5
315	0.12789	0.4	0.12766	0.3	0.12780	0.24	0.12759	0.5	0.12787	0.5
400	0.12792	0.4	0.12768	0.3	0.12780	0.24	0.12759	0.5	0.12789	0.5
500	0.12792	0.4	0.12770	0.3	0.12784	0.24	0.12767	0.5	0.12792	0.5
630	0.12796	0.4	0.12776	0.3	0.12787	0.24	0.12786	0.5	0.12795	0.5
800	0.12800	0.4	0.12778	0.3	0.12790	0.24	0.12791	0.5	0.12800	0.5
1000	0.12801	0.4	0.12783	0.3	0.12794	0.24	0.12788	0.5	0.12806	0.5
1250	0.12811	0.4	0.12788	0.5	0.12800	0.24	0.12799	1	0.12812	0.5
1500	0.12816	0.4	0.12809	0.5	0.12809	0.24	0.12805	1	0.12829	0.5
1600	0.12826	0.4	0.12817	0.5	0.12819	0.24	0.12810	1	0.12837	0.5
2000	0.12846	0.4	0.12841	0.5	0.12833	0.24	0.12835	1	0.12848	0.5
2500	0.12880	0.4	0.12876	0.5	0.12857	0.24	0.12865	1	0.12867	1
3000	0.12922	0.4	0.12918	0.5	0.12898	0.24	0.12925	1	0.12888	1
3150	0.12942	0.4	0.12930	0.5	0.12910	0.34	0.12918	1	0.12912	1
3500	0.12962	0.4	0.12968	0.5	0.12959	0.34	0.12954	1	0.12934	1
4000	0.13004	0.4	0.13014	0.5	0.13003	0.34	0.13028	1	0.12960	1
4500	0.13071	0.4	0.13093	0.5	0.13060	0.34	0.13110	1	0.12994	1
5000	0.13158	0.4	0.13175	1	0.13140	0.6	0.13155	1	0.12998	1
5500	0.13201	1	0.13265	1	0.13207	0.6	0.13209	1.5	0.13040	2
6000	0.13295	1	0.13355	1	0.13295	0.6	0.13327	1.5	0.13086	2
6300	0.13374	1	0.13421	1	0.13341	0.6	0.13400	1.5	0.13126	2
6500	0.13410	1	0.13472	1	0.13382	0.6	0.13440	1.5	0.13156	2
7000	0.13500	1	0.13567	1	0.13447	0.8	0.13550	1.5	0.13221	2
7500	0.13629	1	0.13693	1	0.13561	0.8	0.13640	1.7	0.13296	2
8000	0.13753	1	0.13829	1	0.13685	0.8	0.13740	1.7	0.13348	2
8500	0.13864	1	0.13954	1	0.13821	0.8	0.13880	1.7	0.13418	2
9000	0.14073	1	0.14117	1	0.13960	0.8	0.14010	1.7	0.13468	2
9500	0.14224	1	0.14260	1	0.14098	0.8	0.14142	1.7	0.13525	2
10000	0.14354	1	0.14462	1	0.14265	0.8	0.14422	1.7	0.13678	2

7.1.2 The Back-to-Back Accelerometer (SN 2602106)

Table 7.2: Reported participants' results for the magnitude of the sensitivity of the BB with relative expanded uncertainties ($k = 2$).

f	PTB mean		CMI		NMISA		DPLA		CEM	
in Hz	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %
10	0.12602	0.1	0.12610	0.2	0.12666	0.5	0.12643	0.4	0.12650	0.4
12.5	0.12605	0.1	0.12610	0.2	0.12626	0.5	0.12625	0.4	0.12647	0.4
16	0.12602	0.1	0.12620	0.2	0.12614	0.5	0.12624	0.4	0.12643	0.4
20	0.12611	0.1	0.12620	0.2	0.12611	0.5	0.12625	0.4	0.12648	0.4
25	0.12607	0.1	0.12620	0.2	0.12605	0.5	0.12632	0.4	0.12647	0.4
31.5	0.12607	0.1	0.12620	0.2	0.12599	0.5	0.12631	0.4	0.12645	0.4
40	0.12607	0.1	0.12620	0.2	0.12593	0.5	0.12628	0.4	0.12645	0.4
63	0.12606	0.1	0.12620	0.2	0.12601	0.5	0.12631	0.4	0.12643	0.4
80	0.12611	0.1	0.12620	0.2	0.12602	0.5	0.12632	0.4	0.12642	0.4
100	0.12607	0.1	0.12620	0.2	0.12602	0.5	0.12632	0.4	0.12637	0.4
125	0.12611	0.1	0.12620	0.2	0.12605	0.5	0.12632	0.4	0.12638	0.4
160	0.12613	0.1	0.12630	0.2	0.12604	0.5	0.12632	0.4	0.12640	0.4
200	0.12616	0.1	0.12630	0.2	0.12606	0.5	0.12641	0.4	0.12635	0.4
250	0.12621	0.1	0.12630	0.2	0.12609	0.5	0.12631	0.4	0.12638	0.4
315	0.12620	0.1	0.12630	0.3	0.12614	0.5	0.12635	0.4	0.12640	0.4
400	0.12622	0.1	0.12630	0.3	0.12617	0.5	0.12634	0.4	0.12640	0.4
500	0.12623	0.1	0.12640	0.3	0.12618	0.5	0.12636	0.4	0.12642	0.4
630	0.12625	0.1	0.12640	0.3	0.12622	0.5	0.12638	0.4	0.12640	0.4
800	0.12623	0.1	0.12640	0.3	0.12628	0.5	0.12646	0.4	0.12642	0.4
1000	0.12633	0.1	0.12650	0.3	0.12629	0.5	0.12646	0.4	0.12650	0.4
1250	0.12637	0.1	0.12660	0.3	0.12639	0.8	0.12656	0.4	0.12652	0.4
1500	0.12649	0.1	0.12670	0.3	0.12646	0.8	0.12662	0.4	0.12660	0.4
1600	0.12654	0.1	0.12670	0.3	0.12653	0.8	0.12665	0.4	0.12662	0.4
2000	0.12661	0.1	0.12700	0.4	0.12669	0.8	0.12678	0.4	0.12680	0.4
2500	0.12694	0.1	0.12740	0.4	0.12696	0.8	0.12703	0.4	0.12703	0.4
3000	0.12718	0.1	0.12780	0.4	0.12728	0.8	0.12725	0.4	0.12730	0.4
3150	0.12729	0.1	0.12790	0.4	0.12740	0.8	0.12736	0.4	0.12740	0.4
3500	0.12757	0.1	0.12820	0.4	0.12765	0.8	0.12760	0.4	0.12760	0.4
4000	0.12791	0.1	0.12860	0.4	0.12812	0.8	0.12798	0.4	0.12808	0.4
4500	0.12839	0.1	0.12920	0.4	0.12855	0.8	0.12843	0.4	0.12850	0.4
5000	0.12893	0.1	0.12960	0.4	0.12915	1.2	0.12897	0.4	0.12895	0.4
5500	0.12948	0.3	0.13010	0.4	0.12974	1.2	0.12950	0.6	0.12955	0.8
6000	0.13002	0.3	0.13090	0.4	0.13040	1.2	0.13010	0.6	0.13012	0.8
6300	0.13041	0.3	0.13110	0.4	0.13091	1.2	0.13058	0.6	0.13050	0.8
6500	0.13067	0.3	0.13130	0.4	0.13122	1.2	0.13085	0.6	0.13080	0.8
7000	0.13147	0.3	0.13200	0.4	0.13204	1.2	0.13152	0.6	0.13158	0.8
7500	0.13239	0.3	0.13270	0.4	0.13305	1.2	0.13256	0.6	0.13235	0.8
8000	0.13318	0.3	0.13350	0.4	0.13342	1.2	0.13334	0.6	0.13378	0.8
8500	0.13408	0.3	0.13450	0.4	0.13475	1.2	0.13448	0.6	0.13432	0.8
9000	0.13508	0.3	0.13590	0.4	0.13692	1.2	0.13535	0.6	0.13517	0.8
9500	0.13622	0.3	0.13730	0.4	0.13927	1.2	0.13656	0.6	0.13640	0.8
10000	0.13813	0.3	0.13910	0.4	0.14212	1.2	0.13765	0.6	0.14245	1.2

(continued) Reported participants' results for the magnitude of the sensitivity of the BB with relative expanded uncertainties ($k = 2$).

f	GUM		METAS		NMIJ		KRISS		LNE	
in Hz	X_i in $\frac{pC}{m/s^2}$	U_{rel,X_i} in %	X_i in $\frac{pC}{m/s^2}$	U_{rel,X_i} in %	X_i in $\frac{pC}{m/s^2}$	U_{rel,X_i} in %	X_i in $\frac{pC}{m/s^2}$	U_{rel,X_i} in %	X_i in $\frac{pC}{m/s^2}$	U_{rel,X_i} in %
10	0.12658	0.6	0.12713	0.22	0.12729	1.3	0.12625	0.38	0.12653	0.3
12.5	0.12662	0.6	0.12708	0.22	0.12706	0.53	0.12610	0.36	0.12662	0.3
16	0.12663	0.6	0.12711	0.22	0.12687	0.27	0.12634	0.36	0.12661	0.3
20	0.12662	0.5	0.12703	0.19	0.12688	0.25	0.12613	0.41	0.12666	0.3
25	0.12664	0.5	0.12703	0.19	0.12679	0.24	0.12630	0.41	0.12664	0.3
31.5	0.12663	0.5	0.12702	0.19	0.12677	0.24	0.12629	0.35	0.12665	0.3
40	0.12662	0.5	0.12699	0.19	0.12673	0.24	0.12636	0.36	0.12664	0.3
63	0.12660	0.5	0.12694	0.19	0.12671	0.24	0.12636	0.36	0.12667	0.3
80	0.12660	0.5	0.12692	0.19	0.12667	0.24	0.12641	0.36	0.12663	0.3
100	0.12666	0.5	0.12689	0.19	0.12668	0.24	0.12639	0.36	0.12664	0.3
125	0.12665	0.5	0.12690	0.19	0.12667	0.24	0.12637	0.37	0.12664	0.3
160	0.12661	0.5	0.12691	0.19	0.12664	0.24	0.12644	0.38	0.12666	0.3
200	0.12659	0.5	0.12687	0.2	0.12668	0.24	0.12658	0.4	0.12665	0.3
250	0.12658	0.5	0.12690	0.2	0.12665	0.24	0.12651	0.36	0.12664	0.3
315	0.12658	0.5	0.12693	0.2	0.12664	0.24	0.12658	0.37	0.12667	0.3
400	0.12657	0.5	0.12692	0.19	0.12672	0.24	0.12665	0.37	0.12667	0.3
500	0.12657	0.5	0.12694	0.19	0.12673	0.24	0.12670	0.38	0.12667	0.3
630	0.12660	0.5	0.12695	0.19	0.12669	0.24	0.12676	0.37	0.12669	0.3
800	0.12662	0.5	0.12694	0.19	0.12675	0.24	0.12679	0.39	0.12672	0.3
1000	0.12665	0.5	0.12695	0.23	0.12674	0.24	0.12680	0.39	0.12676	0.3
1250	0.12671	0.5	0.12706	0.23	0.12688	0.24	0.12692	0.38	0.12683	0.3
1500	0.12679	0.5	0.12712	0.23	0.12695	0.24	0.12698	0.38	0.12692	0.3
1600	0.12683	0.5	0.12715	0.23	0.12700	0.24	0.12700	0.38	0.12693	0.3
2000	0.12699	0.5	0.12734	0.23	0.12700	0.24	0.12720	0.38	0.12709	0.3
2500	0.12723	0.5	0.12758	0.23	0.12750	0.25	0.12745	0.38	0.12733	0.3
3000	0.12757	0.5	0.12788	0.23	0.12765	0.25	0.12762	0.4	0.12759	0.3
3150	0.12770	0.5	0.12798	0.23	0.12775	0.26	0.12781	0.41	0.12770	0.3
3500	0.12798	0.5	0.12825	0.23	0.12808	0.27	0.12799	0.44	0.12791	0.3
4000	0.12838	0.5	0.12868	0.23	0.12830	0.29	0.12826	0.49	0.12829	0.3
4500	0.12889	0.5	0.12918	0.23	0.12878	0.24	0.12903	0.73	0.12884	0.3
5000	0.12938	0.6	0.12975	0.23	0.12918	0.25			0.12930	0.6
5500	0.12998	1.1	0.13034	0.68	0.12994	0.25			0.12998	0.6
6000	0.13062	1.1	0.13093	0.68	0.13036	0.25			0.13060	0.6
6300	0.13113	1.1	0.13142	0.68	0.13090	0.25			0.13103	0.6
6500	0.13138	1.1	0.13172	0.68	0.13116	0.24			0.13108	0.6
7000	0.13223	1.1	0.13247	0.68	0.13213	0.24			0.13211	0.6
7500	0.13315	1.1	0.13356	0.68	0.13297	0.25			0.13292	1
8000	0.13423	1.1	0.13379	1.1	0.13375	0.25			0.13368	1
8500	0.13541	1.2	0.13565	1.1	0.13459	0.25			0.13431	1
9000	0.13626	1.2	0.13660	1.1	0.13577	0.25			0.13544	1
9500	0.13783	1.2	0.13814	1.3	0.13651	0.26			0.13683	1
10000	0.13886	1.3	0.13875	1.8	0.13794	0.29			0.13787	1

(continued) Reported participants' results for the magnitude of the sensitivity of the BB with relative expanded uncertainties ($k = 2$).

f	NIM		CENAM		INMETRO		UME		VNIIM	
in Hz	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %	X_i in $\frac{\text{pC}}{\text{m/s}^2}$	U_{rel,X_i} in %
10	0.12682	0.4	0.12672	0.3	0.12692	0.24	0.12690	0.5	0.12645	1
12.5	0.12685	0.4	0.12672	0.3	0.12693	0.24	0.12687	0.5	0.12649	1
16	0.12687	0.4	0.12674	0.3	0.12688	0.24	0.12686	0.5	0.12652	1
20	0.12688	0.4	0.12684	0.3	0.12686	0.24	0.12686	0.5	0.12658	0.5
25	0.12688	0.4	0.12687	0.3	0.12685	0.24	0.12674	0.5	0.12657	0.5
31.5	0.12689	0.4	0.12768	0.3	0.12685	0.24	0.12677	0.5	0.12654	0.5
40	0.12688	0.4	0.12678	0.3	0.12683	0.24	0.12676	0.5	0.12654	0.5
63	0.12687	0.4	0.12676	0.3	0.12681	0.24	0.12680	0.5	0.12657	0.5
80	0.12690	0.4	0.12674	0.3	0.12680	0.24	0.12680	0.5	0.12658	0.5
100	0.12690	0.4	0.12678	0.3	0.12679	0.24	0.12678	0.5	0.12660	0.5
125	0.12690	0.4	0.12678	0.3	0.12679	0.24	0.12675	0.5	0.12663	0.5
160	0.12687	0.4	0.12675	0.3	0.12678	0.24	0.12670	0.5	0.12666	0.5
200	0.12689	0.4	0.12674	0.3	0.12683	0.24	0.12676	0.5	0.12672	0.5
250	0.12686	0.4	0.12673	0.3	0.12683	0.24	0.12681	0.5	0.12669	0.5
315	0.12688	0.4	0.12676	0.3	0.12681	0.24	0.12679	0.5	0.12666	0.5
400	0.12689	0.4	0.12676	0.3	0.12681	0.24	0.12681	0.5	0.12663	0.5
500	0.12689	0.4	0.12679	0.3	0.12681	0.24	0.12673	0.5	0.12663	0.5
630	0.12691	0.4	0.12679	0.3	0.12682	0.24	0.12695	0.5	0.12658	0.5
800	0.12695	0.4	0.12681	0.3	0.12687	0.24	0.12697	0.5	0.12655	0.5
1000	0.12698	0.4	0.12679	0.3	0.12689	0.24	0.12693	0.5	0.12652	0.5
1250	0.12704	0.4	0.12695	0.5	0.12695	0.24	0.12690	1	0.12649	0.5
1500	0.12711	0.4	0.12699	0.5	0.12702	0.24	0.12705	1	0.12647	0.5
1600	0.12719	0.4	0.12704	0.5	0.12712	0.24	0.12720	1	0.12643	0.5
2000	0.12728	0.4	0.12718	0.5	0.12724	0.24	0.12755	1	0.12645	0.5
2500	0.12754	0.4	0.12742	0.5	0.12745	0.24	0.12760	1	0.12655	1
3000	0.12775	0.4	0.12770	0.5	0.12769	0.24	0.12775	1	0.12665	1
3150	0.12786	0.4	0.12785	0.5	0.12783	0.34	0.12790	1	0.12676	1
3500	0.12814	0.4	0.12794	0.5	0.12812	0.34	0.12820	1	0.12687	1
4000	0.12848	0.4	0.12833	0.5	0.12847	0.34	0.12860	1	0.12710	1
4500	0.12903	0.4	0.12885	0.5	0.12884	0.34	0.12884	1	0.12825	1
5000	0.12951	0.4	0.12931	1	0.12939	0.6	0.12925	1	0.12884	1
5500	0.12991	1	0.13003	1	0.12978	0.6	0.12967	1.5	0.12937	2
6000	0.13053	1	0.13064	1	0.13012	0.6	0.12995	1.5	0.13003	2
6300	0.13100	1	0.13093	1	0.13072	0.6	0.13029	1.5	0.13053	2
6500	0.13135	1	0.13136	1	0.13108	0.6	0.13120	1.5	0.13085	2
7000	0.13207	1	0.13209	1	0.13178	0.8	0.13196	1.5	0.13123	2
7500	0.13283	1	0.13302	1	0.13289	0.8	0.13250	1.7	0.13224	2
8000	0.13371	1	0.13416	1	0.13404	0.8	0.13343	1.7	0.13339	2
8500	0.13484	1	0.13492	1	0.13486	0.8	0.13380	1.7	0.13524	2
9000	0.13583	1	0.13605	1	0.13636	0.8	0.13450	1.7	0.13598	2
9500	0.13725	1	0.13697	1	0.13752	0.8	0.13510	1.7	0.13664	2
10000	0.13930	1	0.13834	1	0.13887	0.8	0.13700	1.7	0.13750	2

7.2 Results for the Phase of the Complex Sensitivity

7.2.1 The Single-Ended Accelerometer (SN 2571390)

Table 7.3: Reported participants' results for the phase of the sensitivity of the SE.

f in Hz	PTB mean φ_i in °	PTB mean U_{φ_i} in °	CMI φ_i in °	CMI U_{φ_i} in °	NMISA φ_i in °	NMISA U_{φ_i} in °	DPLA φ_i in °	DPLA U_{φ_i} in °	CEM φ_i in °	CEM U_{φ_i} in °
10	-0.03	0.20	0.03	0.50	-0.06	0.40	-0.06	0.30	-0.05	0.50
12.5	0.00	0.20	-0.01	0.50	-0.06	0.40	-0.04	0.30	-0.02	0.50
16	-0.05	0.20	-0.02	0.50	-0.05	0.40	-0.04	0.30	-0.03	0.50
20	-0.03	0.20	-0.04	0.50	-0.07	0.40	-0.02	0.30	-0.02	0.50
25	-0.04	0.20	-0.02	0.50	-0.10	0.40	-0.03	0.30	-0.01	0.50
31.5	-0.05	0.20	-0.02	0.50	-0.09	0.40	-0.02	0.30	-0.01	0.50
40	-0.04	0.20	-0.01	0.50	-0.07	0.40	-0.02	0.30	0.01	0.50
63	-0.03	0.20	-0.02	0.50	-0.05	0.40	-0.02	0.30	0.02	0.50
80	-0.03	0.20	-0.04	0.50	-0.05	0.40	-0.02	0.30	0.02	0.50
100	-0.03	0.20	-0.04	0.50	-0.05	0.40	-0.02	0.30	0.02	0.50
125	-0.03	0.20	-0.05	0.50	-0.07	0.40	-0.02	0.30	0.02	0.50
160	-0.02	0.20	-0.07	0.50	-0.10	0.40	-0.03	0.30	0.06	0.50
200	-0.01	0.20	-0.08	0.50	-0.04	0.40	-0.06	0.30	0.04	0.50
250	0.01	0.20	-0.10	0.50	-0.03	0.40	0.00	0.30	0.04	0.50
315	-0.00	0.20	-0.11	0.50	-0.02	0.40	-0.06	0.30	0.04	0.50
400	-0.00	0.20	-0.15	0.50	-0.01	0.40	-0.05	0.30	0.03	0.50
500	-0.01	0.20	-0.21	0.50	-0.00	0.40	-0.08	0.30	0.03	0.50
630	-0.00	0.20	-0.23	0.50	0.03	0.40	-0.08	0.30	0.08	0.50
800	-0.01	0.20	-0.31	0.50	0.04	0.40	-0.09	0.30	0.05	0.50
1000	-0.00	0.20	-0.36	0.50	0.05	0.40	-0.15	0.30	0.07	0.50
1250	-0.02	0.50	-0.44	0.50	0.06	0.50	-0.15	0.30	0.05	1.00
1500	-0.03	0.50	-0.53	0.50	0.09	0.50	-0.16	0.30	0.06	1.00
1600	-0.03	0.50	-0.56	0.50	0.10	0.50	-0.17	0.30	0.08	1.00
2000	-0.04	0.50	-0.69	0.50	0.12	0.50	-0.22	0.30	0.08	1.00
2500	-0.05	0.50	-0.84	0.50	0.15	0.50	-0.24	0.30	0.08	1.00
3000	-0.08	0.50	-1.00	0.50	0.19	0.50	-0.27	0.30	0.08	1.00
3150	-0.08	0.50	-1.05	0.50	0.19	0.50	-0.30	0.30	0.08	1.00
3500	-0.09	0.50	-1.14	0.50	0.25	0.50	-0.35	0.30	0.08	1.00
4000	-0.09	0.50	-1.30	0.50	0.26	0.50	-0.37	0.30	0.10	1.00
4500	-0.12	0.50	-1.41	0.50	0.27	0.50	-0.40	0.30	0.10	1.00
5000	-0.13	0.50	-1.54	0.50	0.31	0.80	-0.43	0.30	0.14	1.00
5500	-0.13	0.50	-1.70	0.50	0.34	0.80	-0.49	0.50	0.14	1.00
6000	-0.15	0.50	-1.85	0.50	0.37	0.80	-0.50	0.50	0.13	1.00
6300	-0.14	0.50	-1.93	0.50	0.38	0.80	-0.46	0.50	0.10	1.00
6500	-0.16	0.50	-1.93	0.50	0.39	0.80	-0.51	0.50	0.12	1.00
7000	-0.15	0.50	-2.07	0.50	0.46	0.80	-0.57	0.50	0.17	1.00
7500	-0.12	0.50	-2.33	0.50	0.52	0.80	-0.68	1.00	0.17	1.00
8000	-0.19	0.50	-2.26	0.50	0.52	0.80	-0.70	1.00	0.13	1.00
8500	-0.19	0.50	-2.37	0.50	0.56	0.80	-0.85	1.00	0.11	1.00
9000	-0.21	0.50	-2.63	0.50	0.66	0.80	-0.48	1.00	0.13	1.00
9500	-0.26	0.50	-2.69	0.50	0.55	0.80	-0.69	1.00	0.09	1.00
10000	-0.25	0.50	-2.77	0.50	0.61	0.80	-0.64	1.00	0.08	1.00

(continued) Reported participants' results for the phase of the sensitivity of the SE.

f in Hz	GUM φ_i in °	GUM U_{φ_i} in °	METAS φ_i in °	METAS U_{φ_i} in °	NMIJ φ_i in °	NMIJ U_{φ_i} in °	KRISS φ_i in °	KRISS U_{φ_i} in °	LNE φ_i in °	LNE U_{φ_i} in °
10	-0.03	0.70	-0.00	0.40	-0.04	0.82			-0.34	2.00
12.5	-0.02	0.70	-0.01	0.40	0.02	0.84			-0.11	2.00
16	-0.05	0.70	-0.02	0.40	0.01	0.60			-0.17	2.00
20	-0.04	0.60	-0.03	0.38	-0.03	0.44			-0.16	2.00
25	-0.04	0.60	-0.01	0.38	-0.05	0.42			-0.13	2.00
31.5	-0.05	0.60	-0.00	0.38	-0.05	0.48			-0.12	2.00
40	-0.05	0.60	0.01	0.38	-0.02	0.42			-0.08	2.00
63	-0.05	0.60	-0.03	0.38	-0.03	0.44			0.08	2.00
80	-0.05	0.60	-0.05	0.38	0.01	0.48			0.15	2.00
100	-0.05	0.60	0.01	0.38	-0.01	0.48			0.07	2.00
125	-0.03	0.60	0.01	0.38	-0.03	0.50			0.05	2.00
160	-0.02	0.60	0.02	0.38	-0.03	0.52			0.10	2.00
200	-0.03	0.60	0.04	0.38	-0.04	0.54			0.07	2.00
250	-0.02	0.60	0.06	0.38	-0.04	0.56			0.08	2.00
315	0.00	0.60	0.06	0.38	-0.11	0.30			0.10	2.00
400	0.00	0.60	0.00	0.38	-0.04	0.30			0.08	2.00
500	0.02	0.60	0.02	0.38	-0.11	0.32			0.08	2.00
630	0.05	0.60	0.02	0.38	-0.07	0.30			0.12	2.00
800	0.02	0.60	0.03	0.38	-0.03	0.30			0.14	2.00
1000	0.03	0.60	0.02	0.48	-0.04	0.30			0.17	2.00
1250	0.05	0.60	0.02	0.48	-0.08	0.30			0.24	2.00
1500	0.06	0.60	0.01	0.48	0.06	0.28			0.29	2.00
1600	0.06	0.60	0.04	0.48	0.11	0.28			0.33	2.00
2000	0.09	0.60	0.03	0.48	-0.13	0.28			0.38	5.00
2500	0.09	0.60	0.03	0.48	0.12	0.30			0.48	5.00
3000	0.09	0.60	0.02	0.48	0.00	0.30			0.59	5.00
3150	0.11	0.60	0.01	0.48	0.07	0.28			0.61	5.00
3500	0.11	0.60	0.02	0.48	0.06	0.28			0.68	5.00
4000	0.11	0.60	0.03	0.48	0.09	0.28			0.77	5.00
4500	0.12	0.60	0.02	0.48	0.08	0.28			0.87	5.00
5000	0.16	0.80	0.08	0.48	0.04	0.28			0.97	5.00
5500	0.17	1.00	-0.01	0.86	0.11	0.28			1.07	5.00
6000	0.16	1.00	0.02	0.86	0.13	0.28			1.19	5.00
6300	0.23	1.00	-0.04	0.86	0.09	0.28			1.21	5.00
6500	0.19	1.00	-0.04	0.86	0.10	0.30			1.33	5.00
7000	0.31	1.00	-0.02	0.86	0.20	0.30			1.40	5.00
7500	0.22	1.00	0.01	0.86	0.18	0.30			1.43	5.00
8000	0.24	1.00	-0.08	0.86	0.11	0.30			1.55	5.00
8500	0.11	1.00	-0.10	0.86	0.05	0.30			1.63	5.00
9000	0.23	1.00	-0.07	0.86	0.25	0.30			1.69	5.00
9500	0.23	1.00	-0.23	0.86	0.25	0.30			1.96	5.00
10000	0.17	1.00	-0.21	0.86	0.23	0.30			2.02	5.00

(continued) Reported participants' results for the phase of the sensitivity of the SE.

f in Hz	NIM φ_i in °	NIM U_{φ_i} in °	CENAM φ_i in °	CENAM U_{φ_i} in °	INMETRO φ_i in °	INMETRO U_{φ_i} in °	UME φ_i in °	UME U_{φ_i} in °	VNIIM φ_i in °	VNIIM U_{φ_i} in °
10	0.16	0.50	0.02	1.00	-0.00	0.24	0.05	0.50	2.31	1.00
12.5	0.15	0.50	-0.03	1.00	0.00	0.24	0.04	0.50	1.76	1.00
16	0.14	0.50	0.00	1.00	-0.00	0.24	0.02	0.50	1.30	1.00
20	0.09	0.50	-0.03	1.00	-0.00	0.24	0.04	0.50	1.03	0.76
25	0.08	0.50	-0.01	1.00	-0.00	0.24	-0.04	0.50	0.48	0.76
31.5	0.06	0.50	-0.02	1.00	0.00	0.24	-0.02	0.50	0.29	0.76
40	0.05	0.50	-0.04	1.00	0.00	0.24	0.02	0.50	0.33	0.76
63	0.03	0.50	-0.01	1.00	0.00	0.24	0.02	0.50	0.08	0.76
80	0.04	0.50	-0.04	1.00	0.01	0.24	0.00	0.50	-0.13	0.76
100	0.01	0.50	-0.02	1.00	0.01	0.24	-0.01	0.50	-0.26	0.76
125	0.01	0.50	-0.01	1.00	0.01	0.24	0.01	0.50	-0.10	0.76
160	-0.01	0.50	-0.01	1.00	0.02	0.24	-0.05	0.50	-0.23	0.76
200	0.00	0.50	-0.01	1.00	0.03	0.24	0.01	0.50	-0.17	0.76
250	-0.01	0.50	-0.02	1.00	0.02	0.24	-0.01	0.50	-0.20	0.76
315	-0.02	0.50	-0.01	1.00	0.03	0.24	-0.03	0.50	-0.37	0.76
400	-0.03	0.50	-0.01	1.00	0.02	0.24	-0.04	0.50	-0.31	0.76
500	-0.04	0.50	-0.01	1.00	0.07	0.24	-0.03	0.50	-0.32	0.76
630	-0.07	0.50	-0.01	1.00	0.04	0.24	-0.09	0.50	-0.58	0.76
800	-0.09	0.50	-0.03	1.00	0.05	0.24	-0.05	0.50	-0.58	0.76
1000	-0.13	0.50	-0.03	1.00	0.04	0.24	-0.12	0.50	-0.50	0.76
1250	-0.18	0.50	-0.04	1.00	0.08	0.24	-0.22	1.00	-0.51	0.76
1500	-0.18	0.50	-0.07	1.00	0.08	0.24	-0.15	1.00	-0.72	0.76
1600	-0.22	0.50	-0.09	1.00	0.09	0.24	-0.26	1.00	-0.85	0.76
2000	-0.30	0.50	-0.10	1.00	0.10	0.24	-0.26	1.00	-0.72	0.76
2500	-0.40	0.50	-0.11	1.00	0.14	0.24	-0.34	1.00	-0.77	1.00
3000	-0.41	0.50	-0.12	1.00	0.14	0.24	-0.62	1.00	-0.83	1.00
3150	-0.52	0.50	-0.13	1.00	0.16	0.34	-0.55	1.00	-0.85	1.00
3500	-0.58	0.50	-0.14	1.00	0.21	0.34	-0.49	1.00	-0.89	1.00
4000	-0.62	0.50	-0.19	1.00	0.20	0.50	-0.65	1.00	-0.96	1.00
4500	-0.67	0.50	-0.20	1.00	0.26	0.50	-0.90	1.00	-1.19	1.00
5000	-0.75	0.50	-0.24	1.00	0.27	0.50	-0.97	1.00	-1.04	1.00
5500	-0.81	1.00	-0.21	1.00	0.22	0.80	-1.19	1.50	-1.37	1.50
6000	-0.90	1.00	-0.21	1.00	0.25	0.80	-1.27	1.50	-1.31	1.50
6300	-0.93	1.00	-0.24	1.00	0.19	0.80	-1.06	1.50	-1.63	1.50
6500	-0.91	1.00	-0.22	1.00	0.15	0.80	-1.14	1.50	-1.82	1.50
7000	-1.01	1.00	-0.25	1.00	0.14	0.80	-1.33	1.50	-1.72	1.50
7500	-1.13	1.00	-0.25	1.00	0.27	1.00	-1.13	1.50	-1.88	1.50
8000	-1.22	1.00	-0.28	1.00	0.26	1.00	-1.27	1.50	-2.25	1.50
8500	-1.35	1.00	-0.26	1.00	0.30	1.00	-1.54	1.50	-2.48	1.50
9000	-1.36	1.00	-0.29	1.00	0.19	1.00	-1.45	1.50	-2.90	1.50
9500	-1.47	1.00	-0.30	1.00	0.18	1.00	-1.64	1.50	-3.45	1.50
10000	-1.49	1.00	-0.29	1.00	0.09	1.00	-1.87	1.50	-3.70	1.50

7.2.2 The Back-to-Back Accelerometer (SN 2602106)

All results for the BB accelerometer were wrapped to 180°, since the polarity of its output is inverted relative to the SE. As this is a question of convention rather than measurement uncertainty, this was not taken as a deviation.

Table 7.4: Reported participants' results for the phase of the sensitivity of the BB.

f	PTB mean		CMI		NMISA		DPLA		CEM	
in Hz	φ_i in °	U_{φ_i} in °	φ_i in °	U_{φ_i} in °	φ_i in °	U_{φ_i} in °	φ_i in °	U_{φ_i} in °	φ_i in °	U_{φ_i} in °
10	180.03	0.20	179.99	0.50	180.07	0.40	179.95	0.30	180.00	0.50
12.5	179.95	0.20	179.97	0.50	180.05	0.40	179.96	0.30	180.00	0.50
16	179.99	0.20	179.97	0.50	180.03	0.40	179.97	0.30	180.00	0.50
20	180.04	0.20	179.96	0.50	180.03	0.40	179.98	0.30	180.00	0.50
25	179.95	0.20	179.98	0.50	180.01	0.40	179.97	0.30	180.00	0.50
31.5	179.97	0.20	179.98	0.50	180.02	0.40	179.98	0.30	180.00	0.50
40	179.95	0.20	179.99	0.50	180.04	0.40	179.99	0.30	180.00	0.50
63	179.93	0.20	179.98	0.50	180.05	0.40	179.99	0.30	180.00	0.50
80	179.96	0.20	179.96	0.50	180.06	0.40	179.98	0.30	180.00	0.50
100	180.00	0.20	179.95	0.50	180.06	0.40	179.98	0.30	180.00	0.50
125	179.98	0.20	179.95	0.50	180.05	0.40	179.98	0.30	180.00	0.50
160	179.97	0.20	179.97	0.50	180.06	0.40	179.97	0.30	180.00	0.50
200	179.97	0.20	179.94	0.50	180.07	0.40	179.99	0.30	180.00	0.50
250	179.99	0.20	179.91	0.50	180.07	0.40	179.97	0.30	180.00	0.50
315	179.98	0.20	179.88	0.50	180.07	0.40	179.97	0.30	180.00	0.50
400	179.99	0.20	179.83	0.50	180.06	0.40	179.95	0.30	180.00	0.50
500	179.98	0.20	179.80	0.50	180.07	0.40	179.94	0.30	180.00	0.50
630	179.98	0.20	179.76	0.50	180.06	0.40	179.92	0.30	180.00	0.50
800	179.97	0.20	179.72	0.50	180.04	0.40	179.90	0.30	180.00	0.50
1000	179.97	0.20	179.63	0.50	180.03	0.40	179.90	0.30	180.00	0.50
1250	179.94	0.50	179.55	0.50	180.01	0.50	179.87	0.30	180.00	1.00
1500	179.97	0.50	179.45	0.50	180.00	0.50	179.86	0.30	180.00	1.00
1600	179.94	0.50	179.43	0.50	180.00	0.50	179.85	0.30	180.10	1.00
2000	179.90	0.50	179.27	0.50	179.97	0.50	179.81	0.30	180.10	1.00
2500	179.86	0.50	179.12	0.50	179.95	0.50	179.76	0.30	180.10	1.00
3000	179.87	0.50	178.93	0.50	179.93	0.50	179.72	0.30	180.10	1.00
3150	179.86	0.50	178.86	0.50	179.92	0.50	179.71	0.30	180.10	1.00
3500	179.83	0.50	178.76	0.50	179.93	0.50	179.68	0.30	180.10	1.00
4000	179.82	0.50	178.56	0.50	179.89	0.50	179.65	0.30	180.10	1.00
4500	179.81	0.50	178.40	0.50	179.86	0.50	179.60	0.30	180.10	1.00
5000	179.77	0.50	178.24	0.50	179.84	0.80	179.55	0.30	180.10	1.00
5500	179.77	0.50	178.10	0.50	179.83	0.80	179.51	0.50	180.10	1.00
6000	179.86	0.50	177.89	0.50	179.82	0.80	179.45	0.50	180.10	1.00
6300	179.68	0.50	177.84	0.50	179.82	0.80	179.41	0.50	180.10	1.00
6500	179.87	0.50	177.65	0.50	179.83	0.80	179.41	0.50	180.20	1.00
7000	179.75	0.50	177.55	0.50	179.87	0.80	179.39	0.50	180.20	1.00
7500	179.70	0.50	177.42	0.50	179.77	0.80	179.28	1.00	180.10	1.00
8000	179.69	0.50	177.13	0.50	179.61	0.80	179.26	1.00	180.00	1.00
8500	179.64	0.50	177.00	0.50	179.56	0.80	179.18	1.00	180.10	1.00
9000	179.67	0.50	176.78	0.50	180.51	0.80	179.22	1.00	180.20	1.00
9500	179.59	0.50	176.61	0.50	180.46	0.80	179.15	1.00	180.10	1.00
10000	179.57	0.50	176.42	0.50	179.76	0.80	179.21	1.00	180.80	2.00

(continued) Reported participants' results for the phase of the sensitivity of the BB.

f in Hz	GUM φ_i in °	GUM U_{φ_i} in °	METAS φ_i in °	METAS U_{φ_i} in °	NMIJ φ_i in °	NMIJ U_{φ_i} in °	KRISS φ_i in °	KRISS U_{φ_i} in °	LNE φ_i in °	LNE U_{φ_i} in °
10	180.00	0.70	180.29	0.40	179.94	0.78			179.67	2.00
12.5	179.99	0.70	180.04	0.40	179.97	0.70			179.88	2.00
16	179.99	0.70	180.02	0.40	179.98	0.48			179.83	2.00
20	179.96	0.60	180.01	0.38	179.96	0.32			179.82	2.00
25	179.96	0.60	180.01	0.38	179.98	0.28			179.84	2.00
31.5	179.95	0.60	180.01	0.38	179.96	0.36			179.87	2.00
40	179.94	0.60	180.01	0.38	180.00	0.30			179.92	2.00
63	179.94	0.60	179.96	0.38	179.97	0.34			180.07	2.00
80	179.95	0.60	179.95	0.38	179.98	0.34			180.18	2.00
100	179.95	0.60	180.00	0.38	179.94	0.38			180.08	2.00
125	179.96	0.60	180.00	0.38	179.95	0.38			180.06	2.00
160	179.94	0.60	179.99	0.38	179.95	0.40			180.11	2.00
200	179.98	0.60	180.00	0.38	179.93	0.42			180.06	2.00
250	179.98	0.60	180.01	0.38	179.93	0.44			180.06	2.00
315	179.99	0.60	180.01	0.38	179.94	0.14			180.11	2.00
400	180.00	0.60	180.00	0.38	179.90	0.16			180.09	2.00
500	180.01	0.60	180.01	0.38	179.85	0.16			180.09	2.00
630	180.02	0.60	180.01	0.38	179.91	0.14			180.14	2.00
800	180.01	0.60	180.01	0.38	179.93	0.16			180.15	2.00
1000	180.02	0.60	179.99	0.48	179.90	0.14			180.17	2.00
1250	180.03	0.60	179.99	0.48	179.89	0.14			180.24	2.00
1500	180.04	0.60	179.99	0.48	180.02	0.12			180.29	2.00
1600	180.05	0.60	180.01	0.48	180.00	0.14			180.33	2.00
2000	180.07	0.60	179.99	0.48	180.03	0.14			180.38	5.00
2500	180.07	0.60	179.99	0.48	180.03	0.14			180.48	5.00
3000	180.08	0.60	179.98	0.48	180.07	0.14			180.58	5.00
3150	180.10	0.60	179.98	0.48	180.06	0.16			180.60	5.00
3500	180.09	0.60	180.00	0.48	180.05	0.18			180.65	5.00
4000	180.12	0.60	179.99	0.48	180.03	0.20			180.72	5.00
4500	180.16	0.60	179.99	0.48	180.01	0.12			180.83	5.00
5000	180.18	0.80	180.03	0.48	179.94	0.12			180.93	5.00
5500	180.23	1.00	180.00	0.86	180.02	0.12			180.97	5.00
6000	180.21	1.00	180.02	0.86	180.03	0.12			181.10	5.00
6300	180.31	1.00	180.00	0.86	180.05	0.12			181.16	5.00
6500	180.20	1.00	180.02	0.86	180.03	0.12			181.24	5.00
7000	180.32	1.00	180.10	0.86	180.12	0.14			181.25	5.00
7500	180.20	1.00	180.05	0.86	180.05	0.14			181.44	5.00
8000	180.26	1.00	180.32	1.06	180.17	0.12			181.56	5.00
8500	180.12	1.00	179.80	1.06	180.04	0.12			181.65	5.00
9000	180.18	1.00	180.07	1.06	180.11	0.12			181.77	5.00
9500	180.28	1.00	180.17	1.08	180.05	0.12			181.82	5.00
10000	180.28	1.00	180.00	1.80	180.21	0.12			181.91	5.00

(continued) Reported participants' results for the phase of the sensitivity of the BB.

f in Hz	NIM φ_i in °	NIM U_{φ_i} in °	CENAM φ_i in °	CENAM U_{φ_i} in °	INMETRO φ_i in °	INMETRO U_{φ_i} in °	UME φ_i in °	UME U_{φ_i} in °	VNIIM φ_i in °	VNIIM U_{φ_i} in °
10	180.20	0.50	180.00	1.00	179.99	0.24	180.08	0.50	182.12	1.00
12.5	180.16	0.50	179.82	1.00	179.99	0.24	180.06	0.50	181.71	1.00
16	180.12	0.50	179.93	1.00	179.98	0.24	180.02	0.50	181.45	1.00
20	180.10	0.50	179.90	1.00	179.99	0.24	180.04	0.50	181.37	0.76
25	180.08	0.50	179.99	1.00	179.99	0.24	179.92	0.50	181.26	0.76
31.5	180.07	0.50	179.94	1.00	179.99	0.24	179.93	0.50	181.19	0.76
40	180.05	0.50	179.91	1.00	179.99	0.24	179.99	0.50	181.01	0.76
63	180.02	0.50	179.94	1.00	179.99	0.24	180.03	0.50	180.90	0.76
80	180.03	0.50	179.94	1.00	179.99	0.24	179.99	0.50	180.65	0.76
100	180.01	0.50	179.96	1.00	179.99	0.24	179.98	0.50	180.29	0.76
125	180.00	0.50	179.97	1.00	180.00	0.24	180.01	0.50	180.32	0.76
160	179.99	0.50	179.99	1.00	180.01	0.24	179.96	0.50	180.21	0.76
200	179.98	0.50	179.96	1.00	180.01	0.24	179.99	0.50	180.03	0.76
250	179.98	0.50	179.94	1.00	180.01	0.24	179.96	0.50	179.95	0.76
315	179.97	0.50	179.96	1.00	180.01	0.24	179.96	0.50	179.87	0.76
400	179.96	0.50	179.97	1.00	180.00	0.24	179.93	0.50	179.77	0.76
500	179.95	0.50	179.96	1.00	180.03	0.24	179.94	0.50	179.72	0.76
630	179.90	0.50	179.95	1.00	180.01	0.24	179.95	0.50	179.66	0.76
800	179.89	0.50	179.95	1.00	180.02	0.24	179.90	0.50	179.65	0.76
1000	179.84	0.50	179.96	1.00	180.01	0.24	179.94	0.50	179.60	0.76
1250	179.79	0.50	179.92	1.00	180.06	0.24	179.74	1.00	179.44	0.76
1500	179.76	0.50	179.91	1.00	180.05	0.24	179.78	1.00	179.23	0.76
1600	179.76	0.50	179.90	1.00	180.07	0.24	179.87	1.00	179.15	0.76
2000	179.73	0.50	179.85	1.00	180.07	0.24	179.59	1.00	179.04	0.76
2500	179.59	0.50	179.83	1.00	180.07	0.24	179.48	1.00	178.91	1.00
3000	179.54	0.50	179.82	1.00	180.11	0.24	179.64	1.00	178.81	1.00
3150	179.50	0.50	179.83	1.00	180.12	0.34	179.35	1.00	178.75	1.00
3500	179.48	0.50	179.82	1.00	180.08	0.34	179.30	1.00	178.67	1.00
4000	179.35	0.50	179.76	1.00	180.14	0.50	179.18	1.00	178.63	1.00
4500	179.29	0.50	179.72	1.00	180.13	0.50	179.31	1.00	178.33	1.00
5000	179.18	0.50	179.73	1.00	180.17	0.50	179.09	1.00	178.44	1.00
5500	179.13	1.00	179.67	1.00	180.13	0.80	179.17	1.50	178.04	1.50
6000	179.06	1.00	179.65	1.00	180.11	0.80	179.03	1.50	178.29	1.50
6300	178.98	1.00	179.70	1.00	180.20	0.80	179.08	1.50	178.22	1.50
6500	178.95	1.00	179.71	1.00	180.29	0.80	179.06	1.50	178.16	1.50
7000	178.97	1.00	179.70	1.00	180.33	0.80	178.75	1.50	178.09	1.50
7500	178.90	1.00	179.65	1.00	180.26	1.00	178.78	1.50	177.83	1.50
8000	178.93	1.00	179.65	1.00	180.42	1.00	178.42	1.50	177.38	1.50
8500	178.85	1.00	179.61	1.00	180.55	1.00	178.27	1.50	177.52	1.50
9000	178.84	1.00	179.61	1.00	180.07	1.00	178.39	1.50	175.58	1.50
9500	178.77	1.00	179.60	1.00	180.25	1.00	178.52	1.50	176.86	1.50
10000	178.48	1.00	179.60	1.00	180.34	1.00	177.98	1.50	176.17	1.50

8 — Degree of Equivalence with Respect to the KC Reference Value

The measurement results were reported by the participants using the mandatory report sheet (Excel-file). For this file the displayed resolution of the data was limited, although sometimes the resolution of the data stored in the file represented many more significant digits. In order to comply with the resolution implied by the measurement uncertainty and to generate a consistent picture in this report, all input data were rounded before further calculation in the following way:

quantity	unit	representation
magnitude of complex sensitivity	$\frac{\mathrm{pC}}{\mathrm{m/s^2}}$	0.xxxxx
relative uncertainty	%	x.xx
phase of complex sensitivity	1°	x.xx
uncertainty of phase	1°	x.xx

The resulting reference values are represented with a resolution of one more digit in order to take the effect of weighing and averaging into account.

The evaluation of the results was performed using a weighted mean of the form

$$x_{\mathrm{KC}}(f) = \sum \frac{x_i(f)}{u_i^2(f)} \cdot \left(\sum \frac{1}{u_i^2(f)} \right)^{-1} \tag{8.1}$$

Contributing to the weighted mean were all participants which were not identified as outliers.

Due to the results of the monitoring measurements the magnitude results were evaluated only for the SE accelerometer. However, the primary calibration of such devices exhibits a systematic dependency on the material of the armatures[3],[4]. This dependency was attributed to the artefact as it is a component only applicable when comparing calibrations performed on shakers with different armature materials. In order to quantify this dependency, an *ad hoc* component in terms of an additional variance $u^2_{\mathrm{mat}}(f)$ was added to the variance of the weighted mean in the following form

$$u^2_{\mathrm{KC}}(f) = \left(\sum \frac{1}{u_i^2(f)} \right)^{-1} + u^2_{\mathrm{mat}}(f) \tag{8.2}$$

The relative magnitude was calculated according to the results published in [4] as relative deviation, and transfomed to absolute magnitude by multiplying with x_{KC}. Considering Eq. (4) in [4] the relative deviation of the primary calibration results on ceramics versus beryllium can be expressed as

$$d_{\mathrm{mat,rel}}(f) = 2 \cdot \frac{\mathrm{abs}\left(\frac{E_{\mathrm{be}}}{D_{\mathrm{be}}}\right) - \mathrm{abs}\left(\frac{E_{\mathrm{ce}}}{D_{\mathrm{ce}}}\right)}{\mathrm{abs}\left(\frac{E_{\mathrm{be}}}{D_{\mathrm{be}}}\right) + \mathrm{abs}\left(\frac{E_{\mathrm{ce}}}{D_{\mathrm{ce}}}\right)} \tag{8.3}$$

with

$$\begin{aligned}
E_{\mathrm{ce}} &= i\omega\delta_{\mathrm{2B,ce}} + \omega^2_{\mathrm{2B,ce}} \\
D_{\mathrm{ce}} &= \left(\left(\omega^2_{\mathrm{2B,ce}} + \eta\omega^2_{\mathrm{1H}}\right) + i\omega\left(\delta_{\mathrm{2B,ce}} + \eta\delta_{\mathrm{1H}}\right) - \omega^2\right)\left(\omega^2_{\mathrm{1H}} + i\omega\delta_{\mathrm{1H}} - \omega^2\right) - \eta\left(i\omega\delta_{\mathrm{1H}} + \omega^2_{\mathrm{1H}}\right)^2 \\
E_{\mathrm{be}} &= i\omega\delta_{\mathrm{2B,be}} + \omega^2_{\mathrm{2B,be}} \\
D_{\mathrm{be}} &= \left(\left(\omega^2_{\mathrm{2B,be}} + \eta\omega^2_{\mathrm{1H}}\right) + i\omega\left(\delta_{\mathrm{2B,be}} + \eta\delta_{\mathrm{1H}}\right) - \omega^2\right)\left(\omega^2_{\mathrm{1H}} + i\omega\delta_{\mathrm{1H}} - \omega^2\right) - \eta\left(i\omega\delta_{\mathrm{1H}} + \omega^2_{\mathrm{1H}}\right)^2
\end{aligned}$$

Parameters on the right hand side of these equations are defined according to [4]. As the necessary parameters could only be evaluated with an open transducer, which is not possible with the artefacts of the KC, the parameters from the referenced publication were used to calculate $d_{\mathrm{mat,rel}}(f)$. That is

$$\begin{aligned}
i &= \sqrt{-1} \\
\omega_{1\mathrm{H}} &= 2\pi \cdot 36443\,\mathrm{Hz} \\
\delta_{1\mathrm{H}} &= 0.0017 \\
\eta &= 0.53 \\
\omega_{2\mathrm{B,ce}} &= 2\pi \cdot 77270\,\mathrm{Hz} \qquad \text{(ceramic)} \\
\delta_{2\mathrm{B,ce}} &= 0.0004 \qquad \text{(ceramic)} \\
\omega_{2\mathrm{B,be}} &= 2\pi \cdot 68490\,\mathrm{Hz} \qquad \text{(beryllium)} \\
\delta_{2\mathrm{B,be}} &= 0.264 \qquad \text{(beryllium)}
\end{aligned}$$

In order to adapt the published measurement results of [4] to the actual sensor of this KC the standard uncertainty u_{mat} was calculated from the relative deviation according to eq.(8.3) by multiplication with the magnitude of key comparison reference value and the factor 0.5 in order to have the expanded component cover the full deviation. Accordingly,

$$u_{\mathrm{mat}}(f) = 0.5 \cdot x_{\mathrm{KC}}(f) \cdot d_{\mathrm{mat,rel}}(f) \tag{8.4}$$

The absolute expanded ($k = 2$) value U_{mat} is documented in column 4 of the subsequent tables. The influence of the material on the phase response measurements is negligible, hence, $u_{\mathrm{mat}}(f) = 0$ was presumed for the evaluation of the phase results.

The special treatment of the material influence for the magnitude results made it necessary to use different methods for the identification of outliers. The method according to [5] is not able to account for an additional uncertainty component attributed directly to the weighted mean. Thus, for the analysis of the magnitude results, outliers were identified by the application of a two-sided Grubbs' Test [6], [7]. Note, that this test does not take the associated measurement uncertainty into account. For the analysis of the phase results, where no influence of the armature materials was apparent, the usual approach following [5] was applied.

In the charts the data are labeled as MoCS (member of consistent subset) or non-MoCS, respectively.

In the above equations the following shortcuts were used:

$x_i(f)$	result of participant i of the largest consistent subset at frequency f
$u_i(f)$	absolute standard uncertainty of participant i of the largest consistent subset at frequency f
$u_{\mathrm{mat}}(f)$	std. uncertainty component due to a systematic material dependence of the results
$x_{\mathrm{KC}}(f)$	best estimate of the key comparison reference value (KCRV) at frequency f
$u_{\mathrm{KC}}(f)$	estimated absolute standard uncertainty of the KCRV at frequency f

.

For the further evaluation of the KC, the degrees of equivalence with respect to the KCRV are calculated as:

$$D_i(f) = x_i(f) - x_{\mathrm{KC}}(f) \tag{8.5}$$

$$u_{D_i}^2(f) = \begin{cases} u_i^2(f) - \left(\sum \frac{1}{u_i^2(f)}\right)^{-1} + u_{\mathrm{mat}}^2(f) = \quad u_i^2(f) - u_{\mathrm{KC}}^2(f) + 2 \cdot u_{\mathrm{mat}}^2(f) & \text{for MoCS} \\ u_i^2(f) + u_{\mathrm{KC}}^2(f) & \text{for non-MoCS} \end{cases} \tag{8.6}$$

The formulas are applicable to the magnitude as well as to the phase measurement results.

In the subsequently presented tables results with $D_i(f) > 2 \cdot u_{D_i}(f)$ are marked by a yellow background. Results which were excluded from the largest consistent subset (non-MoCS results) according to the result of the consistency check, and which therefore did not contribute to the KCRV, are (in addition) marked with an asterisk (*). In the subsequently presented diagrams the points for the participant results are color-coded to express whether the result is MoCS or non-MoCS.

8.1 Magnitude of the Complex Sensitivity of the SE

Table 8.1: Unilateral degrees of equivalence for the magnitude of the SE

f	KCRV		U_{mat}	PTB mean		CMI		NMISA		DPLA	
in Hz	X_{KC} in $\frac{pC}{m/s^2}$	U_{KC} in $10^{-4}\frac{pC}{m/s^2}$	in $10^{-4}\frac{pC}{m/s^2}$	D_i	U_{D_i} in $10^{-4}\frac{pC}{m/s^2}$	D_i	U_{D_i} in $10^{-4}\frac{pC}{m/s^2}$	D_i	U_{D_i} in $10^{-4}\frac{pC}{m/s^2}$	D_i	U_{D_i} in $10^{-4}\frac{pC}{m/s^2}$
10	0.127692	0.868	0.000	-0.5	0.9	-1.9	2.4	2.4	6.3	0.2	5.0
12.5	0.127718	0.864	0.000	-0.5	0.9	-1.2	2.4	0.4	6.3	-1.2	5.0
16	0.127719	0.858	0.000	-0.5	0.9	-1.2	2.4	1.5	6.3	-1.5	5.0
20	0.127738	0.836	0.000	-0.7	1.0	-0.4	2.4	2.7	6.3	-1.7	5.0
25	0.127721	0.836	0.000	-0.7	1.0	-0.2	2.4	2.9	6.3	-1.1	5.0
31.5	0.127722	0.836	0.000	-0.6	1.0	-0.2	2.4	2.0	6.3	-1.1	5.0
40	0.127712	0.836	0.000	-0.6	1.0	-0.1	2.4	2.1	6.3	-1.2	5.0
63	0.127684	0.835	0.000	-0.8	1.0	0.2	2.4	2.8	6.3	-0.6	5.0
80	0.127688	0.835	0.001	-0.9	1.0	0.1	2.4	2.6	6.3	-0.7	5.0
100	0.127663	0.822	0.001	-0.9	1.0	0.4	2.4	2.9	6.3	-0.4	5.0
125	0.127689	0.824	0.001	-0.6	1.0	0.1	2.4	2.9	6.3	-0.8	5.0
160	0.127690	0.829	0.002	-0.4	1.0	0.1	2.4	0.6	6.3	-1.0	5.0
200	0.127713	0.835	0.004	-0.3	1.0	-0.1	2.4	0.5	6.3	0.5	5.0
250	0.127736	0.832	0.006	-0.3	1.0	0.6	2.4	0.5	6.3	-1.2	5.0
315	0.127752	0.862	0.009	-0.3	0.9	0.5	3.7	0.5	6.3	-1.4	5.0
400	0.127764	0.864	0.014	-0.3	0.9	0.4	3.7	0.4	6.3	-0.6	5.0
500	0.127776	0.858	0.022	-0.5	0.9	1.2	3.7	-0.3	6.3	-1.0	5.0
630	0.127810	0.857	0.035	-0.4	0.9	0.9	3.7	-0.7	6.3	-1.0	5.0
800	0.127847	0.858	0.057	-0.6	1.0	1.5	3.7	-0.7	6.3	-0.8	5.0
1000	0.127898	0.873	0.089	-0.4	0.9	2.0	3.7	-1.3	6.3	-0.8	5.0
1250	0.127995	0.906	0.140	-0.4	0.9	2.0	3.7	-1.5	10.2	-0.8	5.0
1500	0.128114	0.919	0.202	-0.3	0.9	2.9	3.8	-2.0	10.2	-0.9	5.0
1600	0.128151	0.927	0.230	-0.3	0.9	2.5	3.8	-1.6	10.2	-1.0	5.0
2000	0.128362	0.978	0.360	-0.2	1.0	3.4	5.1	-2.2	10.2	-0.3	5.1
2500	0.128686	1.081	0.564	0.0	1.1	5.1	5.1	-2.6	10.2	-0.9	5.1
3000	0.129073	1.234	0.816	-0.4	1.2	6.3	5.2	-3.0	10.3	-0.5	5.1
3150	0.129178	1.321	0.901	-0.3	1.2	7.2*	5.4*	-2.6	10.3	-0.2	5.2
3500	0.129544	1.480	1.117	-0.0	1.4	6.6*	5.4*	-3.4	10.4	-1.0	5.2
4000	0.130063	1.752	1.468	-0.6	1.7	8.4	5.4	-3.6	10.4	-0.5	5.3
4500	0.130684	2.106	1.871	-0.5	2.1	8.2	5.5	-4.1	10.5	-0.3	8.0
5000	0.131377	2.552	2.329	-0.6	2.5	6.2	5.7	-4.9	15.8	0.4	8.2
5500	0.132313	3.533	2.846	-1.9	4.4	4.9	5.7	-6.7	15.9	-1.7	8.2
6000	0.133076	4.019	3.418	-1.6	4.8	2.2	6.0	-6.6	16.1	-1.7	8.4
6300	0.133643	4.346	3.792	-2.2	5.1	2.6	6.2	-7.0	16.3	-0.7	8.6
6500	0.133976	4.596	4.053	-2.2	5.3	3.2	6.4	-6.7	16.4	-1.6	13.8
7000	0.134922	5.273	4.752	-1.4	5.8	0.8	6.8	-7.2	16.6	-2.5	14.1
7500	0.136308	5.998	5.535	-2.3	6.5	0.9	7.4	-9.1	17.0	-1.4	14.5
8000	0.137469	6.796	6.380	-2.5	7.2	1.3	8.1	-10.0	17.4	-3.2	14.9
8500	0.138658	7.669	7.300	-2.5	8.1	-2.6	8.9	-9.7	17.9	0.2	15.5
9000	0.140118	8.655	8.314	-0.8	9.0	-5.2	9.7	-8.1	18.5	19.9	22.8
9500	0.141435	9.709	9.403	0.2	10.0	-3.3	10.7	-12.7	19.1	0.1	16.8
10000	0.143102	10.896	10.604	-0.7	11.2	-2.0	11.8	-12.5	19.9	-4.1	17.6

(continued) Unilateral degrees of equivalence for the magnitude of the SE

f	KCRV		U_{mat}	CEM		GUM		METAS		NMIJ	
in Hz	X_{KC} in $\frac{pC}{m/s^2}$	U_{KC} in $10^{-4}\frac{pC}{m/s^2}$	in $10^{-4}\frac{pC}{m/s^2}$	D_i in $10^{-4}\frac{pC}{m/s^2}$	U_{D_i}	D_i in $10^{-4}\frac{pC}{m/s^2}$	U_{D_i}	D_i in $10^{-4}\frac{pC}{m/s^2}$	U_{D_i}	D_i in $10^{-4}\frac{pC}{m/s^2}$	U_{D_i}
10	0.127692	0.868	0.000	-0.1	5.0	2.1	7.6	3.5	2.7	4.7	16.9
12.5	0.127718	0.864	0.000	-0.6	5.0	1.7	7.6	2.9	2.7	3.2	7.4
16	0.127719	0.858	0.000	-1.7	5.0	2.4	7.6	2.6	2.7	1.4	5.3
20	0.127738	0.836	0.000	-1.5	5.0	1.2	6.3	2.3	2.3	1.2	5.0
25	0.127721	0.836	0.000	-0.1	5.0	1.5	6.3	2.0	2.3	0.8	4.9
31.5	0.127722	0.836	0.000	0.2	5.0	1.5	6.3	1.8	2.3	0.2	4.9
40	0.127712	0.836	0.000	-0.0	5.0	1.7	6.3	1.8	2.3	-0.0	4.9
63	0.127684	0.835	0.000	0.1	5.0	1.4	6.3	1.7	2.3	0.4	4.9
80	0.127688	0.835	0.001	0.1	5.0	1.5	6.3	1.5	2.3	-0.1	4.9
100	0.127663	0.822	0.001	0.4	5.0	2.4	6.3	1.6	2.3	0.2	4.9
125	0.127689	0.824	0.001	0.1	5.0	1.9	6.3	1.2	2.3	-0.1	4.9
160	0.127690	0.829	0.002	0.1	5.0	1.6	6.3	1.0	2.3	-0.4	4.9
200	0.127713	0.835	0.004	-0.1	5.0	0.2	6.3	0.8	2.4	-0.2	4.9
250	0.127736	0.832	0.006	-0.4	5.0	0.3	6.3	1.2	2.6	-0.8	4.9
315	0.127752	0.862	0.009	-0.5	5.0	0.5	6.3	2.4	2.7	0.4	4.9
400	0.127764	0.864	0.014	-0.6	5.0	-0.0	6.3	2.6	2.7	-0.9	4.9
500	0.127776	0.858	0.022	-0.8	5.0	0.2	6.3	1.5	2.4	0.4	4.9
630	0.127810	0.857	0.035	-1.1	5.0	0.4	6.3	1.2	2.4	0.2	4.9
800	0.127847	0.858	0.057	0.5	5.0	0.7	6.3	1.2	2.4	0.3	4.9
1000	0.127898	0.873	0.089	-1.0	5.0	0.4	6.3	1.1	2.8	0.7	4.9
1250	0.127995	0.906	0.140	-1.2	5.0	0.3	6.3	0.9	2.8	2.2	4.9
1500	0.128114	0.919	0.202	-1.3	5.0	0.2	6.3	0.6	2.8	3.5	4.9
1600	0.128151	0.927	0.230	-1.3	5.0	0.4	6.4	0.3	2.8	0.8	5.1
2000	0.128362	0.978	0.360	-2.6	5.1	0.6	6.4	0.4	2.8	3.3	5.1
2500	0.128686	1.081	0.564	-3.9	5.1	0.7	6.4	0.3	2.9	2.6	5.1
3000	0.129073	1.234	0.816	-0.7	5.1	1.0	6.4	0.3	2.9	5.2	5.2
3150	0.129178	1.321	0.901	-0.8	5.2	1.4	6.5	0.4	3.0	3.6	5.0
3500	0.129544	1.480	1.117	-1.4	5.2	1.5	6.5	-0.6	3.0	3.3	5.1
4000	0.130063	1.752	1.468	-0.6	5.3	2.1	6.6	-0.5	3.2	6.4	5.2
4500	0.130684	2.106	1.871	-0.8	5.5	1.3	6.7	-1.1	3.4	4.5	5.4
5000	0.131377	2.552	2.329	-1.8	5.6	1.4	8.2	-0.7	3.7	4.0	5.5
5500	0.132313	3.533	2.846	-3.1	10.7	-1.4	14.7	-3.3	9.2	4.8	5.5
6000	0.133076	4.019	3.418	-2.8	11.0	1.6	14.9	-3.5	9.4	5.1	6.0
6300	0.133643	4.346	3.792	-3.4	11.1	1.9	15.1	-3.6	9.6	4.9	6.2
6500	0.133976	4.596	4.053	-3.8	11.2	1.2	15.1	-4.6	9.7	5.1	6.3
7000	0.134922	5.273	4.752	-3.2	11.5	3.2	15.4	-6.6	10.0	6.0	6.8
7500	0.136308	5.998	5.535	-4.1	12.0	1.4	15.8	-4.0	10.5	8.5	7.4
8000	0.137469	6.796	6.380	-4.7	12.5	4.5	16.3	-7.8	11.0	9.9	8.2
8500	0.138658	7.669	7.300	-3.6	13.0	5.3	16.8	-4.9	11.7	11.0	8.9
9000	0.140118	8.655	8.314	-2.2	13.7	1.7	17.4	-2.9	12.4	8.5	9.8
9500	0.141435	9.709	9.403	-8.3	14.5	15.5	18.2	-16.8	13.1	9.4	10.9
10000	0.143102	10.896	10.604	-6.0	15.4	12.6	21.4	-10.9	14.1	11.2	12.4

(continued) Unilateral degrees of equivalence for the magnitude of the SE

f	KCRV		U_{mat}	KRISS		LNE		NIM		CENAM	
in	X_{KC}	U_{KC} in	in	D_i	U_{D_i}	D_i	U_{D_i}	D_i	U_{D_i}	D_i	U_{D_i}
Hz	in $\frac{pC}{m/s^2}$	$10^{-4}\frac{pC}{m/s^2}$	$10^{-4}\frac{pC}{m/s^2}$	in $10^{-4}\frac{pC}{m/s^2}$		in $10^{-4}\frac{pC}{m/s^2}$		in $10^{-4}\frac{pC}{m/s^2}$		in $10^{-4}\frac{pC}{m/s^2}$	
10	0.127692	0.868	0.000	-7.9*	5.0*	0.3	3.7	-0.2	5.0	-0.5	3.7
12.5	0.127718	0.864	0.000	-7.9*	4.7*	0.2	3.7	0.3	5.0	-1.1	3.7
16	0.127719	0.858	0.000	-6.8*	4.7*	0.3	3.7	1.4	5.0	-0.3	3.7
20	0.127738	0.836	0.000	-8.8*	5.3*	0.7	3.7	1.0	5.0	-0.6	3.7
25	0.127721	0.836	0.000	-7.0*	5.3*	-0.2	3.7	1.2	5.0	-0.2	3.7
31.5	0.127722	0.836	0.000	-6.5*	4.7*	-0.2	3.7	1.3	5.0	-0.1	3.7
40	0.127712	0.836	0.000	-5.6*	4.7*	-0.3	3.7	1.4	5.0	-0.2	3.7
63	0.127684	0.835	0.000	-4.2*	4.7*	-0.5	3.7	1.6	5.0	-0.1	3.7
80	0.127688	0.835	0.001	-3.5*	4.7*	0.2	3.7	2.1	5.0	-0.3	3.7
100	0.127663	0.822	0.001	-3.0	4.6	0.3	3.7	2.4	5.0	-0.0	3.7
125	0.127689	0.824	0.001	-2.8	4.9	0.0	3.7	2.0	5.0	0.0	3.7
160	0.127690	0.829	0.002	-3.2	6.7	0.3	3.7	1.9	5.0	-0.2	3.7
200	0.127713	0.835	0.004	-2.3	7.2	0.3	3.7	1.6	5.0	-0.3	3.7
250	0.127736	0.832	0.006	-2.4	4.8	-0.3	3.7	1.6	5.0	-0.7	3.7
315	0.127752	0.862	0.009	-2.3	4.8	-0.4	3.7	1.4	5.0	-0.9	3.7
400	0.127764	0.864	0.014	-1.7	5.2	-0.3	3.7	1.6	5.0	-0.8	3.7
500	0.127776	0.858	0.022	-1.4	5.8	-0.4	3.7	1.4	5.0	-0.8	3.7
630	0.127810	0.857	0.035	-1.3	5.3	-0.1	3.7	1.5	5.0	-0.5	3.7
800	0.127847	0.858	0.057	-1.7	5.2	-0.2	3.7	1.5	5.0	-0.7	3.7
1000	0.127898	0.873	0.089	-1.4	5.2	-0.1	3.7	1.1	5.0	-0.7	3.7
1250	0.127995	0.906	0.140	-2.1	5.2	-0.3	3.7	1.1	5.0	-1.2	6.3
1500	0.128114	0.919	0.202	-2.6	5.3	-0.2	3.7	0.5	5.1	-0.2	6.3
1600	0.128151	0.927	0.230	-2.0	5.3	-0.3	3.7	1.1	5.1	0.2	6.3
2000	0.128362	0.978	0.360	-1.5	5.2	-0.4	3.8	1.0	5.1	0.5	6.4
2500	0.128686	1.081	0.564	-3.0	6.0	-0.4	3.8	1.1	5.1	0.7	6.4
3000	0.129073	1.234	0.816	-3.4	6.3	-0.6	3.8	1.5	5.2	1.1	6.4
3150	0.129178	1.321	0.901	-2.7	7.1	-0.3	3.9	2.4	5.2	1.2	6.5
3500	0.129544	1.480	1.117	1.3	8.4	-0.5	3.9	0.8	5.2	1.4	6.5
4000	0.130063	1.752	1.468	-0.8	7.4	-0.8	4.1	-0.2	5.3	0.8	6.6
4500	0.130684	2.106	1.871	4.3	6.6	-1.3	4.2	0.3	5.5	2.5	6.7
5000	0.131377	2.552	2.329			-1.6	8.1	2.0	5.7	3.7	13.3
5500	0.132313	3.533	2.846			-3.4	8.1	-3.0	13.3	3.4	13.4
6000	0.133076	4.019	3.418			-3.4	8.4	-1.3	13.6	4.7	13.6
6300	0.133643	4.346	3.792			-1.5	8.6	1.0	13.7	5.7	13.8
6500	0.133976	4.596	4.053			-5.3	8.7	1.2	13.8	7.4	13.9
7000	0.134922	5.273	4.752			-5.0	14.1	0.8	14.1	7.5	14.2
7500	0.136308	5.998	5.535			-6.5	14.5	-0.2	14.5	6.2	14.6
8000	0.137469	6.796	6.380			-6.3	14.9	0.6	15.0	8.2	15.0
8500	0.138658	7.669	7.300			-7.3	15.4	-0.2	15.5	8.8	15.6
9000	0.140118	8.655	8.314			-11.6	16.0	6.1	16.2	10.5	16.2
9500	0.141435	9.709	9.403			1.9	16.8	8.1	16.9	11.7	16.9
10000	0.143102	10.896	10.604			-3.8	17.6	4.4	17.7	15.2	17.8

(continued) Unilateral degrees of equivalence for the magnitude of the SE

f in Hz	KCRV X_{KC} in $\frac{pC}{m/s^2}$	KCRV U_{KC} in $10^{-4}\frac{pC}{m/s^2}$	U_{mat} in $10^{-4}\frac{pC}{m/s^2}$	INMETRO D_i in $10^{-4}\frac{pC}{m/s^2}$	INMETRO U_{D_i} in $10^{-4}\frac{pC}{m/s^2}$	UME D_i in $10^{-4}\frac{pC}{m/s^2}$	UME U_{D_i} in $10^{-4}\frac{pC}{m/s^2}$	VNIIM D_i in $10^{-4}\frac{pC}{m/s^2}$	VNIIM U_{D_i} in $10^{-4}\frac{pC}{m/s^2}$
10	0.127692	0.868	0.000	0.6	2.9	1.9	6.3	-3.0	12.7
12.5	0.127718	0.864	0.000	0.9	2.9	1.6	6.3	-3.0	12.7
16	0.127719	0.858	0.000	0.6	2.9	2.0	6.3	-2.5	12.7
20	0.127738	0.836	0.000	0.4	3.0	0.7	6.3	-1.8	6.3
25	0.127721	0.836	0.000	0.7	3.0	-1.4	6.3	-0.5	6.3
31.5	0.127722	0.836	0.000	0.7	3.0	-1.1	6.3	-0.3	6.3
40	0.127712	0.836	0.000	0.6	3.0	-1.0	6.3	0.2	6.3
63	0.127684	0.835	0.000	0.9	3.0	-0.1	6.3	0.8	6.3
80	0.127688	0.835	0.001	0.8	3.0	0.1	6.3	0.7	6.3
100	0.127663	0.822	0.001	1.1	3.0	0.2	6.3	1.3	6.3
125	0.127689	0.824	0.001	0.7	3.0	-0.8	6.3	1.0	6.3
160	0.127690	0.829	0.002	0.6	3.0	-1.8	6.3	1.4	6.3
200	0.127713	0.835	0.004	0.7	3.0	-1.5	6.3	1.5	6.3
250	0.127736	0.832	0.006	0.6	3.0	-1.4	6.3	1.1	6.3
315	0.127752	0.862	0.009	0.5	2.9	-1.6	6.3	1.2	6.3
400	0.127764	0.864	0.014	0.4	2.9	-1.7	6.3	1.3	6.3
500	0.127776	0.858	0.022	0.6	2.9	-1.1	6.3	1.4	6.3
630	0.127810	0.857	0.035	0.6	2.9	0.5	6.3	1.4	6.3
800	0.127847	0.858	0.057	0.5	2.9	0.6	6.3	1.5	6.3
1000	0.127898	0.873	0.089	0.4	2.9	-0.2	6.3	1.6	6.3
1250	0.127995	0.906	0.140	0.0	2.9	-0.1	12.8	1.2	6.3
1500	0.128114	0.919	0.202	-0.2	2.9	-0.6	12.8	1.8	6.4
1600	0.128151	0.927	0.230	0.4	3.0	-0.5	12.8	2.2	6.4
2000	0.128362	0.978	0.360	-0.3	3.0	-0.1	12.8	1.2	6.4
2500	0.128686	1.081	0.564	-1.2	3.0	-0.4	12.8	-0.2	12.8
3000	0.129073	1.234	0.816	-0.9	3.1	1.8	12.9	-1.9	12.9
3150	0.129178	1.321	0.901	-0.8	4.4	0.0	12.9	-0.6	12.9
3500	0.129544	1.480	1.117	0.5	4.4	-0.0	13.0	-2.0	12.9
4000	0.130063	1.752	1.468	-0.3	4.6	2.2	13.1	-4.6	13.0
4500	0.130684	2.106	1.871	-0.8	4.7	4.2	13.2	-7.4	13.1
5000	0.131377	2.552	2.329	0.2	8.2	1.7	13.3	-14.0*	13.2*
5500	0.132313	3.533	2.846	-2.4	8.2	-2.2	19.9	-19.1*	26.3*
6000	0.133076	4.019	3.418	-1.3	8.4	1.9	20.2	-22.2*	26.5*
6300	0.133643	4.346	3.792	-2.3	8.6	3.6	20.3	-23.8*	26.6*
6500	0.133976	4.596	4.053	-1.6	8.7	4.2	20.4	-24.2*	26.7*
7000	0.134922	5.273	4.752	-4.5	11.5	5.8	20.7	-27.1*	27.0*
7500	0.136308	5.998	5.535	-7.0	12.0	0.9	23.7	-33.5*	27.3*
8000	0.137469	6.796	6.380	-6.2	12.5	-0.7	24.1	-39.9*	27.5*
8500	0.138658	7.669	7.300	-4.5	13.0	1.4	24.6	-44.8*	27.9*
9000	0.140118	8.655	8.314	-5.2	13.7	-0.2	25.1	-54.4*	28.3*
9500	0.141435	9.709	9.403	-4.5	14.5	-0.1	25.7	-61.8*	28.7*
10000	0.143102	10.896	10.604	-4.5	15.4	11.2	26.6	-63.2*	29.4*

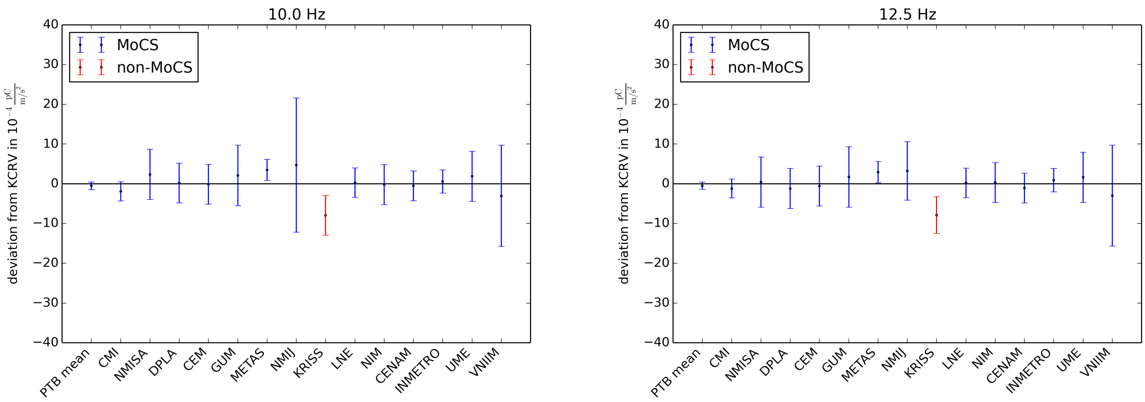

Figure 8.1: Deviation of the magnitude for the frequencies 10.0 Hz and 12.5 Hz for the SE.

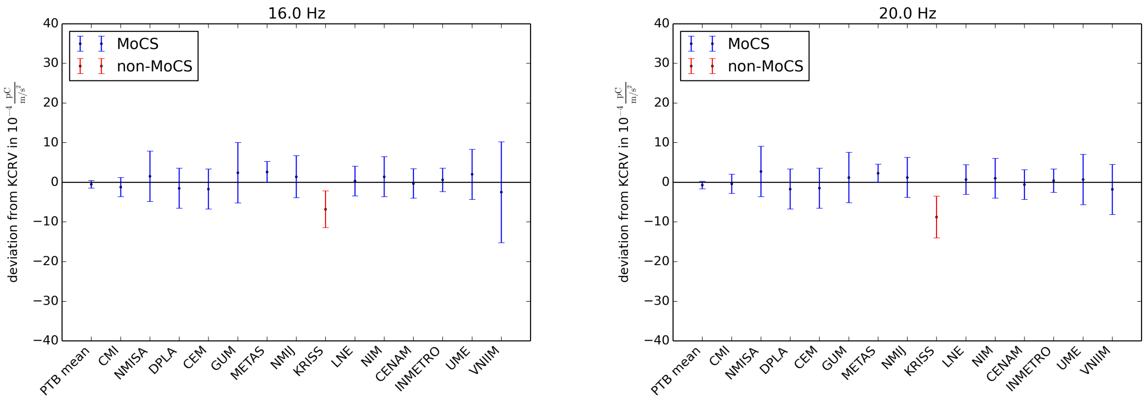

Figure 8.2: Deviation of the magnitude for the frequencies 16.0 Hz and 20.0 Hz for the SE.

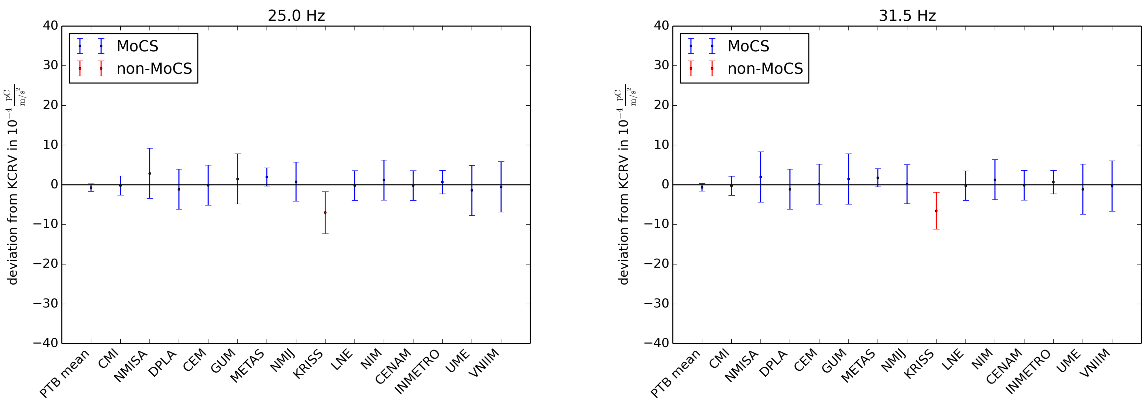

Figure 8.3: Deviation of the magnitude for the frequencies 25.0 Hz and 31.5 Hz for the SE.

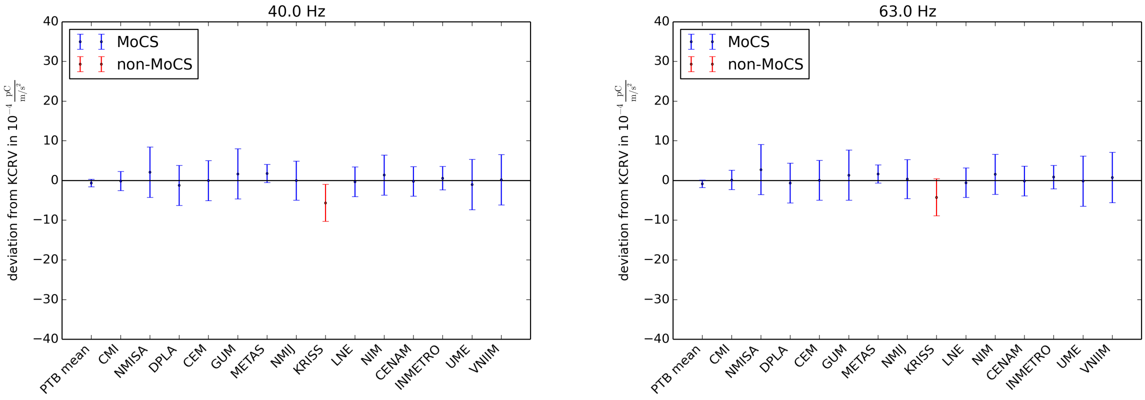

Figure 8.4: Deviation of the magnitude for the frequencies 40.0 Hz and 63.0 Hz for the SE.

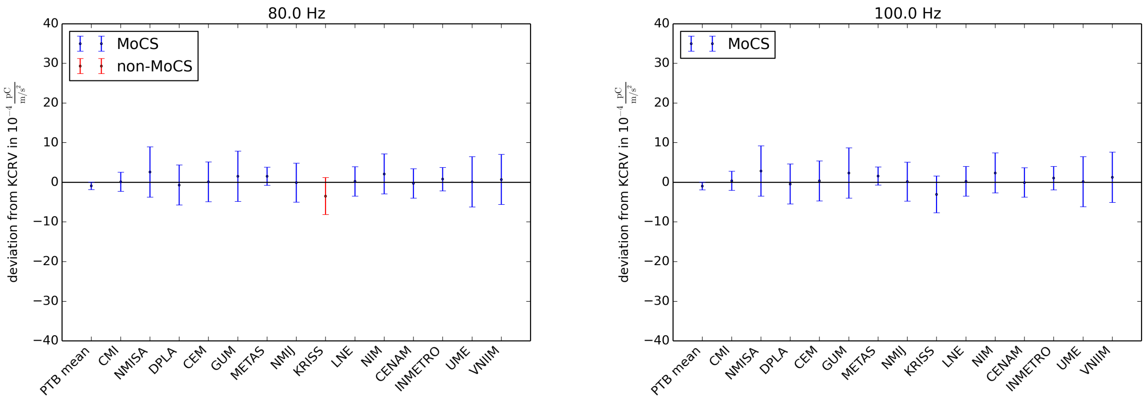

Figure 8.5: Deviation of the magnitude for the frequencies 80.0 Hz and 100.0 Hz for the SE.

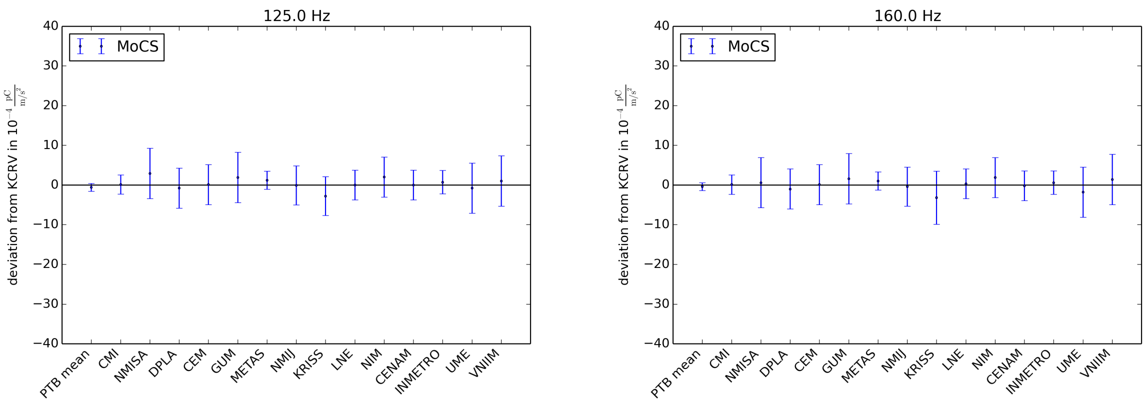

Figure 8.6: Deviation of the magnitude for the frequencies 125.0 Hz and 160.0 Hz for the SE.

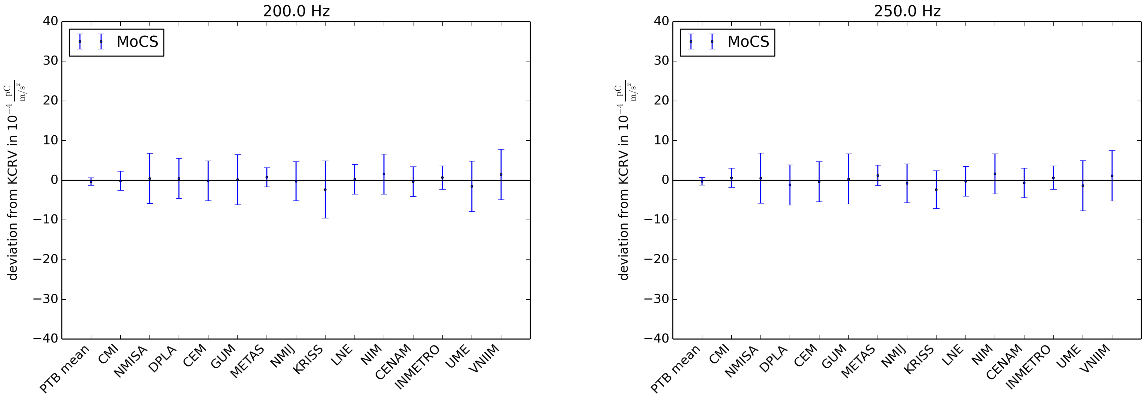

Figure 8.7: Deviation of the magnitude for the frequencies 200.0 Hz and 250.0 Hz for the SE.

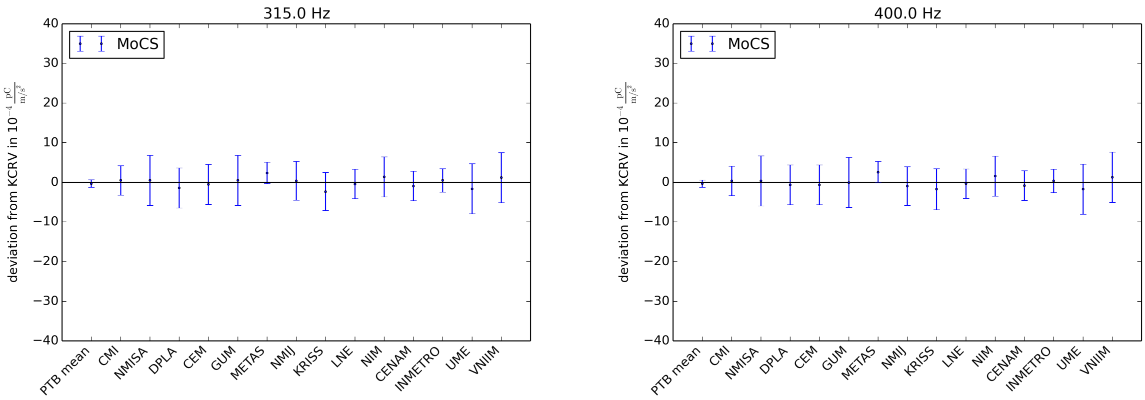

Figure 8.8: Deviation of the magnitude for the frequencies 315.0 Hz and 400.0 Hz for the SE.

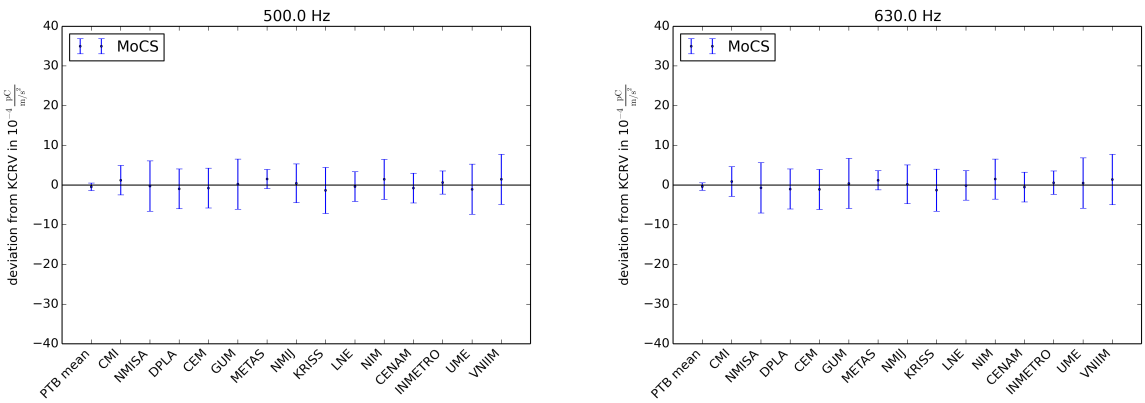

Figure 8.9: Deviation of the magnitude for the frequencies 500.0 Hz and 630.0 Hz for the SE.

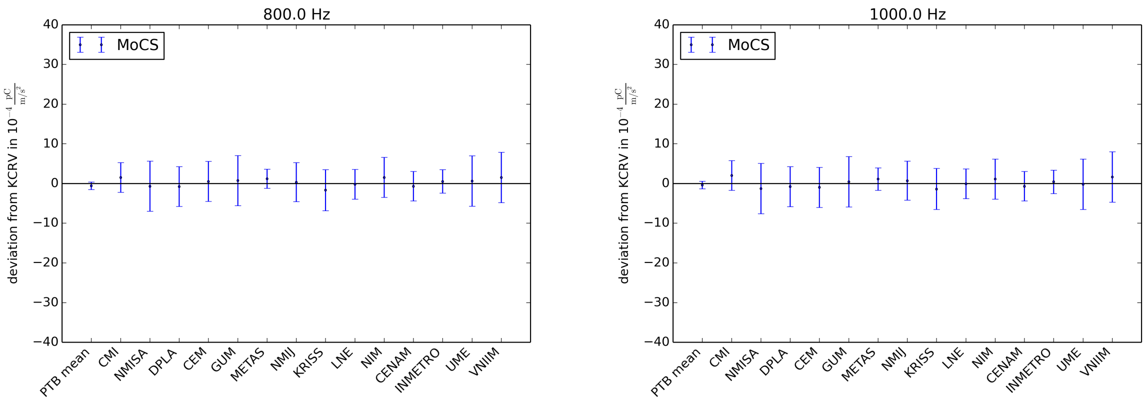

Figure 8.10: Deviation of the magnitude for the frequencies 800.0 Hz and 1000.0 Hz for the SE.

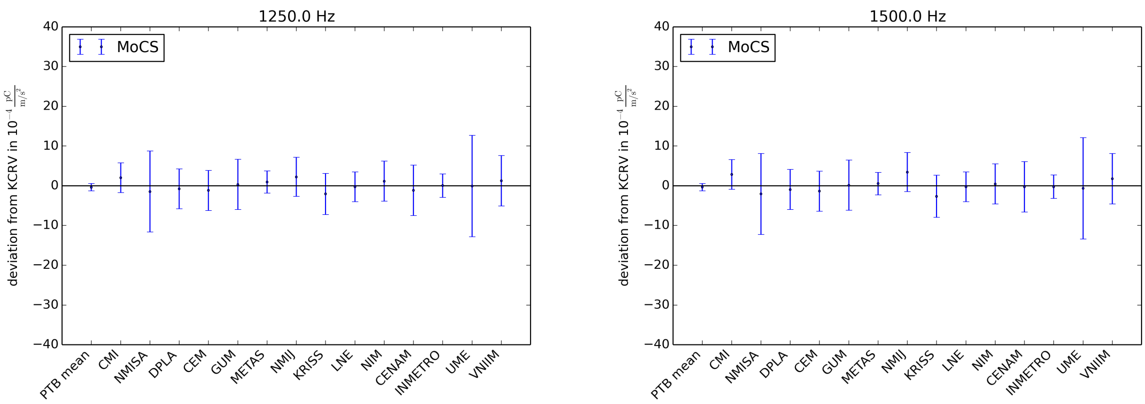

Figure 8.11: Deviation of the magnitude for the frequencies 1250.0 Hz and 1500.0 Hz for the SE.

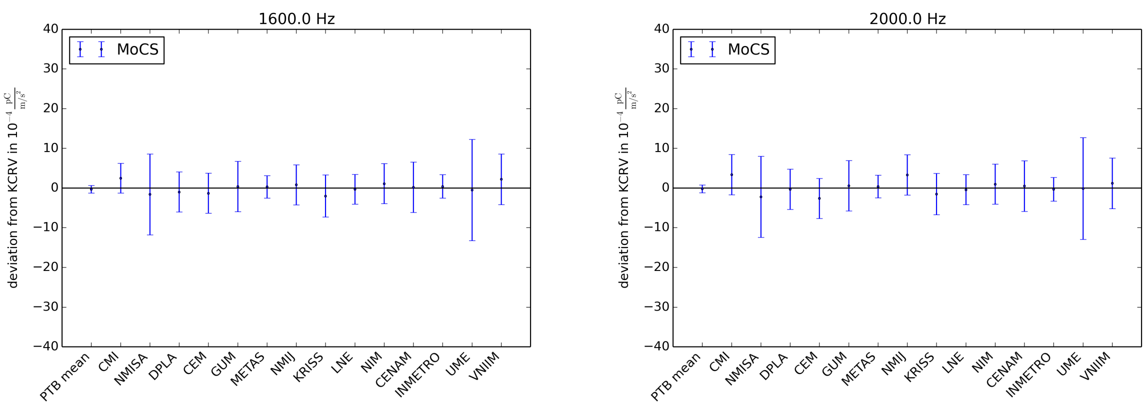

Figure 8.12: Deviation of the magnitude for the frequencies 1600.0 Hz and 2000.0 Hz for the SE.

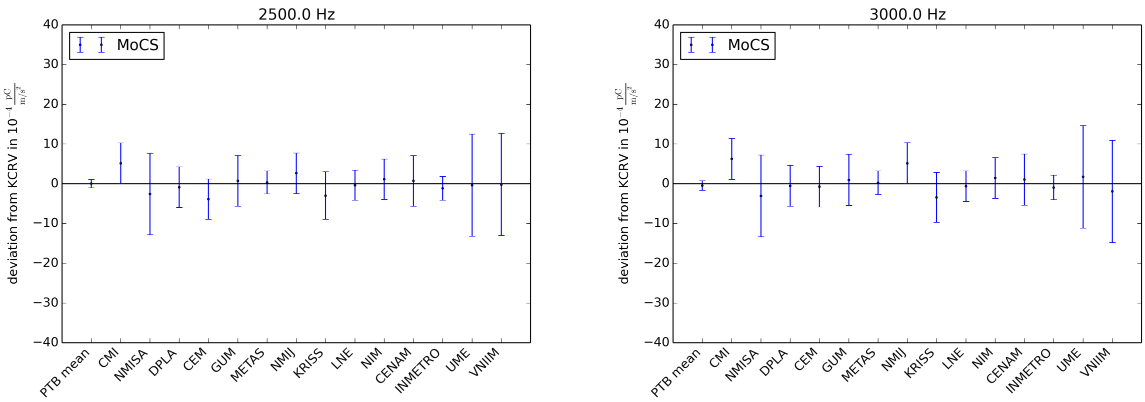

Figure 8.13: Deviation of the magnitude for the frequencies 2500.0 Hz and 3000.0 Hz for the SE.

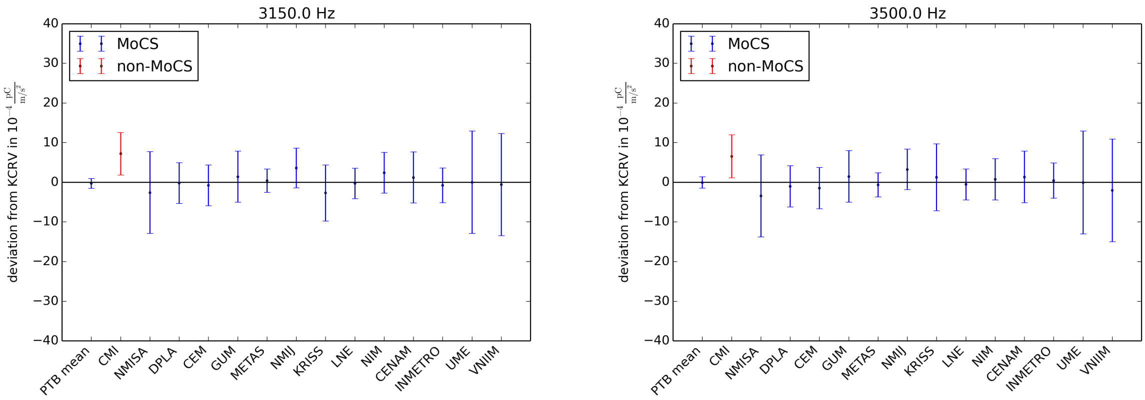

Figure 8.14: Deviation of the magnitude for the frequencies 3150.0 Hz and 3500.0 Hz for the SE.

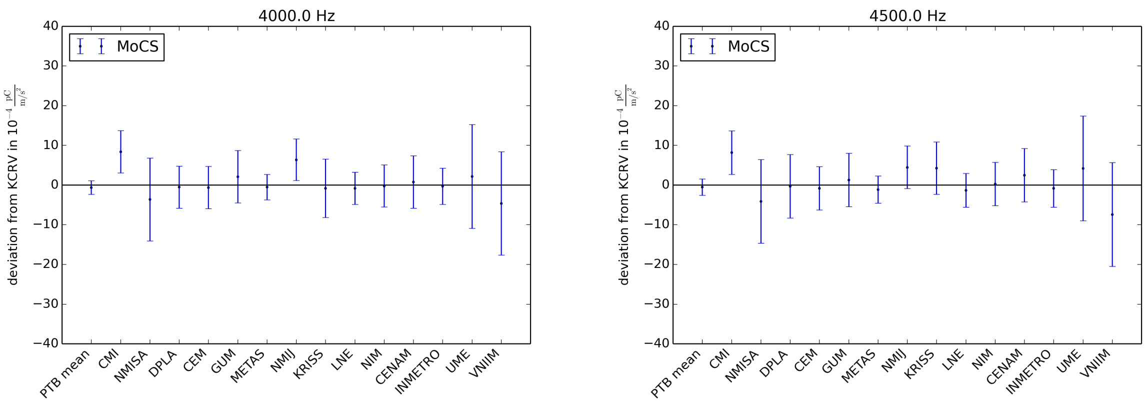

Figure 8.15: Deviation of the magnitude for the frequencies 4000.0 Hz and 4500.0 Hz for the SE.

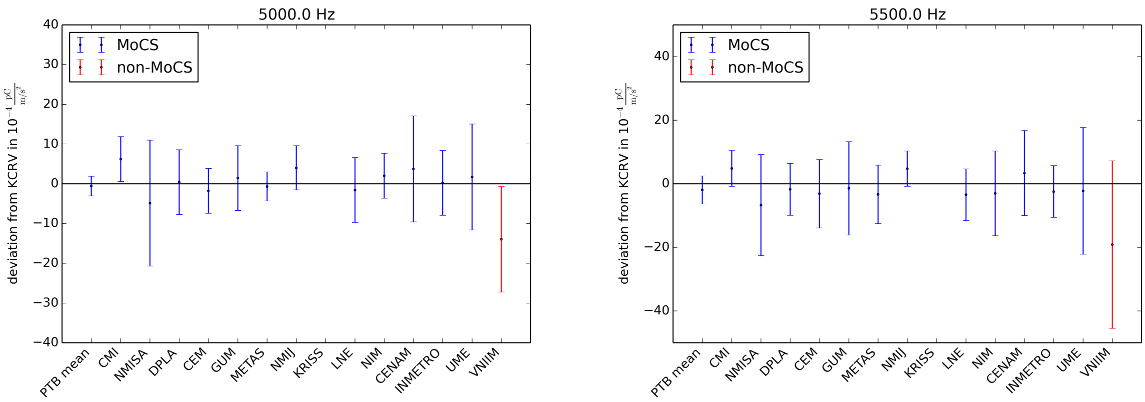

Figure 8.16: Deviation of the magnitude for the frequencies 5000.0 Hz and 5500.0 Hz for the SE.

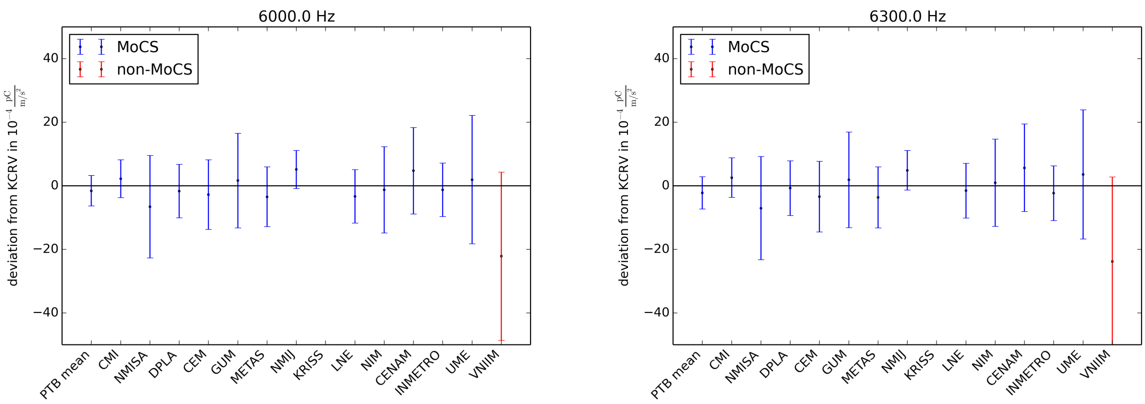

Figure 8.17: Deviation of the magnitude for the frequencies 6000.0 Hz and 6300.0 Hz for the SE.

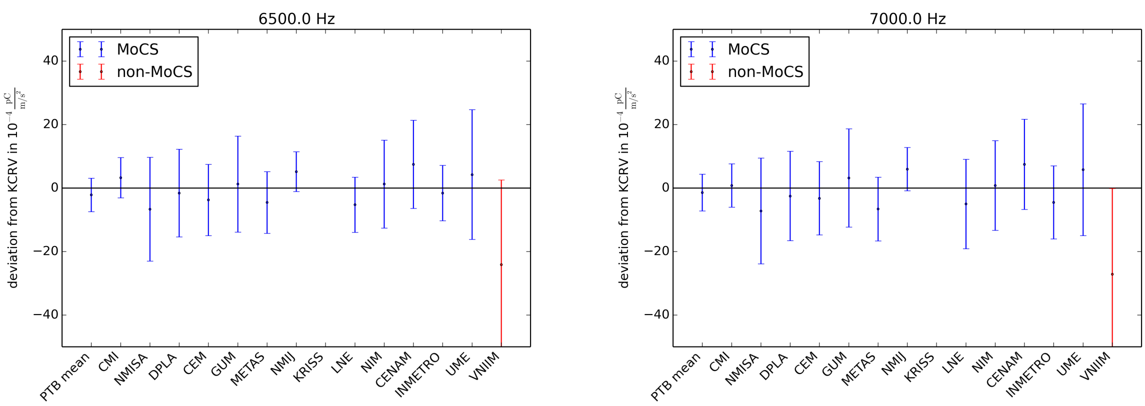

Figure 8.18: Deviation of the magnitude for the frequencies 6500.0 Hz and 7000.0 Hz for the SE.

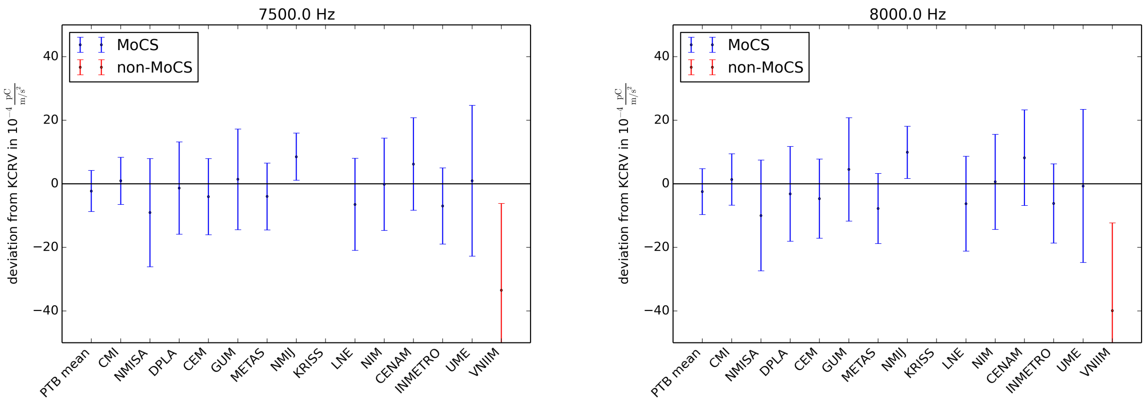

Figure 8.19: Deviation of the magnitude for the frequencies 7500.0 Hz and 8000.0 Hz for the SE.

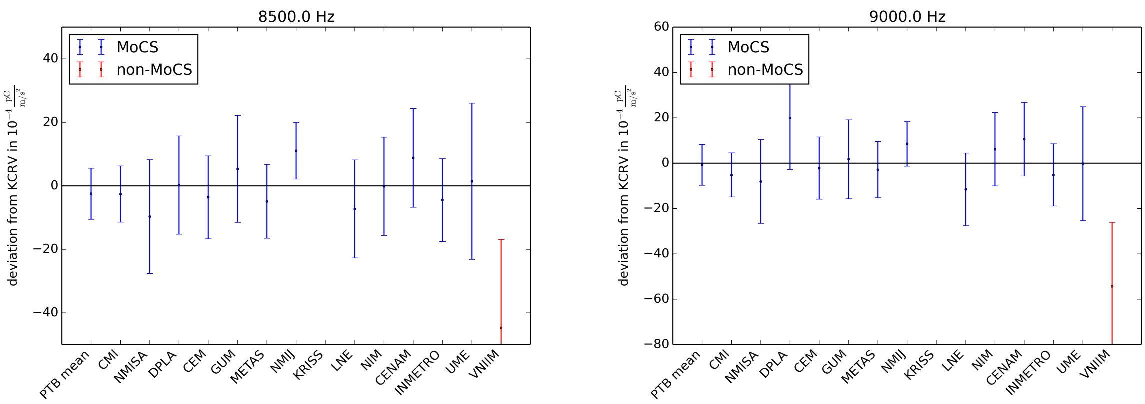

Figure 8.20: Deviation of the magnitude for the frequencies 8500.0 Hz and 9000.0 Hz for the SE.

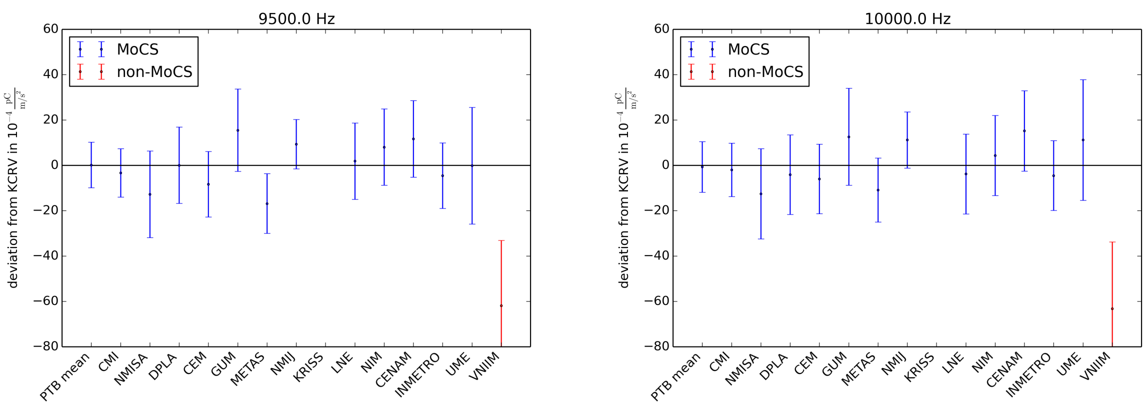

Figure 8.21: Deviation of the magnitude for the frequencies 9500.0 Hz and 10000.0 Hz for the SE.

8.2 Phase of the Complex Sensitivity of the SE

Table 8.2: Unilateral degrees of equivalence for the phase of the SE.

f in Hz	KCRV X_{KC} in °	U_{KC}	PTB mean D_i in °	U_{D_i}	CMI D_i in °	U_{D_i}	NMISA D_i in °	U_{D_i}	DPLA D_i in °	U_{D_i}	CEM D_i in °	U_{D_i}
10	0.012	0.107	-0.04	0.17	0.02	0.49	-0.07	0.39	-0.07	0.28	-0.06	0.49
12.5	0.017	0.107	-0.02	0.17	-0.03	0.49	-0.08	0.39	-0.06	0.28	-0.04	0.49
16	-0.006	0.106	-0.04	0.17	-0.01	0.49	-0.04	0.39	-0.03	0.28	-0.02	0.49
20	0.001	0.103	-0.03	0.17	-0.04	0.49	-0.07	0.39	-0.02	0.28	-0.02	0.49
25	-0.017	0.103	-0.02	0.17	-0.00	0.49	-0.08	0.39	-0.01	0.28	0.01	0.49
31.5	-0.020	0.104	-0.03	0.17	0.00	0.49	-0.07	0.39	0.00	0.28	0.01	0.49
40	-0.011	0.103	-0.03	0.17	0.00	0.49	-0.06	0.39	-0.01	0.28	0.02	0.49
63	-0.015	0.103	-0.01	0.17	-0.00	0.49	-0.03	0.39	-0.00	0.28	0.04	0.49
80	-0.018	0.104	-0.01	0.17	-0.02	0.49	-0.03	0.39	-0.00	0.28	0.04	0.49
100	-0.019	0.104	-0.01	0.17	-0.02	0.49	-0.03	0.39	-0.00	0.28	0.04	0.49
125	-0.017	0.104	-0.01	0.17	-0.03	0.49	-0.05	0.39	-0.00	0.28	0.04	0.49
160	-0.020	0.104	-0.00	0.17	-0.05	0.49	-0.08	0.39	-0.01	0.28	0.08	0.49
200	-0.011	0.104	0.00	0.17	-0.07	0.49	-0.03	0.39	-0.05	0.28	0.05	0.49
250	-0.000	0.104	0.01	0.17	-0.10	0.49	-0.03	0.39	0.00	0.28	0.04	0.49
315	-0.022	0.100	0.02	0.17	-0.09	0.49	0.00	0.39	-0.04	0.28	0.06	0.49
400	-0.020	0.100	0.02	0.17	-0.13	0.49	0.01	0.39	-0.03	0.28	0.05	0.49
500	-0.024	0.101	0.01	0.17	-0.19	0.49	0.02	0.39	-0.06	0.28	0.05	0.49
630	-0.027	0.100	0.03	0.17	-0.20	0.49	0.06	0.39	-0.05	0.28	0.11	0.49
800	-0.028	0.100	0.02	0.17	-0.28	0.49	0.07	0.39	-0.06	0.28	0.08	0.49
1000	-0.041	0.102	0.04	0.17	-0.32	0.49	0.09	0.39	-0.11	0.28	0.11	0.49
1250	-0.063	0.122	0.04	0.49	-0.38	0.49	0.12	0.49	-0.09	0.27	0.11	0.99
1500	-0.048	0.120	0.02	0.49	-0.48	0.49	0.14	0.49	-0.11	0.27	0.11	0.99
1600	-0.044	0.120	0.01	0.49	-0.52	0.49	0.14	0.49	-0.13	0.27	0.12	0.99
2000	-0.103	0.120	0.06	0.49	-0.59	0.49	0.22	0.49	-0.12	0.27	0.18	0.99
2500	-0.063	0.122	0.01	0.48	-0.78	0.48	0.21	0.48	-0.18	0.27	0.14	0.99
3000	-0.046	0.126	-0.03	0.48	-0.95*	0.52*	0.24	0.48	-0.22	0.27	0.13	0.99
3150	-0.068	0.134	-0.01	0.48	-0.98*	0.52*	0.26	0.48	-0.23	0.27	0.15	0.99
3500	-0.072	0.134	-0.02	0.48	-1.07*	0.52*	0.32	0.48	-0.28	0.27	0.15	0.99
4000	-0.102	0.140	0.01	0.48	-1.20*	0.52*	0.36	0.48	-0.27	0.27	0.20	0.99
4500	-0.075	0.146	-0.05	0.48	-1.34*	0.52*	0.34	0.48	-0.33	0.26	0.17	0.99
5000	-0.108	0.152	-0.02	0.48	-1.43*	0.52*	0.42	0.79	-0.32	0.26	0.25	0.99
5500	-0.067	0.182	-0.06	0.47	-1.63*	0.53*	0.41	0.78	-0.42	0.47	0.21	0.98
6000	-0.062	0.182	-0.09	0.47	-1.79*	0.53*	0.43	0.78	-0.44	0.47	0.19	0.98
6300	-0.080	0.182	-0.06	0.47	-1.85*	0.53*	0.46	0.78	-0.38	0.47	0.18	0.98
6500	-0.100	0.187	-0.06	0.46	-1.83*	0.53*	0.49	0.78	-0.41	0.46	0.22	0.98
7000	-0.233	0.240	0.08	0.44	-1.84*	0.55*	0.69	0.76	-0.34	0.44	0.40	0.97
7500	-0.013	0.200	-0.11	0.46	-2.32*	0.54*	0.53	0.77	-0.67	0.98	0.18	0.98
8000	-0.037	0.202	-0.15	0.46	-2.22*	0.54*	0.56	0.77	-0.66	0.98	0.17	0.98
8500	-0.083	0.202	-0.11	0.46	-2.29*	0.54*	0.64	0.77	-0.77	0.98	0.19	0.98
9000	0.029	0.202	-0.24	0.46	-2.66*	0.54*	0.63	0.77	-0.51	0.98	0.10	0.98
9500	0.049	0.206	-0.31	0.46	-2.74*	0.54*	0.50	0.77	-0.74	0.98	0.04	0.98
10000	0.038	0.206	-0.29	0.46	-2.81*	0.54*	0.57	0.77	-0.68	0.98	0.04	0.98

(continued) Unilateral degrees of equivalence for the phase of the SE.

f in Hz	KCRV in °		GUM in °		METAS in °		NMIJ in °		KRISS in °		LNE in °	
	X_{KC}	U_{KC}	D_i	U_{D_i}	D_i	U_{D_i}	D_i	U_{D_i}	D_i	U_{D_i}	D_i	U_{D_i}
10	0.012	0.107	-0.04	0.69	-0.01	0.39	-0.05	0.81			-0.35	2.00
12.5	0.017	0.107	-0.04	0.69	-0.03	0.39	0.00	0.83			-0.13	2.00
16	-0.006	0.106	-0.04	0.69	-0.01	0.39	0.02	0.59			-0.16	2.00
20	0.001	0.103	-0.04	0.59	-0.03	0.37	-0.03	0.43			-0.16	2.00
25	-0.017	0.103	-0.02	0.59	0.01	0.37	-0.03	0.41			-0.11	2.00
31.5	-0.020	0.104	-0.03	0.59	0.02	0.37	-0.03	0.47			-0.10	2.00
40	-0.011	0.103	-0.04	0.59	0.02	0.37	-0.01	0.41			-0.07	2.00
63	-0.015	0.103	-0.03	0.59	-0.01	0.37	-0.01	0.43			0.10	2.00
80	-0.018	0.104	-0.03	0.59	-0.03	0.37	0.03	0.47			0.17	2.00
100	-0.019	0.104	-0.03	0.59	0.03	0.37	0.01	0.47			0.09	2.00
125	-0.017	0.104	-0.01	0.59	0.03	0.37	-0.01	0.49			0.07	2.00
160	-0.020	0.104	-0.00	0.59	0.04	0.37	-0.01	0.51			0.12	2.00
200	-0.011	0.104	-0.02	0.59	0.05	0.37	-0.03	0.53			0.08	2.00
250	-0.000	0.104	-0.02	0.59	0.06	0.37	-0.04	0.55			0.08	2.00
315	-0.022	0.100	0.02	0.59	0.08	0.37	-0.09	0.28			0.12	2.00
400	-0.020	0.100	0.02	0.59	0.02	0.37	-0.02	0.28			0.10	2.00
500	-0.024	0.101	0.04	0.59	0.04	0.37	-0.09	0.30			0.10	2.00
630	-0.027	0.100	0.08	0.59	0.05	0.37	-0.04	0.28			0.15	2.00
800	-0.028	0.100	0.05	0.59	0.06	0.37	-0.00	0.28			0.17	2.00
1000	-0.041	0.102	0.07	0.59	0.06	0.47	0.00	0.28			0.21	2.00
1250	-0.063	0.122	0.11	0.59	0.08	0.46	-0.02	0.27			0.30	2.00
1500	-0.048	0.120	0.11	0.59	0.06	0.46	0.11	0.25			0.34	2.00
1600	-0.044	0.120	0.10	0.59	0.08	0.46	0.15	0.25			0.37	2.00
2000	-0.103	0.120	0.19	0.59	0.13	0.46	-0.03	0.25			0.48	5.00
2500	-0.063	0.122	0.15	0.59	0.09	0.46	0.18	0.27			0.54	5.00
3000	-0.046	0.126	0.14	0.59	0.07	0.46	0.05	0.27			0.64	5.00
3150	-0.068	0.134	0.18	0.58	0.08	0.46	0.14	0.25			0.68	5.00
3500	-0.072	0.134	0.18	0.58	0.09	0.46	0.13	0.25			0.75	5.00
4000	-0.102	0.140	0.21	0.58	0.13	0.46	0.19	0.24			0.87	5.00
4500	-0.075	0.146	0.19	0.58	0.09	0.46	0.15	0.24			0.94	5.00
5000	-0.108	0.152	0.27	0.79	0.19	0.46	0.15	0.24			1.08	5.00
5500	-0.067	0.182	0.24	0.98	0.06	0.84	0.18	0.21			1.14	5.00
6000	-0.062	0.182	0.22	0.98	0.08	0.84	0.19	0.21			1.25	5.00
6300	-0.080	0.182	0.31	0.98	0.04	0.84	0.17	0.21			1.29	5.00
6500	-0.100	0.187	0.29	0.98	0.06	0.84	0.20	0.23			1.43	5.00
7000	-0.233	0.240	0.54	0.97	0.21	0.83	0.43*	0.38*			1.63	4.99
7500	-0.013	0.200	0.23	0.98	0.02	0.84	0.19	0.22			1.44	5.00
8000	-0.037	0.202	0.28	0.98	-0.04	0.84	0.15	0.22			1.59	5.00
8500	-0.083	0.202	0.19	0.98	-0.02	0.84	0.13	0.22			1.71	5.00
9000	0.029	0.202	0.20	0.98	-0.10	0.84	0.22	0.22			1.66	5.00
9500	0.049	0.206	0.18	0.98	-0.28	0.83	0.20	0.22			1.91	5.00
10000	0.038	0.206	0.13	0.98	-0.25	0.83	0.19	0.22			1.98	5.00

(continued) Unilateral degrees of equivalence for the phase of the SE

f in Hz	KCRV X_{KC} in °	KCRV U_{KC} in °	NIM D_i in °	NIM U_{D_i} in °	CENAM D_i in °	CENAM U_{D_i} in °	INMETRO D_i in °	INMETRO U_{D_i} in °	UME D_i in °	UME U_{D_i} in °	VNIIM D_i in °	VNIIM U_{D_i} in °
10	0.012	0.107	0.15	0.49	0.01	0.99	-0.01	0.21	0.04	0.49	2.30	0.99
12.5	0.017	0.107	0.13	0.49	-0.05	0.99	-0.02	0.21	0.02	0.49	1.74	0.99
16	-0.006	0.106	0.15	0.49	0.01	0.99	0.01	0.22	0.03	0.49	1.31	0.99
20	0.001	0.103	0.09	0.49	-0.03	0.99	-0.00	0.22	0.04	0.49	1.03	0.75
25	-0.017	0.103	0.10	0.49	0.01	0.99	0.02	0.22	-0.02	0.49	0.50	0.75
31.5	-0.020	0.104	0.08	0.49	0.00	0.99	0.02	0.22	0.00	0.49	0.31	0.75
40	-0.011	0.103	0.06	0.49	-0.03	0.99	0.01	0.22	0.03	0.49	0.34	0.75
63	-0.015	0.103	0.05	0.49	0.01	0.99	0.02	0.22	0.04	0.49	0.10	0.75
80	-0.018	0.104	0.06	0.49	-0.02	0.99	0.03	0.22	0.02	0.49	-0.11	0.75
100	-0.019	0.104	0.03	0.49	-0.00	0.99	0.03	0.22	0.01	0.49	-0.24	0.75
125	-0.017	0.104	0.03	0.49	0.01	0.99	0.03	0.22	0.03	0.49	-0.08	0.75
160	-0.020	0.104	0.01	0.49	0.01	0.99	0.04	0.22	-0.03	0.49	-0.21	0.75
200	-0.011	0.104	0.01	0.49	0.00	0.99	0.04	0.22	0.02	0.49	-0.16	0.75
250	-0.000	0.104	-0.01	0.49	-0.02	0.99	0.02	0.22	-0.01	0.49	-0.20	0.75
315	-0.022	0.100	0.00	0.49	0.01	0.99	0.05	0.22	-0.01	0.49	-0.35	0.75
400	-0.020	0.100	-0.01	0.49	0.01	0.99	0.04	0.22	-0.02	0.49	-0.29	0.75
500	-0.024	0.101	-0.02	0.49	0.01	0.99	0.09	0.22	-0.01	0.49	-0.30	0.75
630	-0.027	0.100	-0.04	0.49	0.02	0.99	0.07	0.22	-0.06	0.49	-0.55	0.75
800	-0.028	0.100	-0.06	0.49	-0.00	0.99	0.08	0.22	-0.02	0.49	-0.55	0.75
1000	-0.041	0.102	-0.09	0.49	0.01	0.99	0.08	0.22	-0.08	0.49	-0.46	0.75
1250	-0.063	0.122	-0.12	0.49	0.02	0.99	0.14	0.21	-0.16	0.99	-0.45	0.75
1500	-0.048	0.120	-0.13	0.49	-0.02	0.99	0.13	0.21	-0.10	0.99	-0.67	0.75
1600	-0.044	0.120	-0.18	0.49	-0.05	0.99	0.13	0.21	-0.22	0.99	-0.81	0.75
2000	-0.103	0.120	-0.20	0.49	0.00	0.99	0.20	0.21	-0.16	0.99	-0.62	0.75
2500	-0.063	0.122	-0.34	0.48	-0.05	0.99	0.20	0.21	-0.28	0.99	-0.71	0.99
3000	-0.046	0.126	-0.36	0.48	-0.07	0.99	0.19	0.20	-0.57	0.99	-0.78	0.99
3150	-0.068	0.134	-0.45	0.48	-0.06	0.99	0.23	0.31	-0.48	0.99	-0.78	0.99
3500	-0.072	0.134	-0.51	0.48	-0.07	0.99	0.28	0.31	-0.42	0.99	-0.82	0.99
4000	-0.102	0.140	-0.52	0.48	-0.09	0.99	0.30	0.48	-0.55	0.99	-0.86	0.99
4500	-0.075	0.146	-0.60*	0.52*	-0.13	0.99	0.33	0.48	-0.83	0.99	-1.12	0.99
5000	-0.108	0.152	-0.64*	0.52*	-0.13	0.99	0.38	0.48	-0.86	0.99	-0.93	0.99
5500	-0.067	0.182	-0.74	0.98	-0.14	0.98	0.29	0.78	-1.12	1.49	-1.30	1.49
6000	-0.062	0.182	-0.84	0.98	-0.15	0.98	0.31	0.78	-1.21	1.49	-1.25	1.49
6300	-0.080	0.182	-0.85	0.98	-0.16	0.98	0.27	0.78	-0.98	1.49	-1.55	1.49
6500	-0.100	0.187	-0.81	0.98	-0.12	0.98	0.25	0.78	-1.04	1.49	-1.72	1.49
7000	-0.233	0.240	-0.78	0.97	-0.02	0.97	0.37	0.76	-1.10	1.48	-1.49	1.48
7500	-0.013	0.200	-1.12	0.98	-0.24	0.98	0.28	0.98	-1.12	1.49	-1.87	1.49
8000	-0.037	0.202	-1.18	0.98	-0.24	0.98	0.30	0.98	-1.23	1.49	-2.21*	1.51*
8500	-0.083	0.202	-1.27	0.98	-0.18	0.98	0.38	0.98	-1.46	1.49	-2.40*	1.51*
9000	0.029	0.202	-1.39	0.98	-0.32	0.98	0.16	0.98	-1.48	1.49	-2.93*	1.51*
9500	0.049	0.206	-1.52*	1.02*	-0.35	0.98	0.13	0.98	-1.69	1.49	-3.50*	1.51*
10000	0.038	0.206	-1.53*	1.02*	-0.33	0.98	0.05	0.98	-1.91	1.49	-3.74*	1.51*

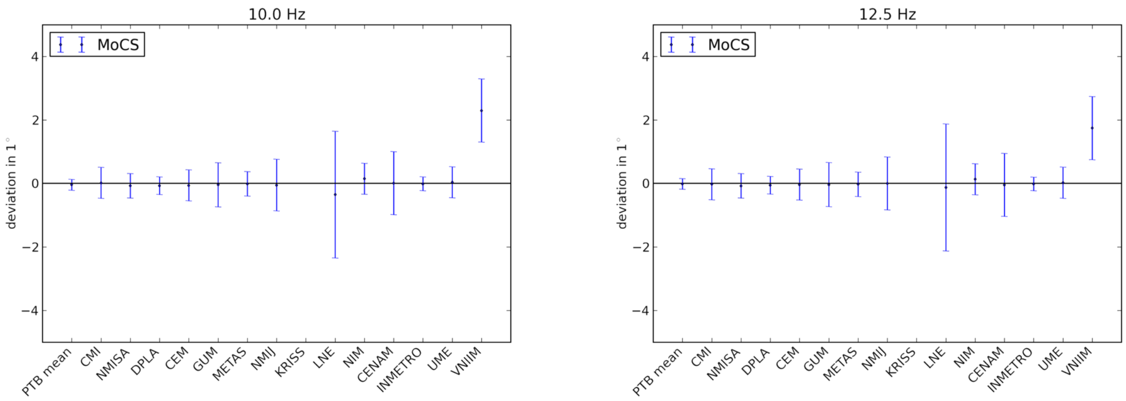

Figure 8.22: Deviation of the phase for the frequencies 10.0 Hz and 12.5 Hz for the SE.

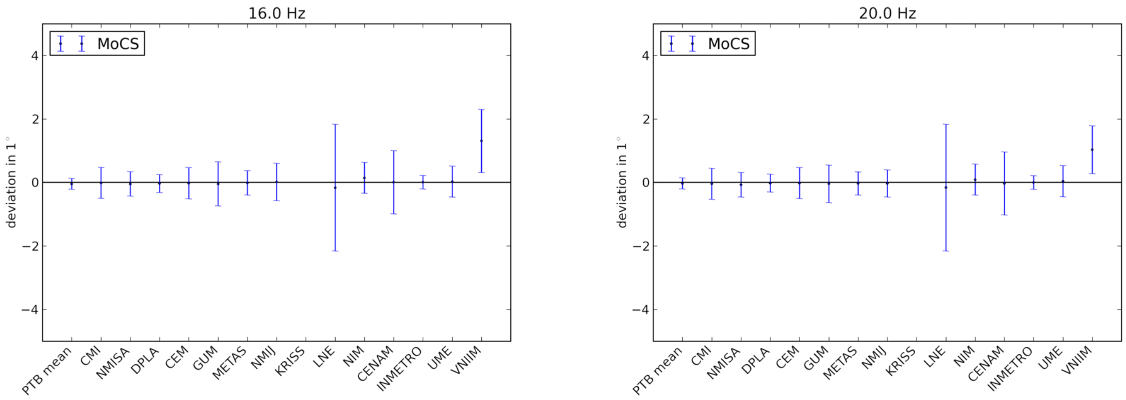

Figure 8.23: Deviation of the phase for the frequencies 16.0 Hz and 20.0 Hz for the SE.

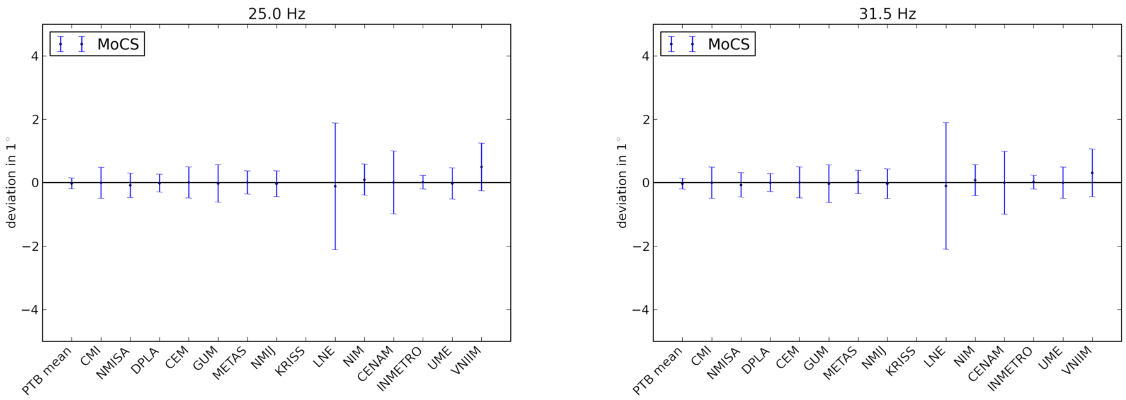

Figure 8.24: Deviation of the phase for the frequencies 25.0 Hz and 31.5 Hz for the SE.

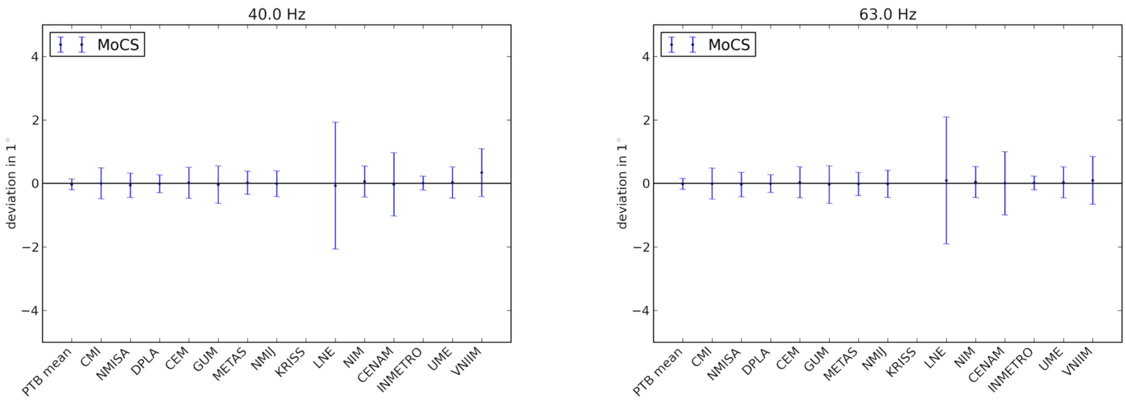

Figure 8.25: Deviation of the phase for the frequencies 40.0 Hz and 63.0 Hz for the SE.

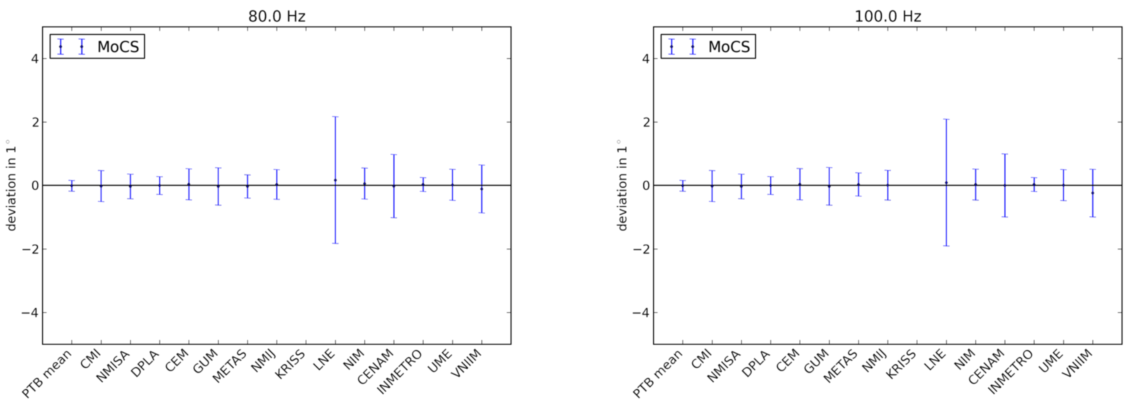

Figure 8.26: Deviation of the phase for the frequencies 80.0 Hz and 100.0 Hz for the SE.

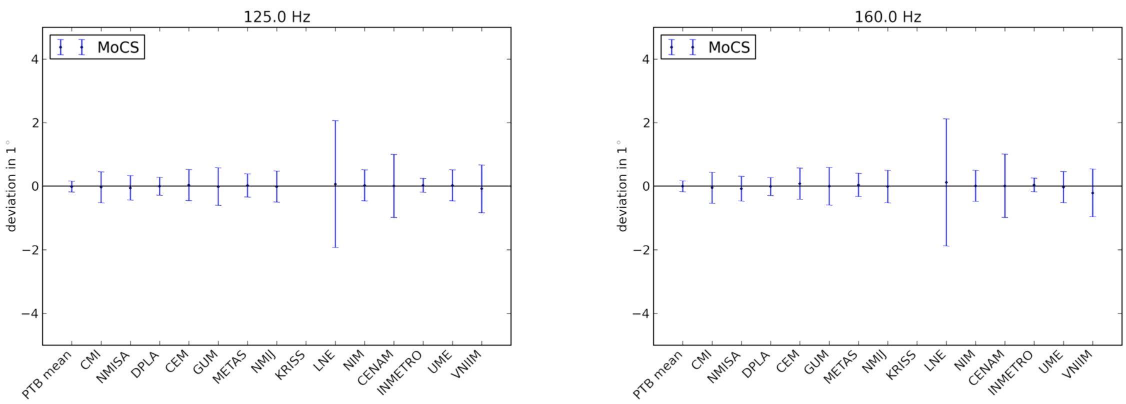

Figure 8.27: Deviation of the phase for the frequencies 125.0 Hz and 160.0 Hz for the SE.

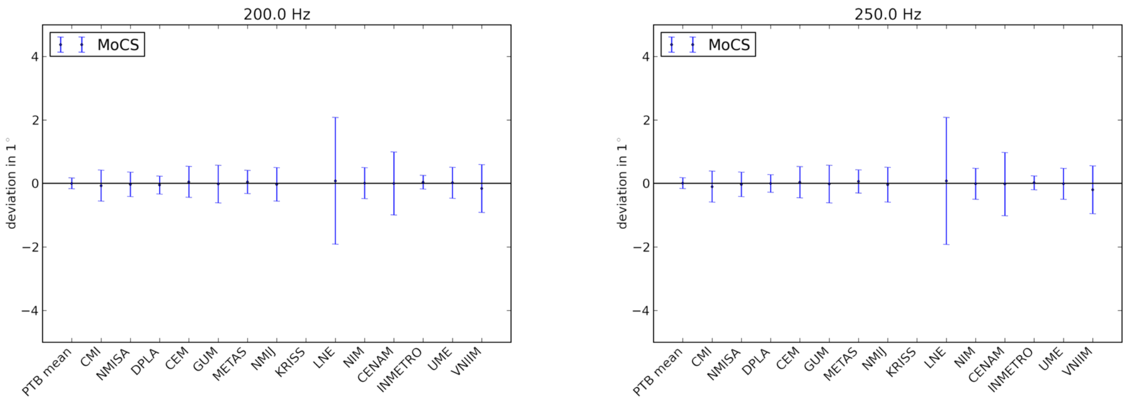

Figure 8.28: Deviation of the phase for the frequencies 200.0 Hz and 250.0 Hz for the SE.

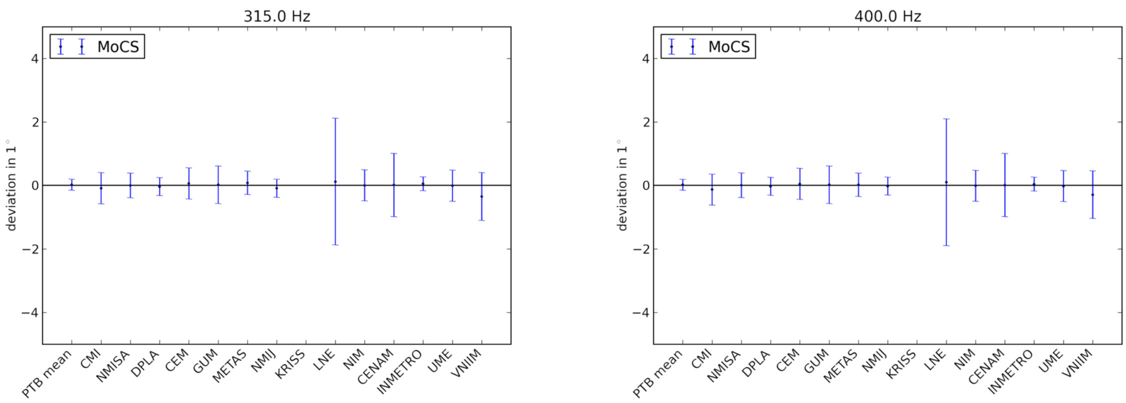

Figure 8.29: Deviation of the phase for the frequencies 315.0 Hz and 400.0 Hz for the SE.

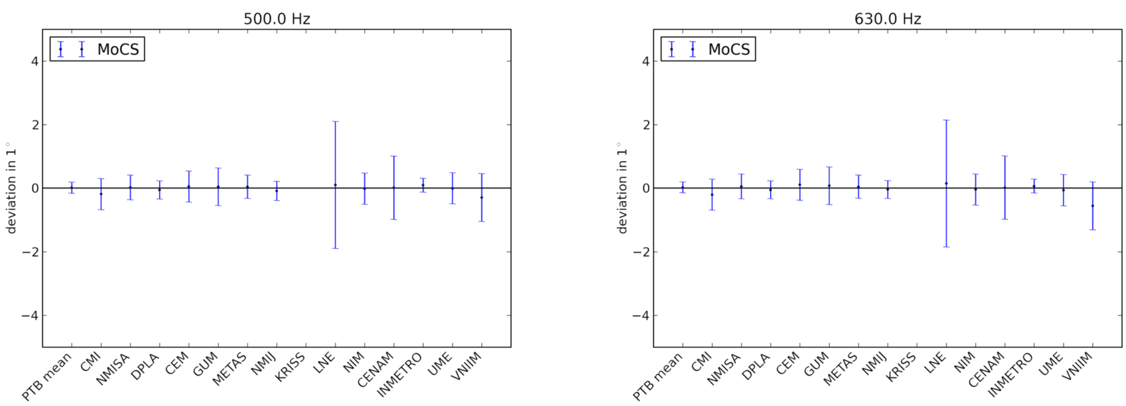

Figure 8.30: Deviation of the phase for the frequencies 500.0 Hz and 630.0 Hz for the SE.

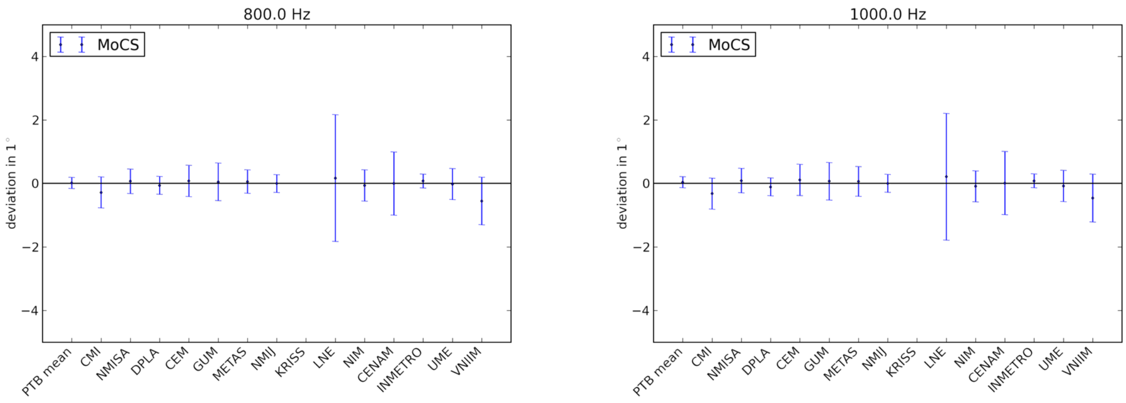

Figure 8.31: Deviation of the phase for the frequencies 800.0 Hz and 1000.0 Hz for the SE.

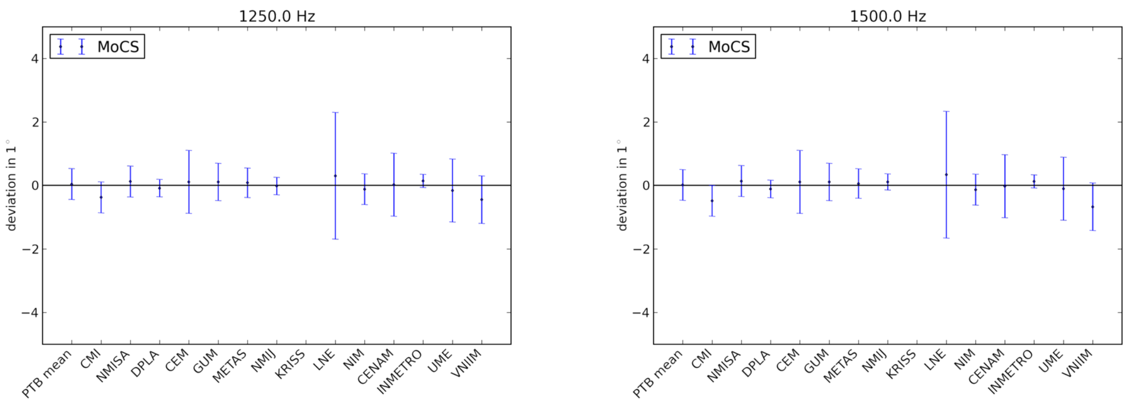

Figure 8.32: Deviation of the phase for the frequencies 1250.0 Hz and 1500.0 Hz for the SE.

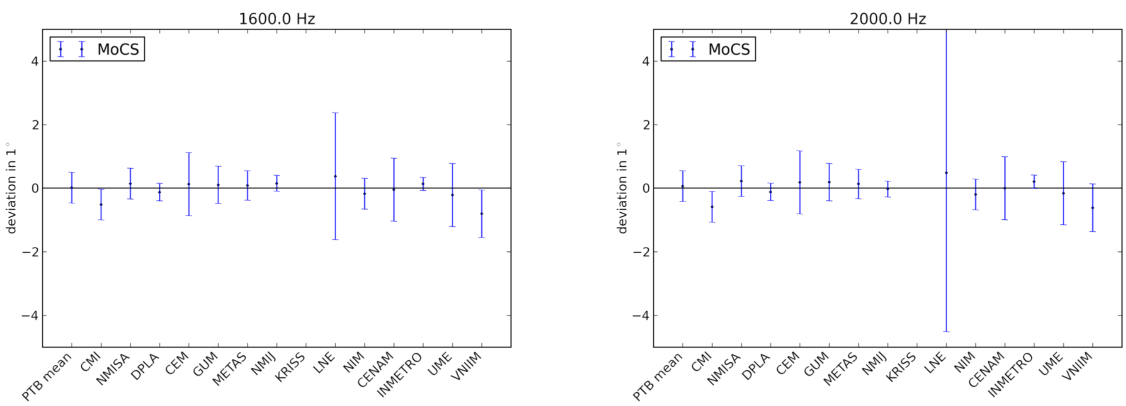

Figure 8.33: Deviation of the phase for the frequencies 1600.0 Hz and 2000.0 Hz for the SE.

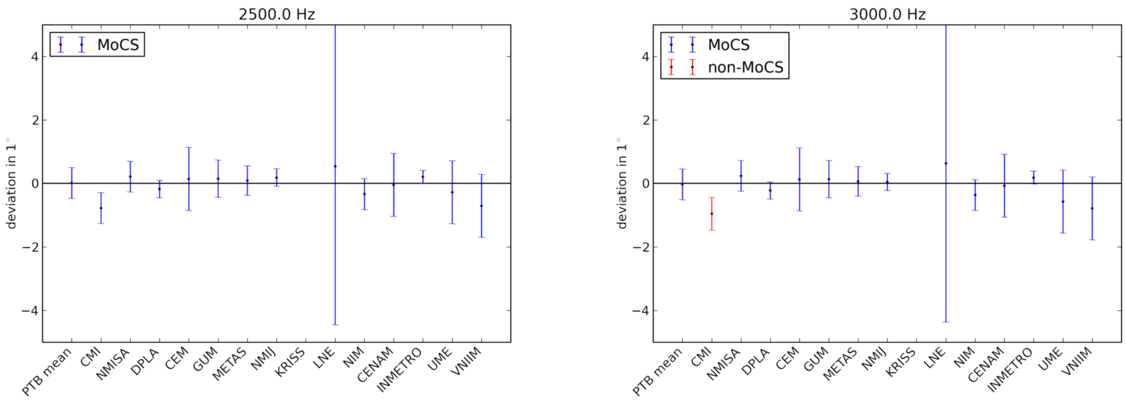

Figure 8.34: Deviation of the phase for the frequencies 2500.0 Hz and 3000.0 Hz for the SE.

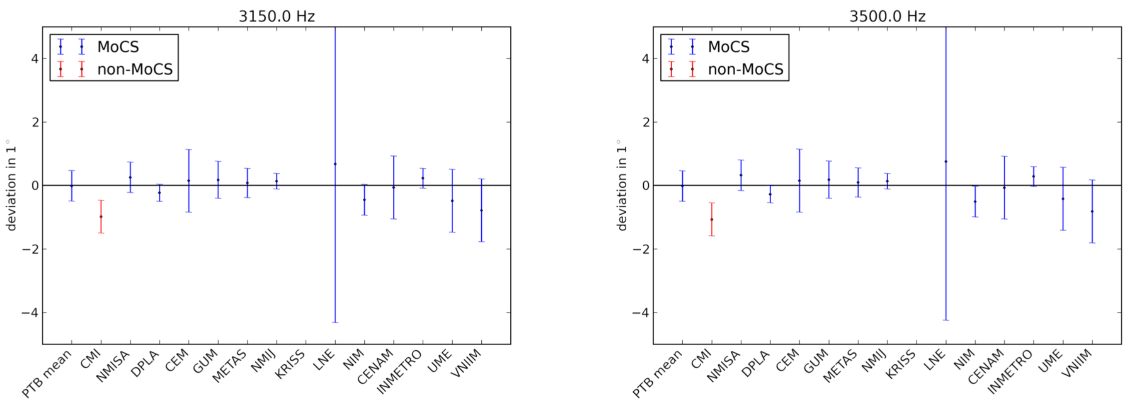

Figure 8.35: Deviation of the phase for the frequencies 3150.0 Hz and 3500.0 Hz for the SE.

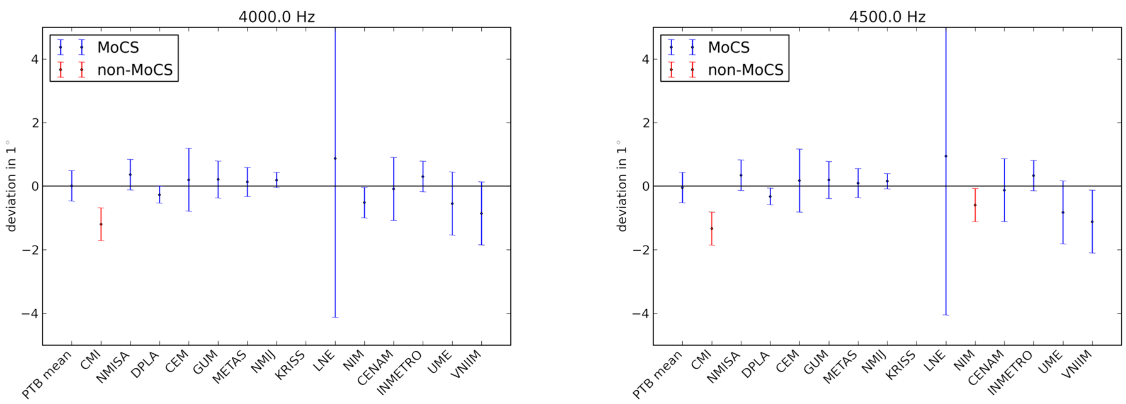

Figure 8.36: Deviation of the phase for the frequencies 4000.0 Hz and 4500.0 Hz for the SE.

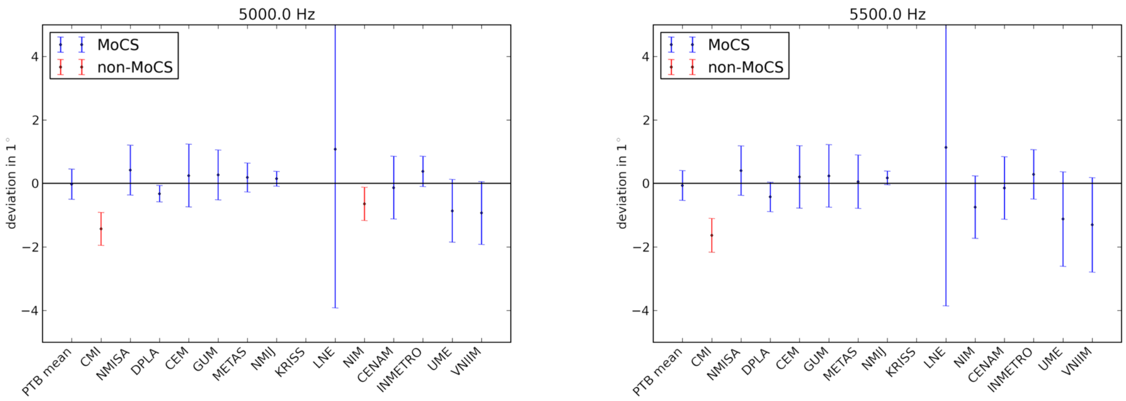

Figure 8.37: Deviation of the phase for the frequencies 5000.0 Hz and 5500.0 Hz for the SE.

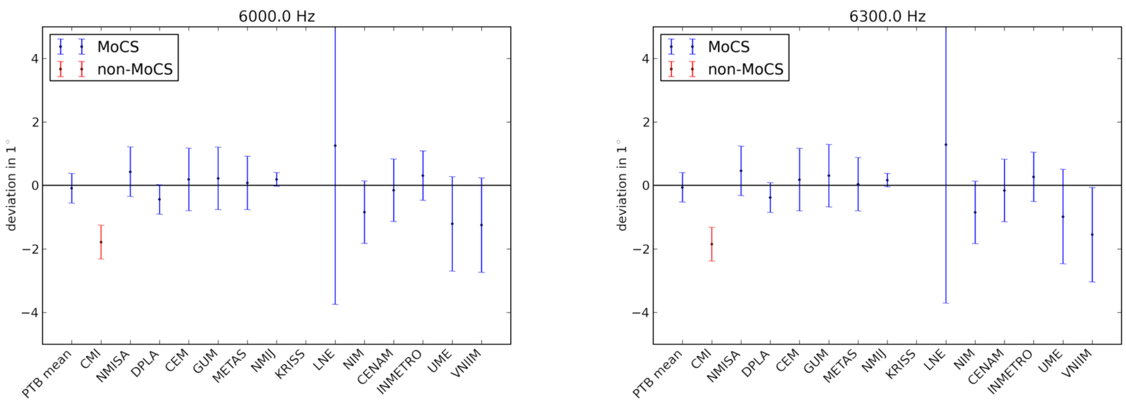

Figure 8.38: Deviation of the phase for the frequencies 6000.0 Hz and 6300.0 Hz for the SE.

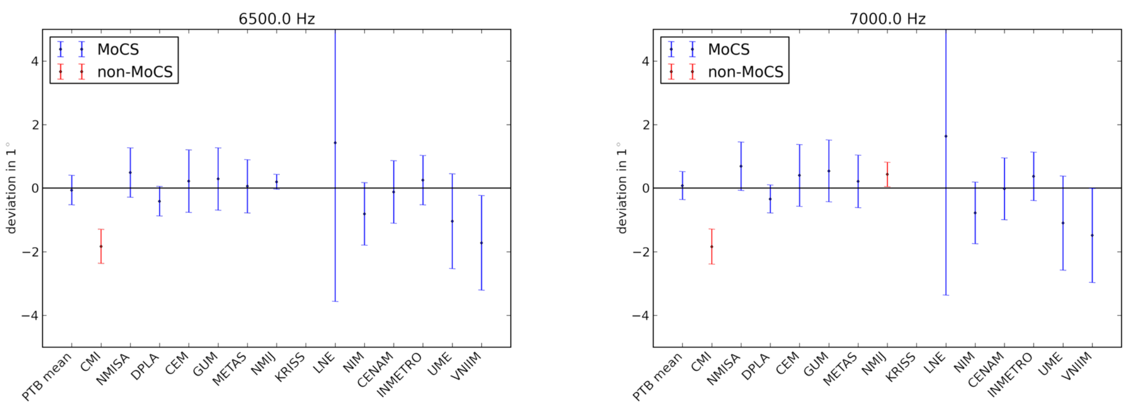

Figure 8.39: Deviation of the phase for the frequencies 6500.0 Hz and 7000.0 Hz for the SE.

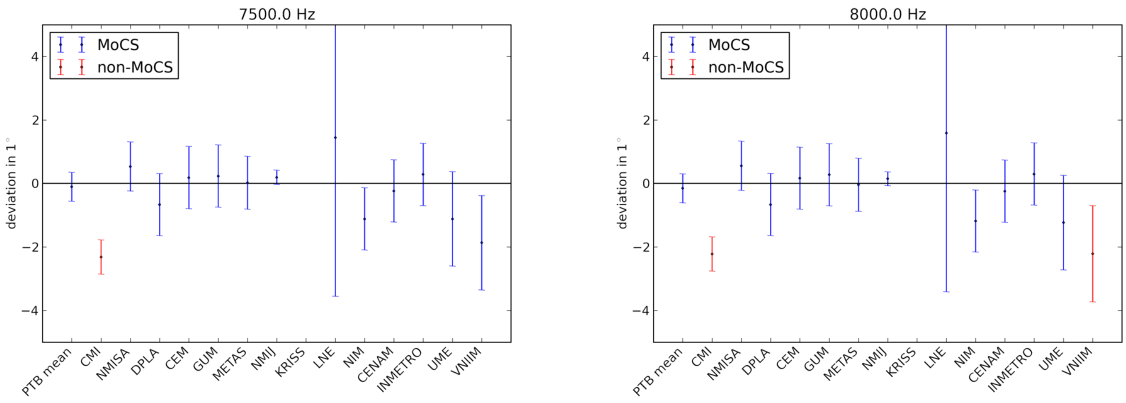

Figure 8.40: Deviation of the phase for the frequencies 7500.0 Hz and 8000.0 Hz for the SE.

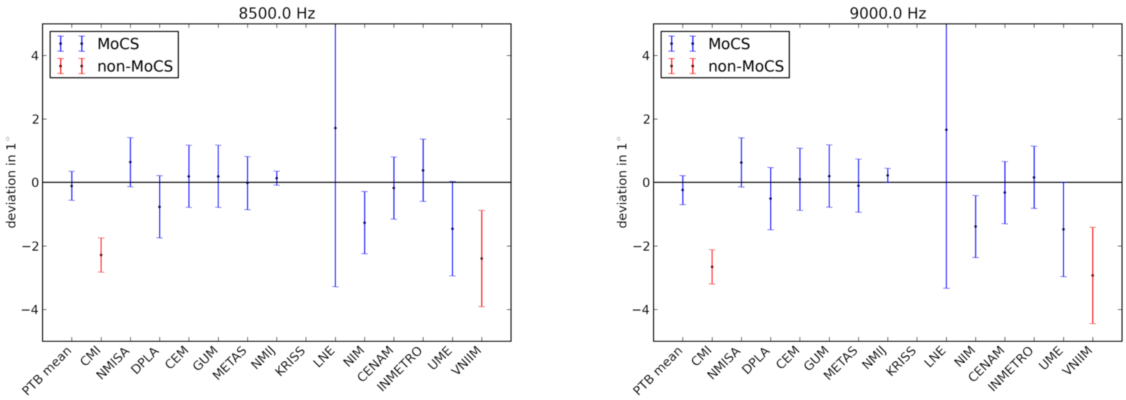

Figure 8.41: Deviation of the phase for the frequencies 8500.0 Hz and 9000.0 Hz for the SE.

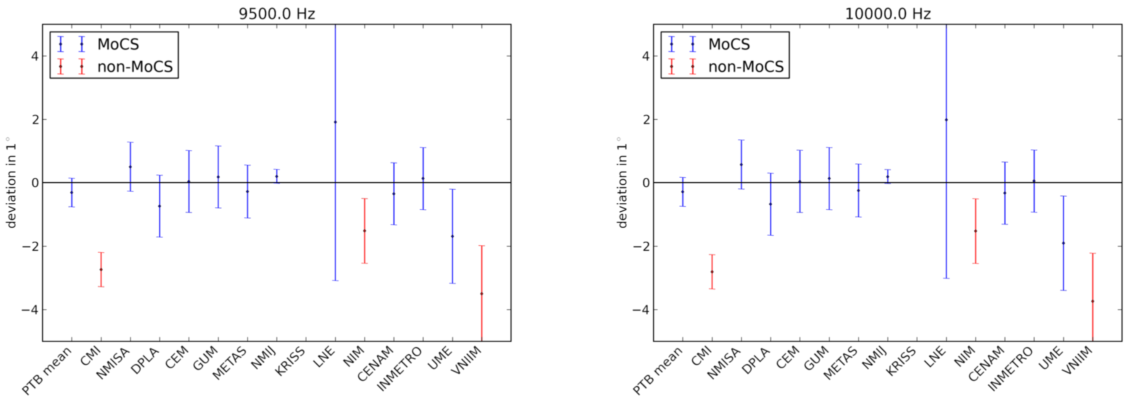

Figure 8.42: Deviation of the phase for the frequencies 9500.0 Hz and 10000.0 Hz for the SE.

8.3 Phase of the Complex Sensitivity of the BB

The phase of the BB was evaluated wrapped by multiples of 180° because some participants reported values in the order of −180°, some 0°, and some in the order of 180°. As this ambiguity is more a question of convention rather than technical expertise, all results were wrapped to 180° before the analysis. Note, however, that the phase of a BB-sensor is by principle in the order of ±180° because the charge output has opposite sign, compared to the SE.

Table 8.3: Unilateral degrees of equivalence for the phase of the BB.

f	KCRV		PTB mean		CMI		NMISA		DPLA		CEM	
in	x_{KC}	U_{KC}	D_i	U_{D_i}	D_i	U_{D_i}	D_i	U_{D_i}	D_i	U_{D_i}	D_i	U_{D_i}
Hz	in °		in °		in °		in °		in °		in °	
10	180.060	0.107	-0.03	0.17	-0.07	0.49	0.01	0.39	-0.11	0.28	-0.06	0.49
12.5	180.010	0.106	-0.06	0.17	-0.04	0.49	0.04	0.39	-0.05	0.28	-0.01	0.49
16	180.012	0.105	-0.02	0.17	-0.04	0.49	0.02	0.39	-0.04	0.28	-0.01	0.49
20	180.030	0.101	0.01	0.17	-0.07	0.49	-0.00	0.39	-0.05	0.28	-0.03	0.49
25	180.001	0.099	-0.05	0.17	-0.02	0.49	0.01	0.39	-0.03	0.28	-0.00	0.49
31.5	180.005	0.102	-0.04	0.17	-0.03	0.49	0.01	0.39	-0.03	0.28	-0.01	0.49
40	180.004	0.100	-0.05	0.17	-0.01	0.49	0.04	0.39	-0.01	0.28	-0.00	0.49
63	179.992	0.102	-0.06	0.17	-0.01	0.49	0.06	0.39	-0.00	0.28	0.01	0.49
80	179.993	0.102	-0.03	0.17	-0.03	0.49	0.07	0.39	-0.01	0.28	0.01	0.49
100	179.997	0.102	0.00	0.17	-0.05	0.49	0.06	0.39	-0.02	0.28	0.00	0.49
125	179.995	0.102	-0.01	0.17	-0.04	0.49	0.06	0.39	-0.01	0.28	0.01	0.49
160	179.989	0.103	-0.02	0.17	-0.02	0.49	0.07	0.39	-0.02	0.28	0.01	0.49
200	179.989	0.103	-0.02	0.17	-0.05	0.49	0.08	0.39	0.00	0.28	0.01	0.49
250	179.989	0.103	0.00	0.17	-0.08	0.49	0.08	0.39	-0.02	0.28	0.01	0.49
315	179.970	0.085	0.01	0.18	-0.09	0.49	0.10	0.39	0.00	0.29	0.03	0.49
400	179.954	0.089	0.04	0.18	-0.12	0.49	0.11	0.39	-0.00	0.29	0.05	0.49
500	179.939	0.089	0.04	0.18	-0.14	0.49	0.13	0.39	0.00	0.29	0.06	0.49
630	179.946	0.085	0.03	0.18	-0.19	0.49	0.11	0.39	-0.03	0.29	0.05	0.49
800	179.949	0.089	0.02	0.18	-0.23	0.49	0.09	0.39	-0.05	0.29	0.05	0.49
1000	179.930	0.085	0.04	0.18	-0.30	0.49	0.10	0.39	-0.03	0.29	0.07	0.49
1250	179.906	0.096	0.03	0.49	-0.36	0.49	0.10	0.49	-0.04	0.28	0.09	1.00
1500	179.968	0.089	0.00	0.49	-0.52	0.49	0.03	0.49	-0.11	0.29	0.03	1.00
1600	179.951	0.096	-0.01	0.49	-0.52	0.49	0.05	0.49	-0.10	0.28	0.15	1.00
2000	179.946	0.097	-0.05	0.49	-0.68	0.49	0.02	0.49	-0.14	0.28	0.15	1.00
2500	179.963	0.099	-0.10	0.49	-0.84*	0.51*	-0.01	0.49	-0.20	0.28	0.14	1.00
3000	179.983	0.099	-0.11	0.49	-1.05*	0.51*	-0.05	0.49	-0.26	0.28	0.12	1.00
3150	179.945	0.110	-0.09	0.49	-1.09*	0.51*	-0.03	0.49	-0.24	0.28	0.15	0.99
3500	179.916	0.116	-0.09	0.49	-1.16*	0.51*	0.01	0.49	-0.24	0.28	0.18	0.99
4000	179.868	0.126	-0.05	0.48	-1.31*	0.52*	0.02	0.48	-0.22	0.27	0.23	0.99
4500	179.927	0.097	-0.12	0.49	-1.53*	0.51*	-0.07	0.49	-0.33	0.28	0.17	1.00
5000	179.868	0.099	-0.10	0.49	-1.63*	0.51*	-0.03	0.79	-0.32	0.28	0.23	1.00
5500	179.958	0.107	-0.19	0.49	-1.86*	0.51*	-0.13	0.79	-0.45	0.49	0.14	0.99
6000	179.967	0.107	-0.11	0.49	-2.08*	0.51*	-0.15	0.79	-0.52	0.49	0.13	0.99
6300	179.975	0.107	-0.29	0.49	-2.13*	0.51*	-0.15	0.79	-0.56	0.49	0.13	0.99
6500	179.969	0.107	-0.10	0.49	-2.32*	0.51*	-0.14	0.79	-0.56	0.49	0.23	0.99
7000	179.704	0.240	0.05	0.44	-2.15*	0.55*	0.17	0.76	-0.31	0.44	0.50	0.97
7500	179.984	0.125	-0.28	0.48	-2.56*	0.52*	-0.21	0.79	-0.70	0.99	0.12	0.99
8000	179.715	0.278	-0.03	0.42	-2.59*	0.57*	-0.11	0.75	-0.46	0.96	0.28	0.96
8500	179.978	0.110	-0.34	0.49	-2.98*	0.51*	-0.42	0.79	-0.80	0.99	0.12	0.99
9000	180.056	0.110	-0.39	0.49	-3.28*	0.51*	0.45	0.79	-0.84	0.99	0.14	0.99
9500	180.003	0.110	-0.41	0.49	-3.39*	0.51*	0.46	0.79	-0.85	0.99	0.10	0.99
10000	179.586	0.294	-0.02	0.40	-3.17*	0.58*	0.17	0.74	-0.38	0.96	1.21	1.98

(continued) Unilateral degrees of equivalence for the phase of the BB.

f in Hz	KCRV X_{KC} in °	U_{KC}	GUM D_i in °	U_{D_i}	METAS D_i in °	U_{D_i}	NMIJ D_i in °	U_{D_i}	KRISS D_i in °	U_{D_i}	LNE D_i in °	U_{D_i}
10	180.060	0.107	-0.06	0.69	0.23	0.39	-0.12	0.77			-0.39	2.00
12.5	180.010	0.106	-0.02	0.69	0.03	0.39	-0.04	0.69			-0.13	2.00
16	180.012	0.105	-0.02	0.69	0.01	0.39	-0.03	0.47			-0.18	2.00
20	180.030	0.101	-0.07	0.59	-0.02	0.37	-0.07	0.30			-0.21	2.00
25	180.001	0.099	-0.04	0.59	0.01	0.37	-0.02	0.26			-0.16	2.00
31.5	180.005	0.102	-0.06	0.59	0.00	0.37	-0.05	0.35			-0.14	2.00
40	180.004	0.100	-0.06	0.59	0.01	0.37	-0.00	0.28			-0.08	2.00
63	179.992	0.102	-0.05	0.59	-0.03	0.37	-0.02	0.32			0.08	2.00
80	179.993	0.102	-0.04	0.59	-0.04	0.37	-0.01	0.32			0.19	2.00
100	179.997	0.102	-0.05	0.59	0.00	0.37	-0.06	0.37			0.08	2.00
125	179.995	0.102	-0.03	0.59	0.01	0.37	-0.04	0.37			0.07	2.00
160	179.989	0.103	-0.05	0.59	0.00	0.37	-0.04	0.39			0.12	2.00
200	179.989	0.103	-0.01	0.59	0.01	0.37	-0.06	0.41			0.07	2.00
250	179.989	0.103	-0.01	0.59	0.02	0.37	-0.06	0.43			0.07	2.00
315	179.970	0.085	0.02	0.59	0.04	0.37	-0.03	0.11			0.14	2.00
400	179.954	0.089	0.05	0.59	0.05	0.37	-0.05	0.13			0.14	2.00
500	179.939	0.089	0.07	0.59	0.07	0.37	-0.09	0.13			0.15	2.00
630	179.946	0.085	0.07	0.59	0.06	0.37	-0.04	0.11			0.19	2.00
800	179.949	0.089	0.06	0.59	0.06	0.37	-0.02	0.13			0.20	2.00
1000	179.930	0.085	0.09	0.59	0.06	0.47	-0.03	0.11			0.24	2.00
1250	179.906	0.096	0.12	0.59	0.08	0.47	-0.02	0.10			0.33	2.00
1500	179.968	0.089	0.07	0.59	0.02	0.47	0.05	0.08			0.32	2.00
1600	179.951	0.096	0.10	0.59	0.06	0.47	0.05	0.10			0.38	2.00
2000	179.946	0.097	0.12	0.59	0.04	0.47	0.08	0.10			0.43	5.00
2500	179.963	0.099	0.11	0.59	0.03	0.47	0.07	0.10			0.52	5.00
3000	179.983	0.099	0.10	0.59	-0.00	0.47	0.09	0.10			0.60	5.00
3150	179.945	0.110	0.15	0.59	0.03	0.47	0.11	0.12			0.65	5.00
3500	179.916	0.116	0.17	0.59	0.08	0.47	0.13	0.14			0.73	5.00
4000	179.868	0.126	0.25	0.59	0.12	0.46	0.16	0.16			0.85	5.00
4500	179.927	0.097	0.23	0.59	0.06	0.47	0.08	0.07			0.90	5.00
5000	179.868	0.099	0.31	0.79	0.16	0.47	0.07	0.07			1.06	5.00
5500	179.958	0.107	0.27	0.99	0.04	0.85	0.06	0.05			1.01	5.00
6000	179.967	0.107	0.24	0.99	0.05	0.85	0.06	0.05			1.13	5.00
6300	179.975	0.107	0.34	0.99	0.03	0.85	0.08	0.05			1.19	5.00
6500	179.969	0.107	0.23	0.99	0.05	0.85	0.06	0.05			1.27	5.00
7000	179.704	0.240	0.62	0.97	0.40	0.83	0.42*	0.28*			1.55	4.99
7500	179.984	0.125	0.22	0.99	0.07	0.85	0.07	0.06			1.46	5.00
8000	179.715	0.278	0.54	0.96	0.60	1.02	0.45*	0.30*			1.84	4.99
8500	179.978	0.110	0.14	0.99	-0.18	1.05	0.06	0.05			1.67	5.00
9000	180.056	0.110	0.12	0.99	0.01	1.05	0.05	0.05			1.71	5.00
9500	180.003	0.110	0.28	0.99	0.17	1.07	0.05	0.05			1.82	5.00
10000	179.586	0.294	0.69	0.96	0.41	1.78	0.62*	0.32*			2.32	4.99

(continued) Unilateral degrees of equivalence for the phase of the BB

f in Hz	KCRV X_{KC} in °	KCRV U_{KC} in °	NIM D_i in °	NIM U_{D_i} in °	CENAM D_i in °	CENAM U_{D_i} in °	INMETRO D_i in °	INMETRO U_{D_i} in °	UME D_i in °	UME U_{D_i} in °	VNIIM D_i in °	VNIIM U_{D_i} in °
10	180.060	0.107	0.14	0.49	-0.06	0.99	-0.07	0.21	0.02	0.49	2.06	0.99
12.5	180.010	0.106	0.15	0.49	-0.19	0.99	-0.02	0.22	0.05	0.49	1.70	0.99
16	180.012	0.105	0.11	0.49	-0.08	0.99	-0.03	0.22	0.01	0.49	1.44	0.99
20	180.030	0.101	0.07	0.49	-0.13	0.99	-0.04	0.22	0.01	0.49	1.34	0.75
25	180.001	0.099	0.08	0.49	-0.01	1.00	-0.01	0.22	-0.08	0.49	1.26	0.75
31.5	180.005	0.102	0.06	0.49	-0.07	0.99	-0.02	0.22	-0.08	0.49	1.18	0.75
40	180.004	0.100	0.05	0.49	-0.09	0.99	-0.01	0.22	-0.01	0.49	1.01	0.75
63	179.992	0.102	0.03	0.49	-0.05	0.99	-0.00	0.22	0.04	0.49	0.91	0.75
80	179.993	0.102	0.04	0.49	-0.05	0.99	-0.00	0.22	-0.00	0.49	0.66	0.75
100	179.997	0.102	0.01	0.49	-0.04	0.99	-0.01	0.22	-0.02	0.49	0.29	0.75
125	179.995	0.102	0.01	0.49	-0.02	0.99	0.01	0.22	0.02	0.49	0.33	0.75
160	179.989	0.103	0.00	0.49	0.00	0.99	0.02	0.22	-0.03	0.49	0.22	0.75
200	179.989	0.103	-0.01	0.49	-0.03	0.99	0.02	0.22	0.00	0.49	0.04	0.75
250	179.989	0.103	-0.01	0.49	-0.05	0.99	0.02	0.22	-0.03	0.49	-0.04	0.75
315	179.970	0.085	0.00	0.49	-0.01	1.00	0.04	0.22	-0.01	0.49	-0.10	0.76
400	179.954	0.089	0.01	0.49	0.02	1.00	0.05	0.22	-0.02	0.49	-0.18	0.75
500	179.939	0.089	0.01	0.49	0.02	1.00	0.09	0.22	0.00	0.49	-0.22	0.75
630	179.946	0.085	-0.05	0.49	0.00	1.00	0.06	0.22	0.00	0.49	-0.29	0.76
800	179.949	0.089	-0.06	0.49	0.00	1.00	0.07	0.22	-0.05	0.49	-0.30	0.75
1000	179.930	0.085	-0.09	0.49	0.03	1.00	0.08	0.22	0.01	0.49	-0.33	0.76
1250	179.906	0.096	-0.12	0.49	0.01	1.00	0.15	0.22	-0.17	1.00	-0.47	0.75
1500	179.968	0.089	-0.21	0.49	-0.06	1.00	0.08	0.22	-0.19	1.00	-0.74	0.75
1600	179.951	0.096	-0.19	0.49	-0.05	1.00	0.12	0.22	-0.08	1.00	-0.80	0.75
2000	179.946	0.097	-0.22	0.49	-0.10	1.00	0.12	0.22	-0.36	1.00	-0.91	0.75
2500	179.963	0.099	-0.37	0.49	-0.13	1.00	0.11	0.22	-0.48	1.00	-1.05	1.00
3000	179.983	0.099	-0.44	0.49	-0.16	1.00	0.13	0.22	-0.34	1.00	-1.17	1.00
3150	179.945	0.110	-0.45	0.49	-0.12	0.99	0.17	0.32	-0.60	0.99	-1.20	0.99
3500	179.916	0.116	-0.44	0.49	-0.10	0.99	0.16	0.32	-0.62	0.99	-1.25	0.99
4000	179.868	0.126	-0.52	0.48	-0.11	0.99	0.27	0.48	-0.69	0.99	-1.24	0.99
4500	179.927	0.097	-0.64	0.49	-0.21	1.00	0.20	0.49	-0.62	1.00	-1.60*	1.00*
5000	179.868	0.099	-0.69	0.49	-0.14	1.00	0.30	0.49	-0.78	1.00	-1.43*	1.00*
5500	179.958	0.107	-0.83	0.99	-0.29	0.99	0.17	0.79	-0.79	1.50	-1.92	1.50
6000	179.967	0.107	-0.91	0.99	-0.32	0.99	0.14	0.79	-0.94	1.50	-1.68	1.50
6300	179.975	0.107	-0.99	0.99	-0.27	0.99	0.23	0.79	-0.89	1.50	-1.75	1.50
6500	179.969	0.107	-1.02	0.99	-0.26	0.99	0.32	0.79	-0.91	1.50	-1.81	1.50
7000	179.704	0.240	-0.73	0.97	-0.00	0.97	0.63	0.76	-0.95	1.48	-1.61	1.48
7500	179.984	0.125	-1.08	0.99	-0.33	0.99	0.28	0.99	-1.20	1.49	-2.15*	1.51*
8000	179.715	0.278	-0.79	0.96	-0.07	0.96	0.70	0.96	-1.30	1.47	-2.34*	1.53*
8500	179.978	0.110	-1.13	0.99	-0.37	0.99	0.57	0.99	-1.71	1.50	-2.46*	1.50*
9000	180.056	0.110	-1.22	0.99	-0.45	0.99	0.01	0.99	-1.67	1.50	-4.48*	1.50*
9500	180.003	0.110	-1.23	0.99	-0.40	0.99	0.25	0.99	-1.48	1.50	-3.14*	1.50*
10000	179.586	0.294	-1.11	0.96	0.01	0.96	0.75	0.96	-1.61	1.47	-3.42*	1.53*

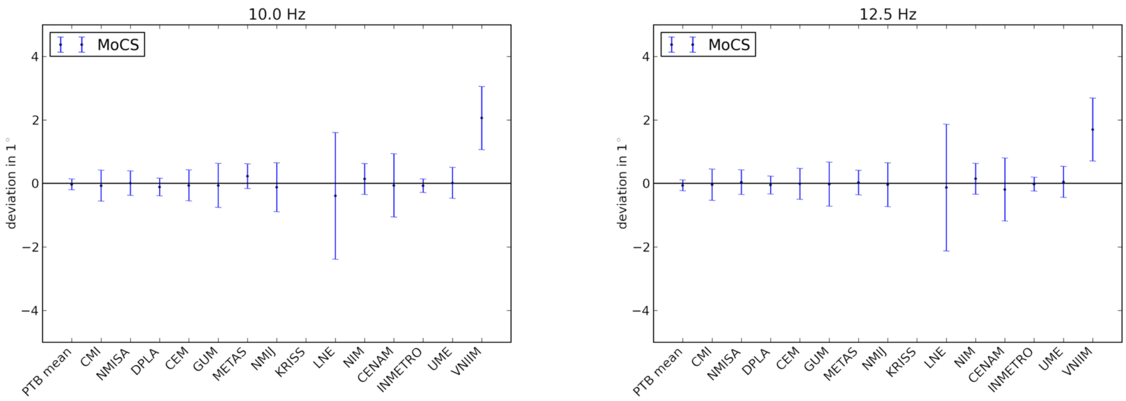

Figure 8.43: Deviation of the phase for the frequencies 10.0 Hz and 12.5 Hz for the BB.

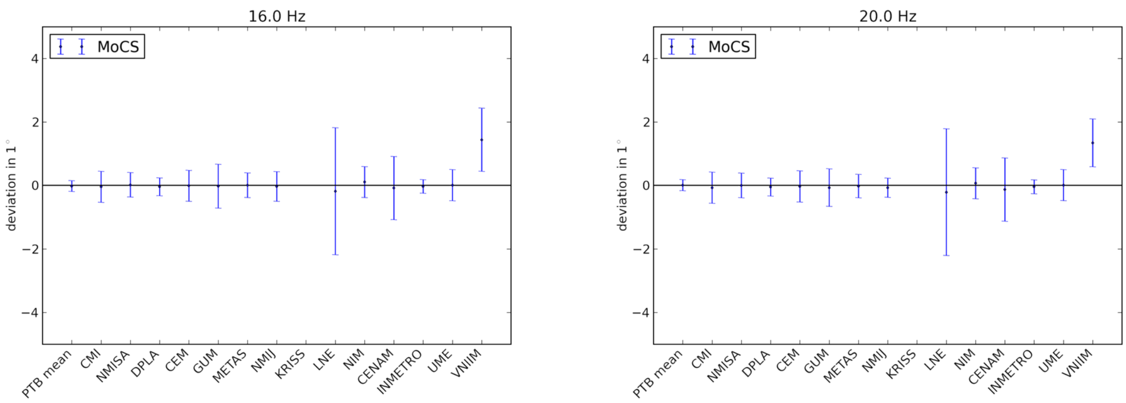

Figure 8.44: Deviation of the phase for the frequencies 16.0 Hz and 20.0 Hz for the BB.

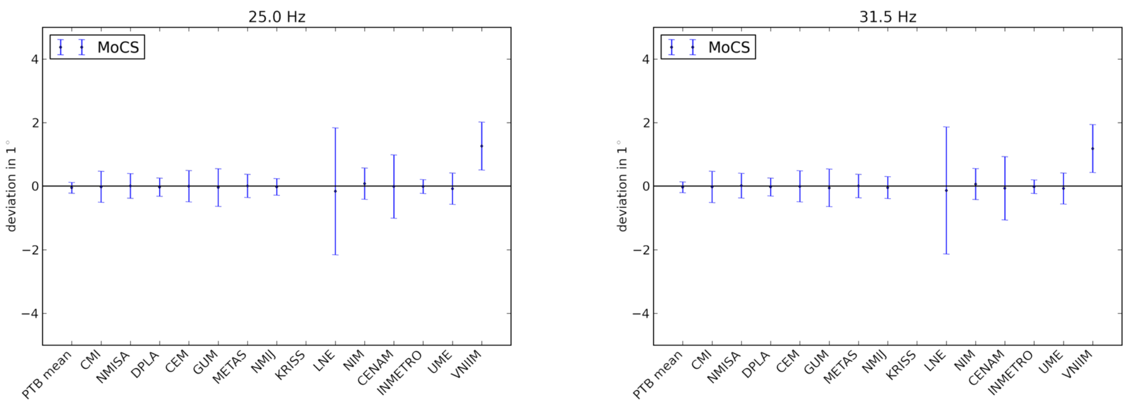

Figure 8.45: Deviation of the phase for the frequencies 25.0 Hz and 31.5 Hz for the BB.

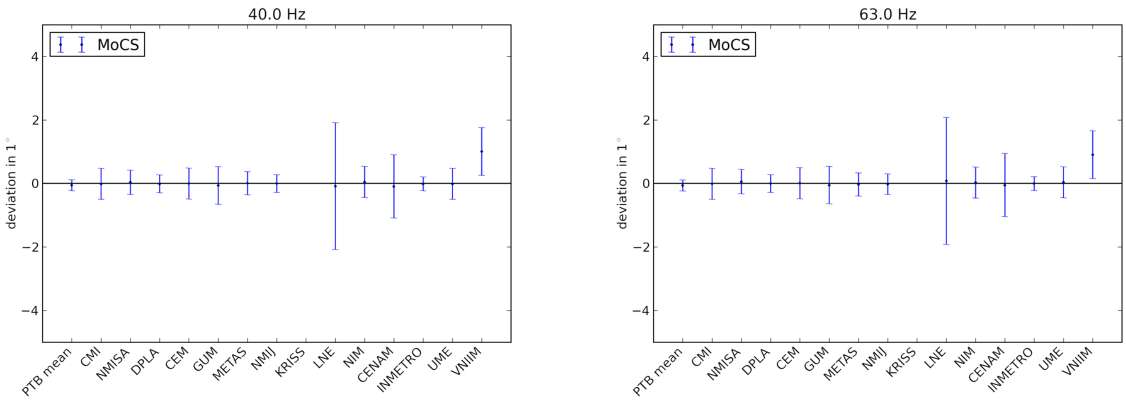

Figure 8.46: Deviation of the phase for the frequencies 40.0 Hz and 63.0 Hz for the BB.

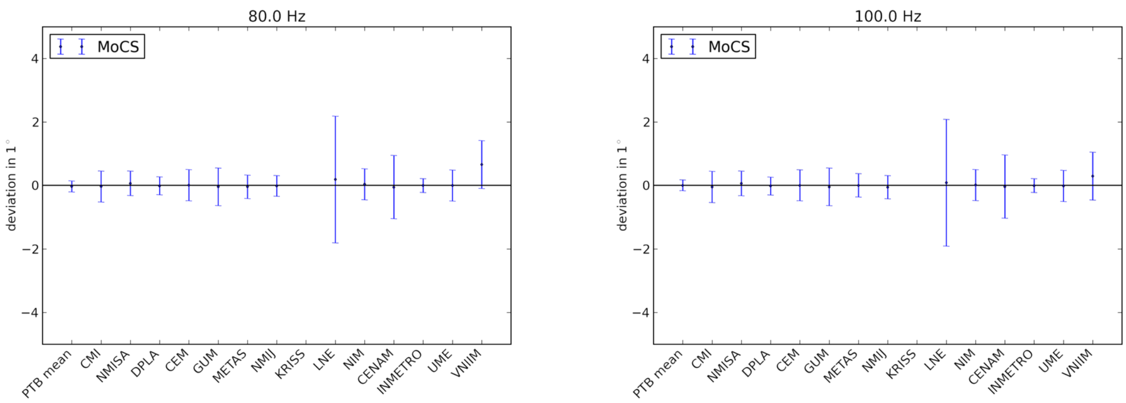

Figure 8.47: Deviation of the phase for the frequencies 80.0 Hz and 100.0 Hz for the BB.

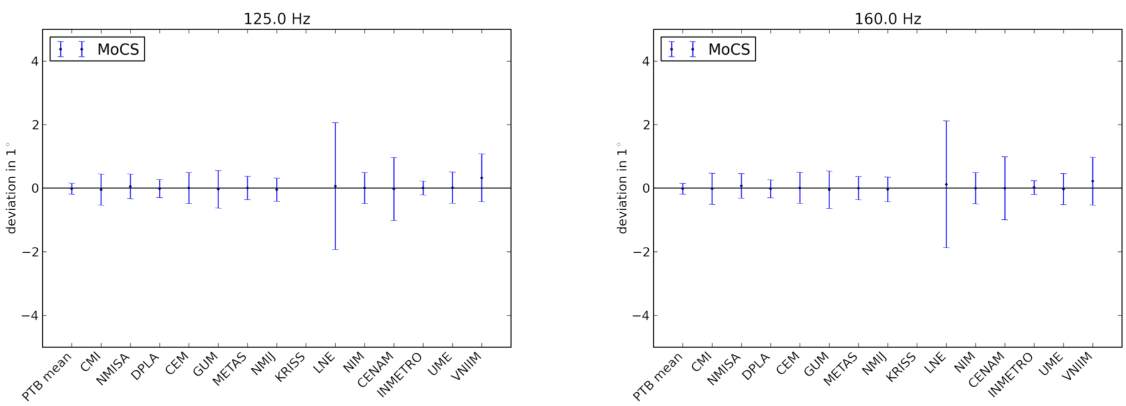

Figure 8.48: Deviation of the phase for the frequencies 125.0 Hz and 160.0 Hz for the BB.

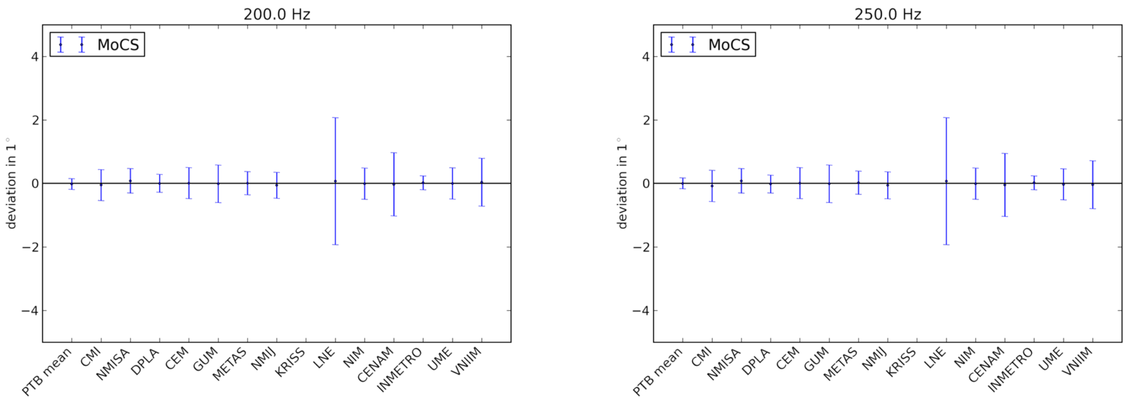

Figure 8.49: Deviation of the phase for the frequencies 200.0 Hz and 250.0 Hz for the BB.

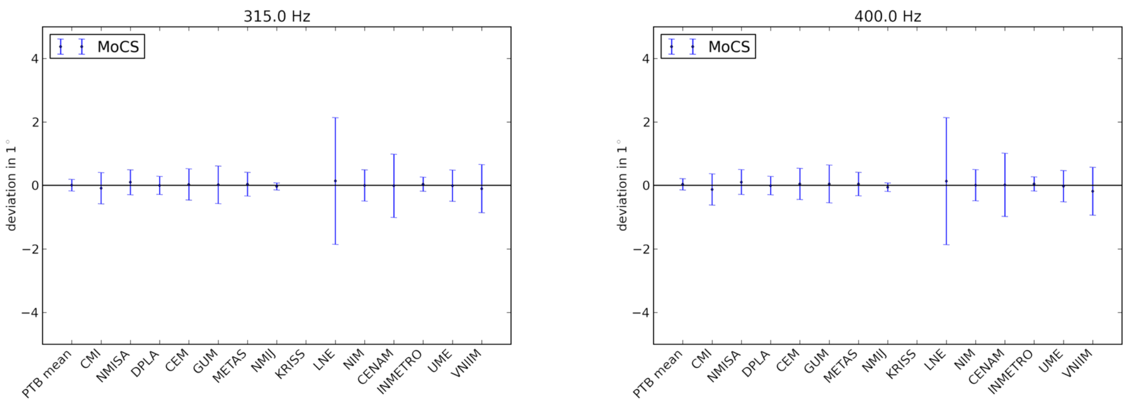

Figure 8.50: Deviation of the phase for the frequencies 315.0 Hz and 400.0 Hz for the BB.

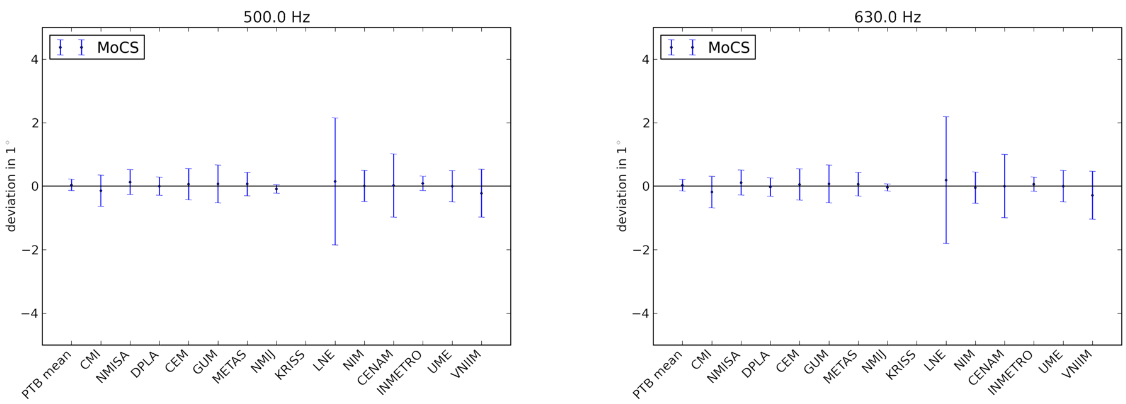

Figure 8.51: Deviation of the phase for the frequencies 500.0 Hz and 630.0 Hz for the BB.

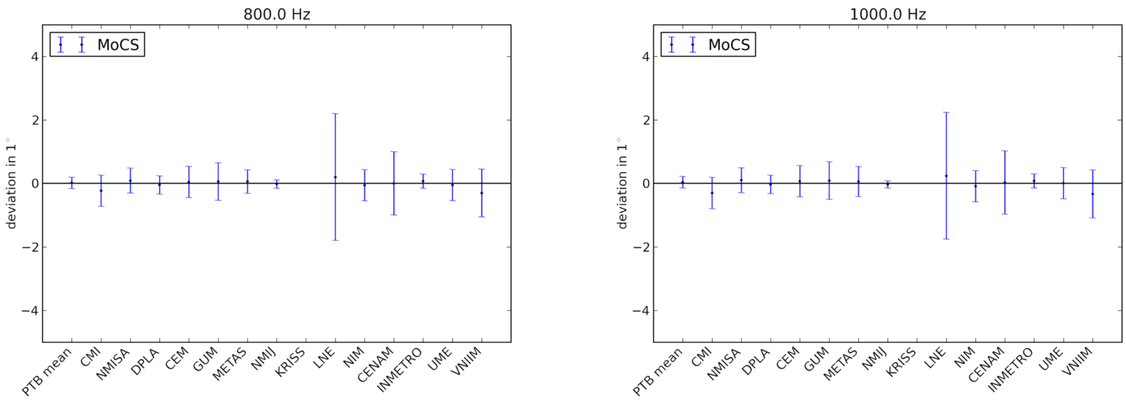

Figure 8.52: Deviation of the phase for the frequencies 800.0 Hz and 1000.0 Hz for the BB.

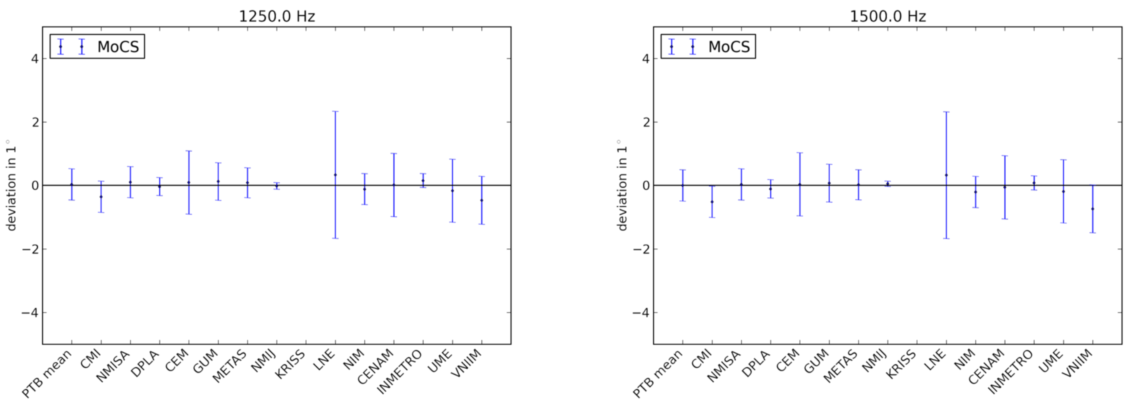

Figure 8.53: Deviation of the phase for the frequencies 1250.0 Hz and 1500.0 Hz for the BB.

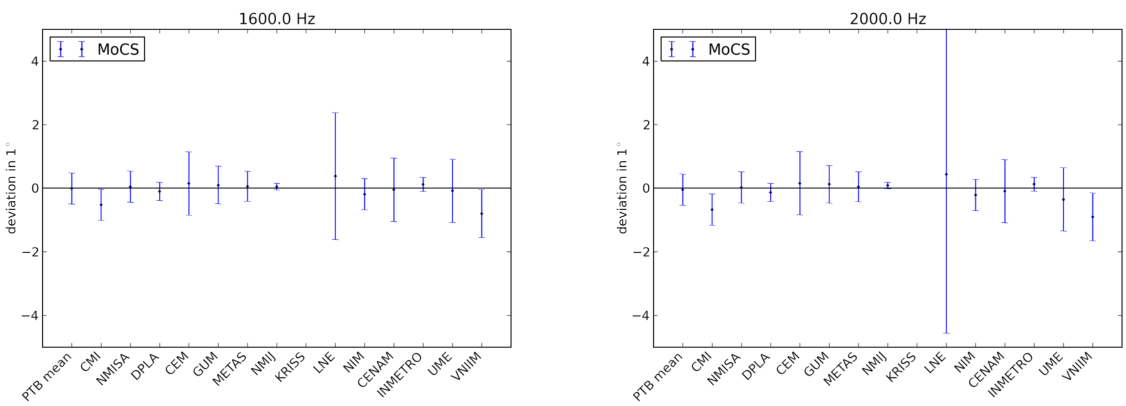

Figure 8.54: Deviation of the phase for the frequencies 1600.0 Hz and 2000.0 Hz for the BB.

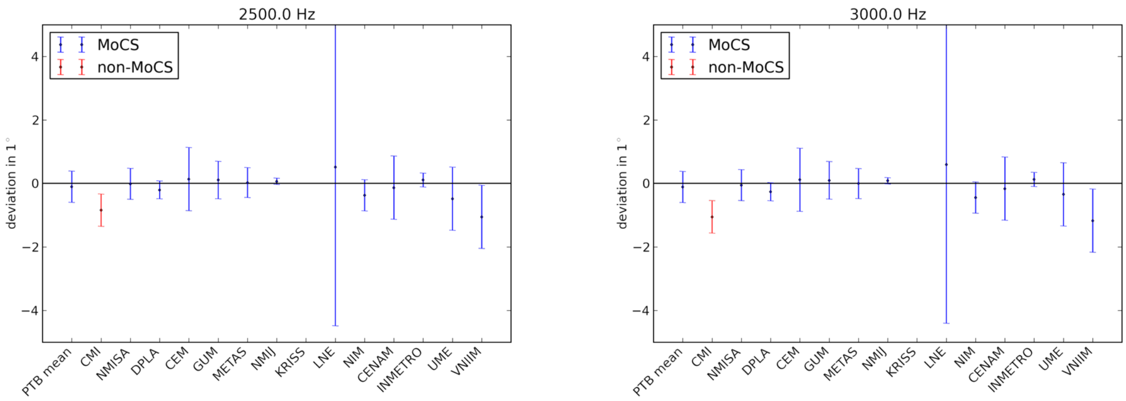

Figure 8.55: Deviation of the phase for the frequencies 2500.0 Hz and 3000.0 Hz for the BB.

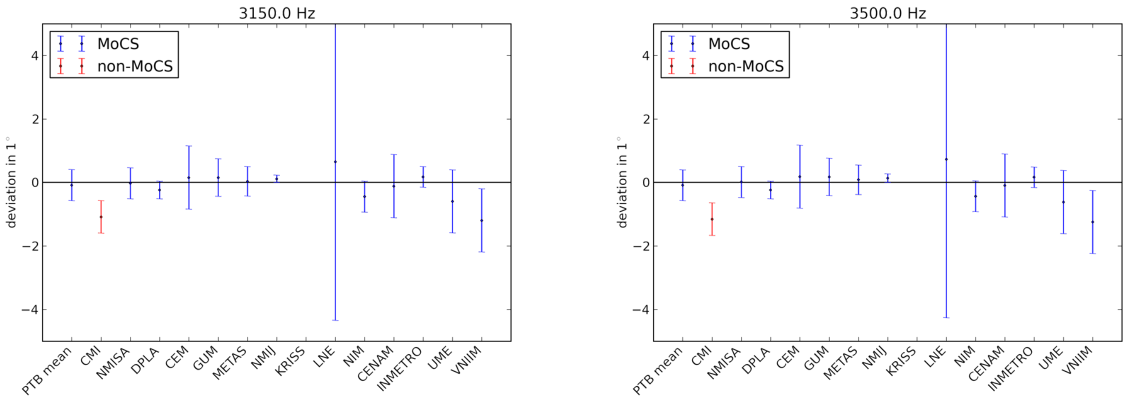

Figure 8.56: Deviation of the phase for the frequencies 3150.0 Hz and 3500.0 Hz for the BB.

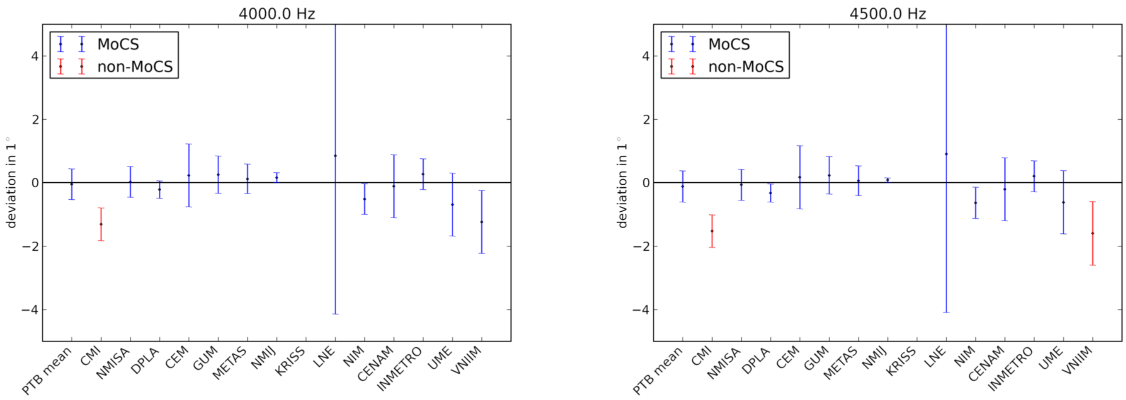

Figure 8.57: Deviation of the phase for the frequencies 4000.0 Hz and 4500.0 Hz for the BB.

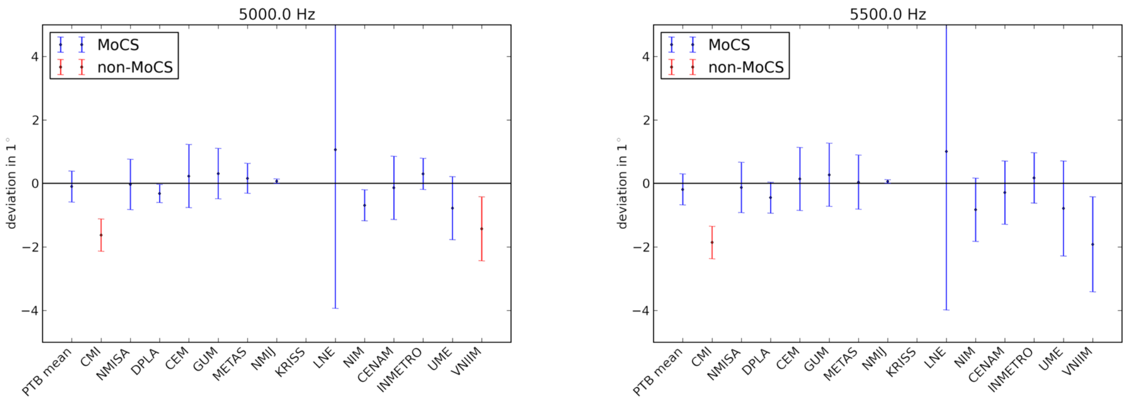

Figure 8.58: Deviation of the phase for the frequencies 5000.0 Hz and 5500.0 Hz for the BB.

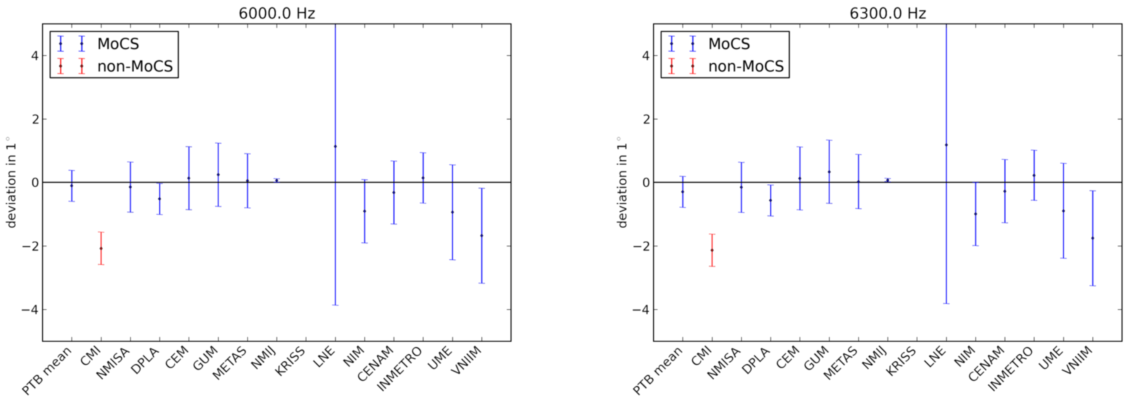

Figure 8.59: Deviation of the phase for the frequencies 6000.0 Hz and 6300.0 Hz for the BB.

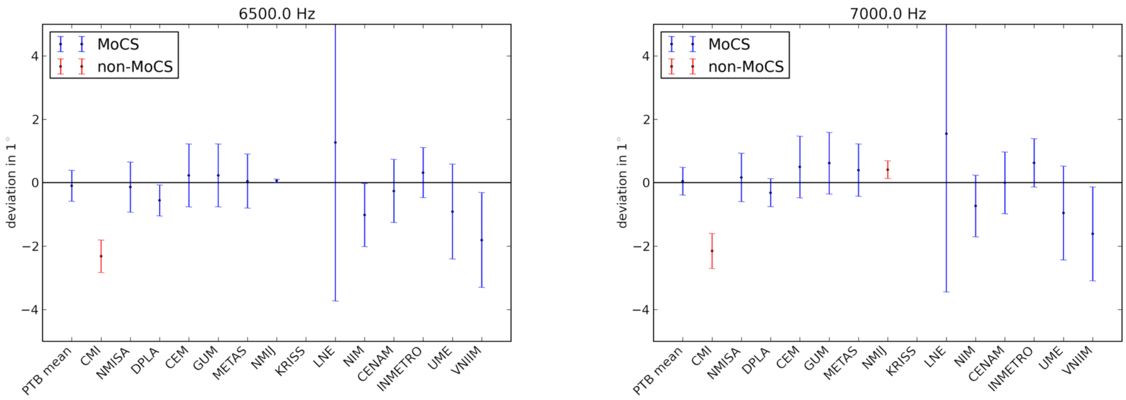

Figure 8.60: Deviation of the phase for the frequencies 6500.0 Hz and 7000.0 Hz for the BB.

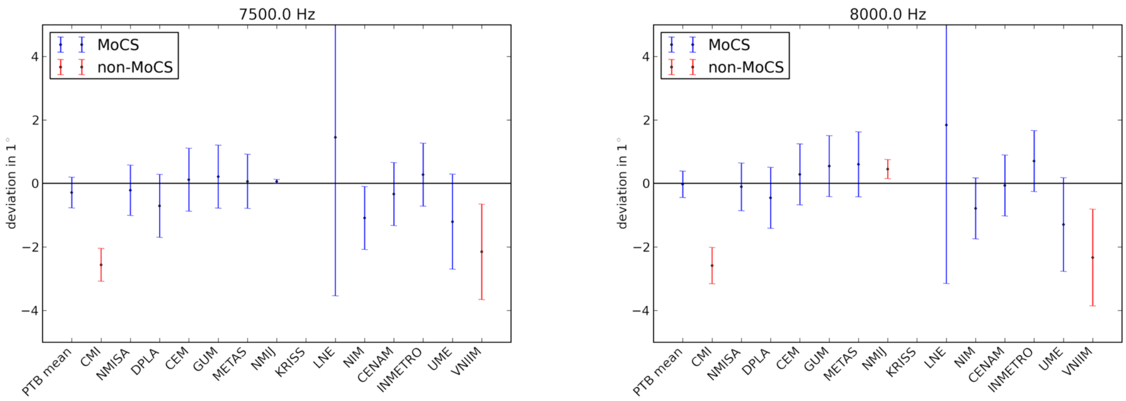

Figure 8.61: Deviation of the phase for the frequencies 7500.0 Hz and 8000.0 Hz for the BB.

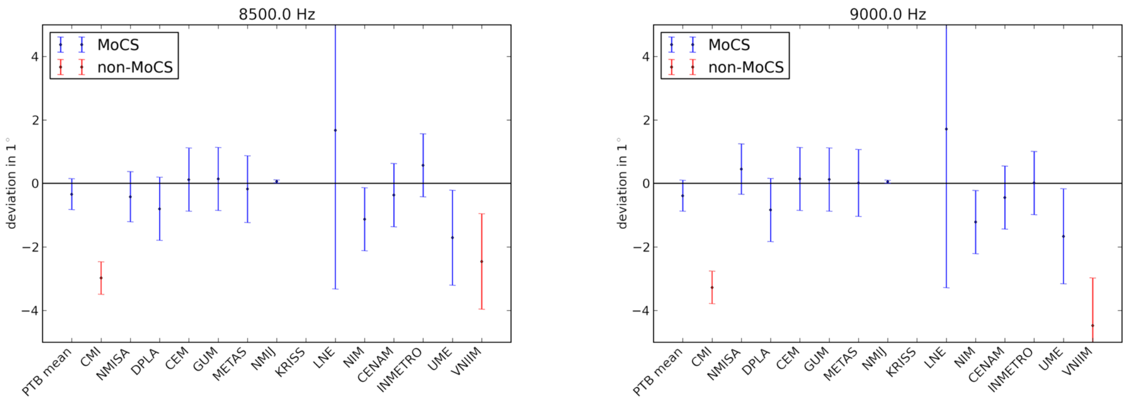

Figure 8.62: Deviation of the phase for the frequencies 8500.0 Hz and 9000.0 Hz for the BB.

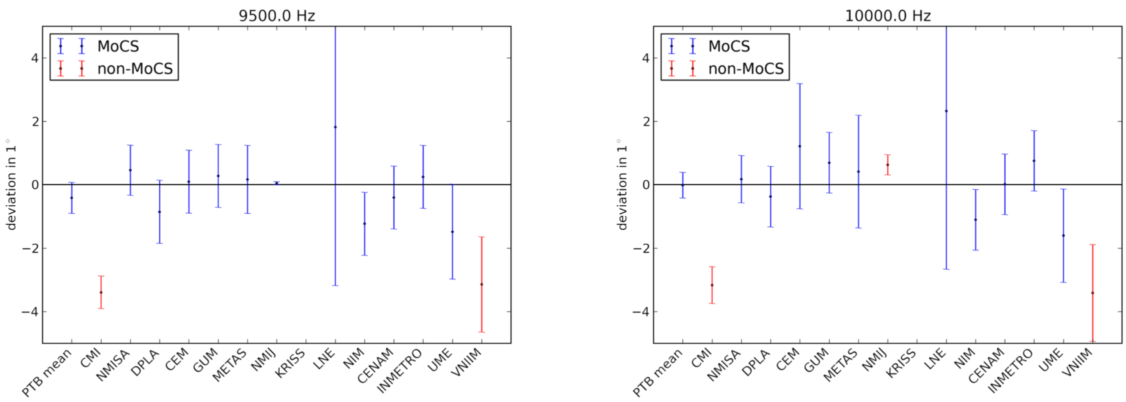

Figure 8.63: Deviation of the phase for the frequencies 9500.0 Hz and 10000.0 Hz for the BB.

9 — Bilateral Degree of Equivalence

9.1 Magnitude of complex sensitivity of the SE

The bilateral degree of equivalence between each two participants is calculated according to

$$D_{i,j}(f) = x_i(f) - x_j(f) \tag{9.1}$$

In order to include the influence of material which is associated with the calibration method and not with the laboratory, it is better to write these as

$$D_{i,j}(f) = D_i(f) - D_j(f) \tag{9.2}$$

Because the unilateral degrees of equivalence include the uncertainty component due to the material effect u_{mat}, the propagated uncertainty in this case is, according to GUM

$$u^2_{D_{i,j}}(f) = u_i^2(f) + u_j^2(f) + 2 \cdot u^2_{\mathrm{mat}}(f) - 2 \cdot cov(D_i, D_j) \tag{9.3}$$

As there is no reliable information about any correlation of D_i and D_j, the covariance term $(cov(D_i, D_j))$is assumed to be zero. The third term in this variance, again, covers the effect of different materials of the shaker armature in the case of single-ended transducer calibration.

The following tables which list the bilateral degrees of equivalence are for two subsequent frequencies each. The lower left triangular set is for the lower frequency noted in the left most column. The upper right triangular set is for the higher frequency noted in the right most column.

Table 9.1: Bilateral degrees of equivalence for the SE at 10.0 Hz and 12.5 Hz

f	j →	PTB mean		CMI		NMISA		DPLA		CEM		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	↓ i	in Hz
	PTB mean			0.7	2.9	-0.9	6.5	0.7	5.3	0.1	5.3	PTB mean	
	CMI	-1.4	2.9			-1.6	6.9	0.0	5.7	-0.6	5.7	CMI	
	NMISA	2.9	6.5	4.3	6.9			1.6	8.2	1.0	8.2	NMISA	
	DPLA	0.7	5.3	2.1	5.7	-2.2	8.2			-0.6	7.2	DPLA	
	CEM	0.4	5.3	1.8	5.7	-2.5	8.2	-0.3	7.2			CEM	
	GUM	2.6	7.8	4.0	8.1	-0.3	10.0	1.9	9.2	2.2	9.2	GUM	
	METAS	4.0	3.1	5.4	3.8	1.1	7.0	3.3	5.8	3.6	5.8	METAS	
10	NMIJ	5.2	17.0	6.6	17.1	2.3	18.1	4.5	17.7	4.8	17.7	NMIJ	12.5
	KRISS	-7.4	5.1	-6.0	5.6	-10.3	8.1	-8.1	7.1	-7.8	7.1	KRISS	
	LNE	0.8	4.0	2.2	4.6	-2.1	7.5	0.1	6.4	0.4	6.4	LNE	
	NIM	0.3	5.3	1.7	5.7	-2.6	8.2	-0.4	7.2	-0.1	7.2	NIM	
	CENAM	0.0	4.0	1.4	4.6	-2.9	7.5	-0.7	6.4	-0.4	6.4	CENAM	
	INMETRO	1.1	3.3	2.5	4.0	-1.8	7.1	0.4	6.0	0.7	6.0	INMETRO	
	UME	2.4	6.5	3.8	6.9	-0.5	9.0	1.7	8.2	2.0	8.2	UME	
	VNIIM	-2.5	12.8	-1.1	13.0	-5.4	14.3	-3.2	13.7	-2.9	13.7	VNIIM	

Bilateral degrees of equivalence for the SE at 10.0 Hz and 12.5 Hz (continued)

f	j →	GUM		METAS		NMIJ		KRISS		LNE		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	↓ i	in Hz
	PTB mean	-2.2	7.8	-3.4	3.1	-3.7	7.5	7.4	4.7	-0.7	4.0	PTB mean	
	CMI	-2.9	8.1	-4.1	3.8	-4.4	7.9	6.7	5.2	-1.4	4.6	CMI	
	NMISA	-1.3	10.0	-2.5	7.0	-2.8	9.8	8.3	7.9	0.2	7.4	NMISA	
	DPLA	-2.9	9.2	-4.1	5.8	-4.4	9.0	6.7	6.9	-1.4	6.4	DPLA	
	CEM	-2.3	9.2	-3.5	5.8	-3.8	9.0	7.3	6.9	-0.8	6.4	CEM	
	GUM			-1.2	8.2	-1.5	10.7	9.6	8.9	1.5	8.6	GUM	
	METAS	1.4	8.2			-0.3	7.9	10.8	5.4	2.7	4.8	METAS	
10	NMIJ	2.6	18.6	1.2	17.2			11.1	8.7	3.0	8.4	NMIJ	12.5
	KRISS	-10.0	9.1	-11.4	5.7	-12.6	17.6			-8.1	6.0	KRISS	
	LNE	-1.8	8.6	-3.2	4.8	-4.4	17.3	8.2	6.3			LNE	
	NIM	-2.3	9.2	-3.7	5.8	-4.9	17.7	7.7	7.1	-0.5	6.4	NIM	
	CENAM	-2.6	8.6	-4.0	4.8	-5.2	17.3	7.4	6.3	-0.8	5.4	CENAM	
	INMETRO	-1.5	8.3	-2.9	4.2	-4.1	17.2	8.5	5.8	0.3	4.9	INMETRO	
	UME	-0.2	10.0	-1.6	7.0	-2.8	18.1	9.8	8.1	1.6	7.5	UME	
	VNIIM	-5.1	14.9	-6.5	13.0	-7.7	21.2	4.9	13.7	-3.3	13.3	VNIIM	

Bilateral degrees of equivalence for the SE at 10.0 Hz and 12.5 Hz (continued)

f	j →	NIM		CENAM		INMETRO		UME		VNIIM		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	↓ i	in Hz
	PTB mean	-0.8	5.3	0.6	4.0	-1.4	3.3	-2.1	6.5	2.5	12.8	PTB mean	
	CMI	-1.5	5.7	-0.1	4.6	-2.1	4.0	-2.8	6.9	1.8	13.0	CMI	
	NMISA	0.1	8.2	1.5	7.4	-0.5	7.1	-1.2	9.0	3.4	14.3	NMISA	
	DPLA	-1.5	7.2	-0.1	6.4	-2.1	6.0	-2.8	8.2	1.8	13.7	DPLA	
	CEM	-0.9	7.2	0.5	6.4	-1.5	6.0	-2.2	8.2	2.4	13.7	CEM	
	GUM	1.4	9.2	2.8	8.6	0.8	8.3	0.1	10.0	4.7	14.9	GUM	
	METAS	2.6	5.8	4.0	4.8	2.0	4.2	1.3	7.0	5.9	13.0	METAS	
10	NMIJ	2.9	9.0	4.3	8.4	2.3	8.0	1.6	9.8	6.2	14.7	NMIJ	12.5
	KRISS	-8.2	6.9	-6.8	6.0	-8.8	5.5	-9.5	7.9	-4.9	13.5	KRISS	
	LNE	-0.1	6.4	1.3	5.4	-0.7	4.9	-1.4	7.5	3.2	13.3	LNE	
	NIM			1.4	6.4	-0.6	6.0	-1.3	8.2	3.3	13.7	NIM	
	CENAM	-0.3	6.4			-2.0	4.9	-2.7	7.5	1.9	13.3	CENAM	
	INMETRO	0.8	6.0	1.1	4.9			-0.7	7.1	3.9	13.1	INMETRO	
	UME	2.1	8.2	2.4	7.5	1.3	7.1			4.6	14.3	UME	
	VNIIM	-2.8	13.7	-2.5	13.3	-3.6	13.1	-4.9	14.3			VNIIM	

Table 9.2: Bilateral degrees of equivalence for the SE at 16.0 Hz and 20.0 Hz

f in Hz	j → / i ↓	PTB mean D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	PTB mean $U_{D_{ij}}$	CMI D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	CMI $U_{D_{ij}}$	NMISA D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	NMISA $U_{D_{ij}}$	DPLA D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	DPLA $U_{D_{ij}}$	CEM D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	CEM $U_{D_{ij}}$	← j / ↓ i	f in Hz
	PTB mean			-0.3	2.9	-3.4	6.5	1.0	5.3	0.8	5.3	PTB mean	
	CMI	-0.7	2.9			-3.1	6.9	1.3	5.7	1.1	5.7	CMI	
	NMISA	2.0	6.5	2.7	6.9			4.4	8.2	4.2	8.2	NMISA	
	DPLA	-1.0	5.3	-0.3	5.7	-3.0	8.2			-0.2	7.2	DPLA	
	CEM	-1.2	5.3	-0.5	5.7	-3.2	8.2	-0.2	7.2			CEM	
	GUM	2.9	7.8	3.6	8.1	0.9	10.0	3.9	9.2	4.1	9.2	GUM	
	METAS	3.1	3.1	3.8	3.8	1.1	7.0	4.1	5.8	4.3	5.8	METAS	
16	NMIJ	1.9	5.5	2.6	5.9	-0.1	8.3	2.9	7.4	3.1	7.4	NMIJ	20
	KRISS	-6.3	4.7	-5.6	5.2	-8.3	7.9	-5.3	6.9	-5.1	6.9	KRISS	
	LNE	0.8	4.0	1.5	4.6	-1.2	7.5	1.8	6.4	2.0	6.4	LNE	
	NIM	1.9	5.3	2.6	5.7	-0.1	8.2	2.9	7.2	3.1	7.2	NIM	
	CENAM	0.2	4.0	0.9	4.6	-1.8	7.5	1.2	6.4	1.4	6.4	CENAM	
	INMETRO	1.1	3.3	1.8	4.0	-0.9	7.1	2.1	6.0	2.3	6.0	INMETRO	
	UME	2.5	6.5	3.2	6.9	0.5	9.0	3.5	8.2	3.7	8.2	UME	
	VNIIM	-2.0	12.8	-1.3	13.0	-4.0	14.3	-1.0	13.7	-0.8	13.7	VNIIM	

Bilateral degrees of equivalence for the SE at 16.0 Hz and 20.0 Hz (continued)

f in Hz	j → / i ↓	GUM D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	GUM $U_{D_{ij}}$	METAS D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	METAS $U_{D_{ij}}$	NMIJ D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	NMIJ $U_{D_{ij}}$	KRISS D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	KRISS $U_{D_{ij}}$	LNE D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	LNE $U_{D_{ij}}$	← j / ↓ i	f in Hz
	PTB mean	-1.9	6.5	-3.0	2.7	-1.9	5.3	8.1	5.4	-1.4	4.0	PTB mean	
	CMI	-1.6	6.9	-2.7	3.5	-1.6	5.7	8.4	5.8	-1.1	4.6	CMI	
	NMISA	1.5	9.0	0.4	6.8	1.5	8.2	11.5	8.2	2.0	7.5	NMISA	
	DPLA	-2.9	8.2	-4.0	5.7	-2.9	7.2	7.1	7.3	-2.4	6.4	DPLA	
	CEM	-2.7	8.2	-3.8	5.7	-2.7	7.2	7.3	7.3	-2.2	6.4	CEM	
	GUM			-1.1	6.8	0.0	8.2	10.0	8.2	0.5	7.5	GUM	
	METAS	0.2	8.2			1.1	5.7	11.1	5.7	1.6	4.5	METAS	
16	NMIJ	-1.0	9.4	-1.2	6.1			10.0	7.3	0.5	6.4	NMIJ	20
	KRISS	-9.2	8.9	-9.4	5.4	-8.2	7.1			-9.5	6.5	KRISS	
	LNE	-2.1	8.6	-2.3	4.8	-1.1	6.6	7.1	6.0			LNE	
	NIM	-1.0	9.2	-1.2	5.8	0.0	7.4	8.2	6.9	1.1	6.4	NIM	
	CENAM	-2.7	8.6	-2.9	4.8	-1.7	6.6	6.5	6.0	-0.6	5.4	CENAM	
	INMETRO	-1.8	8.3	-2.0	4.2	-0.8	6.2	7.4	5.5	0.3	4.9	INMETRO	
	UME	-0.4	10.0	-0.6	7.0	0.6	8.4	8.8	7.9	1.7	7.5	UME	
	VNIIM	-4.9	14.9	-5.1	13.1	-3.9	13.8	4.3	13.5	-2.8	13.3	VNIIM	

Bilateral degrees of equivalence for the SE at 16.0 Hz and 20.0 Hz (continued)

f in Hz	j → / i ↓	NIM D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	NIM $U_{D_{ij}}$	CENAM D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	CENAM $U_{D_{ij}}$	INMETRO D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	INMETRO $U_{D_{ij}}$	UME D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	UME $U_{D_{ij}}$	VNIIM D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	VNIIM $U_{D_{ij}}$	← j / ↓ i	f in Hz
	PTB mean	-1.7	5.3	-0.1	4.0	-1.1	3.3	-1.4	6.5	1.1	6.5	PTB mean	
	CMI	-1.4	5.7	0.2	4.6	-0.8	4.0	-1.1	6.9	1.4	6.9	CMI	
	NMISA	1.7	8.2	3.3	7.5	2.3	7.1	2.0	9.0	4.5	9.0	NMISA	
	DPLA	-2.7	7.2	-1.1	6.4	-2.1	6.0	-2.4	8.2	0.1	8.2	DPLA	
	CEM	-2.5	7.2	-0.9	6.4	-1.9	6.0	-2.2	8.2	0.3	8.2	CEM	
	GUM	0.2	8.2	1.8	7.5	0.8	7.1	0.5	9.0	3.0	9.0	GUM	
	METAS	1.3	5.7	2.9	4.5	1.9	3.9	1.6	6.8	4.1	6.8	METAS	
16	NMIJ	0.2	7.2	1.8	6.4	0.8	6.0	0.5	8.2	3.0	8.2	NMIJ	20
	KRISS	-9.8	7.3	-8.2	6.5	-9.2	6.0	-9.5	8.2	-7.0	8.2	KRISS	
	LNE	-0.3	6.4	1.3	5.4	0.3	4.9	0.0	7.5	2.5	7.4	LNE	
	NIM			1.6	6.4	0.6	6.0	0.3	8.2	2.8	8.2	NIM	
	CENAM	-1.7	6.4			-1.0	4.9	-1.3	7.5	1.2	7.4	CENAM	
	INMETRO	-0.8	6.0	0.9	4.9			-0.3	7.1	2.2	7.1	INMETRO	
	UME	0.6	8.2	2.3	7.5	1.4	7.1			2.5	9.0	UME	
	VNIIM	-3.9	13.7	-2.2	13.3	-3.1	13.1	-4.5	14.3			VNIIM	

Table 9.3: Bilateral degrees of equivalence for the SE at 25.0 Hz and 31.5 Hz

f	j →	PTB mean		CMI		NMISA		DPLA		CEM		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		↓ i	in Hz
	PTB mean			-0.4	2.9	-2.6	6.5	0.5	5.3	-0.8	5.3	PTB mean	
	CMI	0.5	2.9			-2.2	6.9	0.9	5.7	-0.4	5.7	CMI	
	NMISA	3.6	6.5	3.1	6.9			3.1	8.2	1.8	8.2	NMISA	
	DPLA	-0.4	5.3	-0.9	5.7	-4.0	8.2			-1.3	7.2	DPLA	
	CEM	0.6	5.3	0.1	5.7	-3.0	8.2	1.0	7.2			CEM	
	GUM	2.2	6.5	1.7	6.9	-1.4	9.0	2.6	8.2	1.6	8.2	GUM	
	METAS	2.7	2.7	2.2	3.5	-0.9	6.8	3.1	5.7	2.1	5.7	METAS	
25	NMIJ	1.5	5.1	1.0	5.6	-2.1	8.1	1.9	7.1	0.9	7.1	NMIJ	31.5
	KRISS	-6.3	5.4	-6.8	5.8	-9.9	8.3	-5.9	7.3	-6.9	7.3	KRISS	
	LNE	0.5	4.0	0.0	4.6	-3.1	7.5	0.9	6.4	-0.1	6.4	LNE	
	NIM	1.9	5.3	1.4	5.7	-1.7	8.2	2.3	7.2	1.3	7.2	NIM	
	CENAM	0.5	4.0	0.0	4.6	-3.1	7.5	0.9	6.4	-0.1	6.4	CENAM	
	INMETRO	1.4	3.3	0.9	4.0	-2.2	7.1	1.8	6.0	0.8	6.0	INMETRO	
	UME	-0.7	6.5	-1.2	6.9	-4.3	9.0	-0.3	8.2	-1.3	8.2	UME	
	VNIIM	0.2	6.5	-0.3	6.9	-3.4	9.0	0.6	8.2	-0.4	8.2	VNIIM	

Bilateral degrees of equivalence for the SE at 25.0 Hz and 31.5 Hz (continued)

f	j →	GUM		METAS		NMIJ		KRISS		LNE		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		↓ i	in Hz
	PTB mean	-2.1	6.5	-2.4	2.7	-0.8	5.1	5.9	4.7	-0.4	4.0	PTB mean	
	CMI	-1.7	6.9	-2.0	3.5	-0.4	5.6	6.3	5.2	0.0	4.6	CMI	
	NMISA	0.5	9.0	0.2	6.8	1.8	8.1	8.5	7.9	2.2	7.5	NMISA	
	DPLA	-2.6	8.2	-2.9	5.7	-1.3	7.1	5.4	6.9	-0.9	6.4	DPLA	
	CEM	-1.3	8.2	-1.6	5.7	0.0	7.1	6.7	6.9	0.4	6.4	CEM	
	GUM			-0.3	6.8	1.3	8.1	8.0	7.9	1.7	7.5	GUM	
	METAS	0.5	6.8			1.6	5.5	8.3	5.2	2.0	4.5	METAS	
25	NMIJ	-0.7	8.1	-1.2	5.5			6.7	6.8	0.4	6.3	NMIJ	31.5
	KRISS	-8.5	8.2	-9.0	5.7	-7.8	7.2			-6.3	6.0	KRISS	
	LNE	-1.7	7.5	-2.2	4.5	-1.0	6.3	6.8	6.5			LNE	
	NIM	-0.3	8.2	-0.8	5.7	0.4	7.1	8.2	7.3	1.4	6.4	NIM	
	CENAM	-1.7	7.5	-2.2	4.5	-1.0	6.3	6.8	6.5	0.0	5.4	CENAM	
	INMETRO	-0.8	7.1	-1.3	3.9	-0.1	5.9	7.7	6.0	0.9	4.9	INMETRO	
	UME	-2.9	9.0	-3.4	6.8	-2.2	8.1	5.6	8.2	-1.2	7.4	UME	
	VNIIM	-2.0	9.0	-2.5	6.8	-1.3	8.1	6.5	8.2	-0.3	7.4	VNIIM	

Bilateral degrees of equivalence for the SE at 25.0 Hz and 31.5 Hz (continued)

f	j →	NIM		CENAM		INMETRO		UME		VNIIM		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		↓ i	in Hz
	PTB mean	-1.9	5.3	-0.5	4.0	-1.3	3.3	0.5	6.5	-0.3	6.5	PTB mean	
	CMI	-1.5	5.7	-0.1	4.6	-0.9	4.0	0.9	6.9	0.1	6.9	CMI	
	NMISA	0.7	8.2	2.1	7.5	1.3	7.1	3.1	9.0	2.3	9.0	NMISA	
	DPLA	-2.4	7.2	-1.0	6.4	-1.8	6.0	0.0	8.2	-0.8	8.2	DPLA	
	CEM	-1.1	7.2	0.3	6.4	-0.5	6.0	1.3	8.2	0.5	8.2	CEM	
	GUM	0.2	8.2	1.6	7.5	0.8	7.1	2.6	9.0	1.8	9.0	GUM	
	METAS	0.5	5.7	1.9	4.5	1.1	3.9	2.9	6.8	2.1	6.8	METAS	
25	NMIJ	-1.1	7.1	0.3	6.3	-0.5	5.9	1.3	8.1	0.5	8.1	NMIJ	31.5
	KRISS	-7.8	6.9	-6.4	6.0	-7.2	5.5	-5.4	7.9	-6.2	7.9	KRISS	
	LNE	-1.5	6.4	-0.1	5.4	-0.9	4.9	0.9	7.4	0.1	7.4	LNE	
	NIM			1.4	6.4	0.6	6.0	2.4	8.2	1.6	8.2	NIM	
	CENAM	-1.4	6.4			-0.8	4.9	1.0	7.4	0.2	7.4	CENAM	
	INMETRO	-0.5	6.0	0.9	4.9			1.8	7.1	1.0	7.1	INMETRO	
	UME	-2.6	8.2	-1.2	7.4	-2.1	7.1			-0.8	9.0	UME	
	VNIIM	-1.7	8.2	-0.3	7.4	-1.2	7.1	0.9	9.0			VNIIM	

Table 9.4: Bilateral degrees of equivalence for the SE at 40.0 Hz and 63.0 Hz

f	j →	PTB mean		CMI		NMISA		DPLA		CEM		← j	f
in Hz	i ↓	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	↓ i	in Hz
		in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$		
	PTB mean			-1.0	2.9	-3.6	6.5	-0.2	5.3	-0.9	5.3	PTB mean	
	CMI	0.5	2.9			-2.6	6.9	0.8	5.7	0.1	5.7	CMI	
	NMISA	2.7	6.5	2.2	6.9			3.4	8.2	2.7	8.2	NMISA	
	DPLA	-0.6	5.3	-1.1	5.7	-3.3	8.2			-0.7	7.2	DPLA	
	CEM	0.6	5.3	0.1	5.7	-2.1	8.2	1.2	7.2			CEM	
	GUM	2.3	6.5	1.8	6.9	-0.4	9.0	2.9	8.2	1.7	8.2	GUM	
	METAS	2.4	2.7	1.9	3.5	-0.3	6.8	3.0	5.7	1.8	5.7	METAS	
40	NMIJ	0.6	5.1	0.1	5.6	-2.1	8.1	1.2	7.1	0.0	7.1	NMIJ	63
	KRISS	-5.0	4.8	-5.5	5.2	-7.7	7.9	-4.4	6.9	-5.6	6.9	KRISS	
	LNE	0.3	4.0	-0.2	4.6	-2.4	7.5	0.9	6.4	-0.3	6.4	LNE	
	NIM	2.0	5.3	1.5	5.7	-0.7	8.2	2.6	7.2	1.4	7.2	NIM	
	CENAM	0.4	4.0	-0.1	4.6	-2.3	7.5	1.0	6.4	-0.2	6.4	CENAM	
	INMETRO	1.2	3.3	0.7	4.0	-1.5	7.1	1.8	6.0	0.6	6.0	INMETRO	
	UME	-0.4	6.5	-0.9	6.9	-3.1	9.0	0.2	8.2	-1.0	8.2	UME	
	VNIIM	0.8	6.5	0.3	6.9	-1.9	9.0	1.4	8.2	0.2	8.2	VNIIM	

Bilateral degrees of equivalence for the SE at 40.0 Hz and 63.0 Hz (continued)

f	j →	GUM		METAS		NMIJ		KRISS		LNE		← j	f
in Hz	i ↓	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	↓ i	in Hz
		in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$		
	PTB mean	-2.2	6.5	-2.5	2.7	-1.2	5.1	3.4	4.8	-0.3	4.0	PTB mean	
	CMI	-1.2	6.9	-1.5	3.5	-0.2	5.6	4.4	5.2	0.7	4.6	CMI	
	NMISA	1.4	9.0	1.1	6.8	2.4	8.1	7.0	7.9	3.3	7.5	NMISA	
	DPLA	-2.0	8.2	-2.3	5.7	-1.0	7.1	3.6	6.9	-0.1	6.4	DPLA	
	CEM	-1.3	8.2	-1.6	5.7	-0.3	7.1	4.3	6.9	0.6	6.4	CEM	
	GUM			-0.3	6.8	1.0	8.1	5.6	7.9	1.9	7.5	GUM	
	METAS	0.1	6.8			1.3	5.5	5.9	5.2	2.2	4.5	METAS	
40	NMIJ	-1.7	8.1	-1.8	5.5			4.6	6.8	0.9	6.3	NMIJ	63
	KRISS	-7.3	7.9	-7.4	5.2	-5.6	6.8			-3.7	6.0	KRISS	
	LNE	-2.0	7.5	-2.1	4.5	-0.3	6.3	5.3	6.0			LNE	
	NIM	-0.3	8.2	-0.4	5.7	1.4	7.1	7.0	6.9	1.7	6.4	NIM	
	CENAM	-1.9	7.5	-2.0	4.5	-0.2	6.3	5.4	6.0	0.1	5.4	CENAM	
	INMETRO	-1.1	7.1	-1.2	3.9	0.6	5.8	6.2	5.5	0.9	4.9	INMETRO	
	UME	-2.7	9.0	-2.8	6.8	-1.0	8.1	4.6	7.9	-0.7	7.4	UME	
	VNIIM	-1.5	9.0	-1.6	6.8	0.2	8.1	5.8	7.9	0.5	7.4	VNIIM	

Bilateral degrees of equivalence for the SE at 40.0 Hz and 63.0 Hz (continued)

f	j →	NIM		CENAM		INMETRO		UME		VNIIM		← j	f
in Hz	i ↓	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	↓ i	in Hz
		in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$		
	PTB mean	-2.4	5.3	-0.7	4.0	-1.7	3.3	-0.7	6.5	-1.6	6.5	PTB mean	
	CMI	-1.4	5.7	0.3	4.6	-0.7	4.0	0.3	6.9	-0.6	6.9	CMI	
	NMISA	1.2	8.2	2.9	7.5	1.9	7.1	2.9	9.0	2.0	9.0	NMISA	
	DPLA	-2.2	7.2	-0.5	6.4	-1.5	6.0	-0.5	8.2	-1.4	8.2	DPLA	
	CEM	-1.5	7.2	0.2	6.4	-0.8	6.0	0.2	8.2	-0.7	8.2	CEM	
	GUM	-0.2	8.2	1.5	7.5	0.5	7.1	1.5	9.0	0.6	9.0	GUM	
	METAS	0.1	5.7	1.8	4.5	0.8	3.9	1.8	6.8	0.9	6.8	METAS	
40	NMIJ	-1.2	7.1	0.5	6.3	-0.5	5.8	0.5	8.1	-0.4	8.1	NMIJ	63
	KRISS	-5.8	6.9	-4.1	6.0	-5.1	5.5	-4.1	7.9	-5.0	7.9	KRISS	
	LNE	-2.1	6.4	-0.4	5.4	-1.4	4.9	-0.4	7.4	-1.3	7.4	LNE	
	NIM			1.7	6.4	0.7	6.0	1.7	8.2	0.8	8.2	NIM	
	CENAM	-1.6	6.4			-1.0	4.9	0.0	7.4	-0.9	7.4	CENAM	
	INMETRO	-0.8	6.0	0.8	4.9			1.0	7.1	0.1	7.1	INMETRO	
	UME	-2.4	8.2	-0.8	7.4	-1.6	7.1			-0.9	9.0	UME	
	VNIIM	-1.2	8.2	0.4	7.4	-0.4	7.1	1.2	9.0			VNIIM	

Table 9.5: Bilateral degrees of equivalence for the SE at 80.0 Hz and 100.0 Hz

f	j →	PTB mean		CMI		NMISA		DPLA		CEM		← j	f
in Hz	i ↓	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	↓ i	in Hz
	PTB mean			-1.3	2.9	-3.8	6.5	-0.5	5.3	-1.3	5.3	PTB mean	
	CMI	1.0	2.9			-2.5	6.9	0.8	5.7	0.0	5.7	CMI	
	NMISA	3.5	6.5	2.5	6.9			3.3	8.2	2.5	8.2	NMISA	
	DPLA	0.2	5.3	-0.8	5.7	-3.3	8.2			-0.8	7.2	DPLA	
	CEM	1.0	5.3	0.0	5.7	-2.5	8.2	0.8	7.2			CEM	
	GUM	2.4	6.5	1.4	6.9	-1.1	9.0	2.2	8.2	1.4	8.2	GUM	
	METAS	2.4	2.7	1.4	3.5	-1.1	6.8	2.2	5.7	1.4	5.7	METAS	
80	NMIJ	0.8	5.1	-0.2	5.6	-2.7	8.1	0.6	7.1	-0.2	7.1	NMIJ	100
	KRISS	-2.6	4.8	-3.6	5.2	-6.1	7.9	-2.8	6.9	-3.6	6.9	KRISS	
	LNE	1.1	4.0	0.1	4.6	-2.4	7.5	0.9	6.4	0.1	6.4	LNE	
	NIM	3.0	5.3	2.0	5.7	-0.5	8.2	2.8	7.2	2.0	7.2	NIM	
	CENAM	0.6	4.0	-0.4	4.6	-2.9	7.5	0.4	6.4	-0.4	6.4	CENAM	
	INMETRO	1.7	3.3	0.7	4.0	-1.8	7.1	1.5	6.0	0.7	6.0	INMETRO	
	UME	1.0	6.5	0.0	6.9	-2.5	9.0	0.8	8.2	0.0	8.2	UME	
	VNIIM	1.6	6.5	0.6	6.9	-1.9	9.0	1.4	8.2	0.6	8.2	VNIIM	

Bilateral degrees of equivalence for the SE at 80.0 Hz and 100.0 Hz (continued)

f	j →	GUM		METAS		NMIJ		KRISS		LNE		← j	f
in Hz	i ↓	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	↓ i	in Hz
	PTB mean	-3.3	6.5	-2.5	2.7	-1.1	5.1	2.1	4.9	-1.2	4.0	PTB mean	
	CMI	-2.0	6.9	-1.2	3.5	0.2	5.6	3.4	5.4	0.1	4.6	CMI	
	NMISA	0.5	9.0	1.3	6.8	2.7	8.1	5.9	7.9	2.6	7.5	NMISA	
	DPLA	-2.8	8.2	-2.0	5.7	-0.6	7.1	2.6	6.9	-0.7	6.4	DPLA	
	CEM	-2.0	8.2	-1.2	5.7	0.2	7.1	3.4	6.9	0.1	6.4	CEM	
	GUM			0.8	6.8	2.2	8.1	5.4	7.9	2.1	7.5	GUM	
	METAS	0.0	6.8			1.4	5.5	4.6	5.3	1.3	4.5	METAS	
80	NMIJ	-1.6	8.1	-1.6	5.5			3.2	6.9	-0.1	6.3	NMIJ	100
	KRISS	-5.0	7.9	-5.0	5.2	-3.4	6.8			-3.3	6.1	KRISS	
	LNE	-1.3	7.5	-1.3	4.5	0.3	6.3	3.7	6.0			LNE	
	NIM	0.6	8.2	0.6	5.7	2.2	7.1	5.6	6.9	1.9	6.4	NIM	
	CENAM	-1.8	7.5	-1.8	4.5	-0.2	6.3	3.2	6.0	-0.5	5.4	CENAM	
	INMETRO	-0.7	7.1	-0.7	3.9	0.9	5.8	4.3	5.5	0.6	4.9	INMETRO	
	UME	-1.4	9.0	-1.4	6.8	0.2	8.1	3.6	7.9	-0.1	7.4	UME	
	VNIIM	-0.8	9.0	-0.8	6.8	0.8	8.1	4.2	7.9	0.5	7.4	VNIIM	

Bilateral degrees of equivalence for the SE at 80.0 Hz and 100.0 Hz (continued)

f	j →	NIM		CENAM		INMETRO		UME		VNIIM		← j	f
in Hz	i ↓	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	↓ i	in Hz
	PTB mean	-3.3	5.3	-0.9	4.0	-2.0	3.3	-1.1	6.5	-2.2	6.5	PTB mean	
	CMI	-2.0	5.7	0.4	4.6	-0.7	4.0	0.2	6.9	-0.9	6.9	CMI	
	NMISA	0.5	8.2	2.9	7.5	1.8	7.1	2.7	9.0	1.6	9.0	NMISA	
	DPLA	-2.8	7.2	-0.4	6.4	-1.5	6.0	-0.6	8.2	-1.7	8.2	DPLA	
	CEM	-2.0	7.2	0.4	6.4	-0.7	6.0	0.2	8.2	-0.9	8.2	CEM	
	GUM	0.0	8.2	2.4	7.5	1.3	7.1	2.2	9.0	1.1	9.0	GUM	
	METAS	-0.8	5.7	1.6	4.5	0.5	3.9	1.4	6.8	0.3	6.8	METAS	
80	NMIJ	-2.2	7.1	0.2	6.3	-0.9	5.8	0.0	8.1	-1.1	8.1	NMIJ	100
	KRISS	-5.4	7.0	-3.0	6.1	-4.1	5.6	-3.2	7.9	-4.3	7.9	KRISS	
	LNE	-2.1	6.4	0.3	5.4	-0.8	4.9	0.1	7.4	-1.0	7.4	LNE	
	NIM			2.4	6.4	1.3	6.0	2.2	8.2	1.1	8.2	NIM	
	CENAM	-2.4	6.4			-1.1	4.9	-0.2	7.4	-1.3	7.4	CENAM	
	INMETRO	-1.3	6.0	1.1	4.9			0.9	7.1	-0.2	7.1	INMETRO	
	UME	-2.0	8.2	0.4	7.4	-0.7	7.1			-1.1	9.0	UME	
	VNIIM	-1.4	8.2	1.0	7.4	-0.1	7.1	0.6	9.0			VNIIM	

Table 9.6: Bilateral degrees of equivalence for the SE at 125.0 Hz and 160.0 Hz

f	j →	PTB mean		CMI		NMISA		DPLA		CEM		← j	f
in Hz	i ↓	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	↓ i	in Hz
	PTB mean			-0.5	2.9	-1.0	6.5	0.6	5.3	-0.5	5.3	PTB mean	
	CMI	0.7	2.9			-0.5	6.9	1.1	5.7	0.0	5.7	CMI	
	NMISA	3.5	6.5	2.8	6.9			1.6	8.2	0.5	8.2	NMISA	
	DPLA	-0.2	5.3	-0.9	5.7	-3.7	8.2			-1.1	7.2	DPLA	
	CEM	0.7	5.3	0.0	5.7	-2.8	8.2	0.9	7.2			CEM	
	GUM	2.5	6.5	1.8	6.9	-1.0	9.0	2.7	8.2	1.8	8.2	GUM	
	METAS	1.8	2.7	1.1	3.5	-1.7	6.8	2.0	5.7	1.1	5.7	METAS	
125	NMIJ	0.5	5.1	-0.2	5.6	-3.0	8.1	0.7	7.1	-0.2	7.1	NMIJ	160
	KRISS	-2.2	5.1	-2.9	5.6	-5.7	8.1	-2.0	7.1	-2.9	7.1	KRISS	
	LNE	0.6	4.0	-0.1	4.6	-2.9	7.5	0.8	6.4	-0.1	6.4	LNE	
	NIM	2.6	5.3	1.9	5.7	-0.9	8.2	2.8	7.2	1.9	7.2	NIM	
	CENAM	0.6	4.0	-0.1	4.6	-2.9	7.5	0.8	6.4	-0.1	6.4	CENAM	
	INMETRO	1.3	3.3	0.6	4.0	-2.2	7.1	1.5	6.0	0.6	6.0	INMETRO	
	UME	-0.2	6.5	-0.9	6.9	-3.7	9.0	0.0	8.2	-0.9	8.2	UME	
	VNIIM	1.6	6.5	0.9	6.9	-1.9	9.0	1.8	8.2	0.9	8.2	VNIIM	

Bilateral degrees of equivalence for the SE at 125.0 Hz and 160.0 Hz (continued)

f	j →	GUM		METAS		NMIJ		KRISS		LNE		← j	f
in Hz	i ↓	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	↓ i	in Hz
	PTB mean	-2.0	6.5	-1.4	2.7	0.0	5.1	2.8	6.9	-0.7	4.0	PTB mean	
	CMI	-1.5	6.9	-0.9	3.5	0.5	5.6	3.3	7.2	-0.2	4.6	CMI	
	NMISA	-1.0	9.0	-0.4	6.8	1.0	8.1	3.8	9.3	0.3	7.4	NMISA	
	DPLA	-2.6	8.2	-2.0	5.7	-0.6	7.1	2.2	8.5	-1.3	6.4	DPLA	
	CEM	-1.5	8.2	-0.9	5.7	0.5	7.1	3.3	8.5	-0.2	6.4	CEM	
	GUM			0.6	6.8	2.0	8.1	4.8	9.3	1.3	7.5	GUM	
	METAS	-0.7	6.8			1.4	5.5	4.2	7.2	0.7	4.5	METAS	
125	NMIJ	-2.0	8.1	-1.3	5.5			2.8	8.4	-0.7	6.3	NMIJ	160
	KRISS	-4.7	8.1	-4.0	5.5	-2.7	7.0			-3.5	7.8	KRISS	
	LNE	-1.9	7.5	-1.2	4.5	0.1	6.3	2.8	6.3			LNE	
	NIM	0.1	8.2	0.8	5.7	2.1	7.1	4.8	7.1	2.0	6.4	NIM	
	CENAM	-1.9	7.5	-1.2	4.5	0.1	6.3	2.8	6.3	0.0	5.4	CENAM	
	INMETRO	-1.2	7.1	-0.5	3.9	0.8	5.8	3.5	5.8	0.7	4.9	INMETRO	
	UME	-2.7	9.0	-2.0	6.8	-0.7	8.1	2.0	8.1	-0.8	7.4	UME	
	VNIIM	-0.9	9.0	-0.2	6.8	1.1	8.1	3.8	8.1	1.0	7.4	VNIIM	

Bilateral degrees of equivalence for the SE at 125.0 Hz and 160.0 Hz (continued)

f	j →	NIM		CENAM		INMETRO		UME		VNIIM		← j	f
in Hz	i ↓	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	↓ i	in Hz
	PTB mean	-2.3	5.3	-0.2	4.0	-1.0	3.3	1.4	6.5	-1.8	6.5	PTB mean	
	CMI	-1.8	5.7	0.3	4.6	-0.5	4.0	1.9	6.9	-1.3	6.9	CMI	
	NMISA	-1.3	8.2	0.8	7.4	0.0	7.1	2.4	9.0	-0.8	9.0	NMISA	
	DPLA	-2.9	7.2	-0.8	6.4	-1.6	6.0	0.8	8.2	-2.4	8.2	DPLA	
	CEM	-1.8	7.2	0.3	6.4	-0.5	6.0	1.9	8.2	-1.3	8.2	CEM	
	GUM	-0.3	8.2	1.8	7.5	1.0	7.1	3.4	9.0	0.2	9.0	GUM	
	METAS	-0.9	5.7	1.2	4.5	0.4	3.9	2.8	6.8	-0.4	6.8	METAS	
125	NMIJ	-2.3	7.1	-0.2	6.3	-1.0	5.8	1.4	8.1	-1.8	8.1	NMIJ	160
	KRISS	-5.1	8.5	-3.0	7.8	-3.8	7.4	-1.4	9.3	-4.6	9.3	KRISS	
	LNE	-1.6	6.4	0.5	5.4	-0.3	4.9	2.1	7.4	-1.1	7.5	LNE	
	NIM			2.1	6.4	1.3	6.0	3.7	8.2	0.5	8.2	NIM	
	CENAM	-2.0	6.4			-0.8	4.9	1.6	7.4	-1.6	7.5	CENAM	
	INMETRO	-1.3	6.0	0.7	4.9			2.4	7.1	-0.8	7.1	INMETRO	
	UME	-2.8	8.2	-0.8	7.4	-1.5	7.1			-3.2	9.0	UME	
	VNIIM	-1.0	8.2	1.0	7.4	0.3	7.1	1.8	9.0			VNIIM	

Table 9.7: Bilateral degrees of equivalence for the SE at 200.0 Hz and 250.0 Hz

f in Hz	j → i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j ↓ i	f in Hz
		D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	$U_{D_{ij}}$		
	PTB mean			-0.9	2.9	-0.8	6.5	0.9	5.3	0.1	5.3	PTB mean	
	CMI	0.2	2.9			0.1	6.9	1.8	5.7	1.0	5.7	CMI	
	NMISA	0.8	6.5	0.6	6.9			1.7	8.2	0.9	8.2	NMISA	
	DPLA	0.8	5.3	0.6	5.7	0.0	8.2			-0.8	7.2	DPLA	
	CEM	0.2	5.3	0.0	5.7	-0.6	8.2	-0.6	7.2			CEM	
	GUM	0.5	6.5	0.3	6.9	-0.3	9.0	-0.3	8.2	0.3	8.2	GUM	
	METAS	1.1	2.9	0.9	3.6	0.3	6.9	0.3	5.7	0.9	5.7	METAS	
200	NMIJ	0.1	5.1	-0.1	5.6	-0.7	8.1	-0.7	7.1	-0.1	7.1	NMIJ	250
	KRISS	-2.0	7.4	-2.2	7.7	-2.8	9.7	-2.8	8.9	-2.2	8.9	KRISS	
	LNE	0.6	4.0	0.4	4.6	-0.2	7.4	-0.2	6.4	0.4	6.4	LNE	
	NIM	1.9	5.3	1.7	5.7	1.1	8.2	1.1	7.2	1.7	7.2	NIM	
	CENAM	0.0	4.0	-0.2	4.6	-0.8	7.4	-0.8	6.4	-0.2	6.4	CENAM	
	INMETRO	1.0	3.3	0.8	4.0	0.2	7.1	0.2	6.0	0.8	6.0	INMETRO	
	UME	-1.2	6.5	-1.4	6.9	-2.0	9.0	-2.0	8.2	-1.4	8.2	UME	
	VNIIM	1.8	6.5	1.6	6.9	1.0	9.0	1.0	8.2	1.6	8.2	VNIIM	

Bilateral degrees of equivalence for the SE at 200.0 Hz and 250.0 Hz (continued)

f in Hz	j → i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j ↓ i	f in Hz
		D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	$U_{D_{ij}}$		
	PTB mean	-0.6	6.5	-1.5	3.0	0.5	5.1	2.1	5.0	0.0	4.0	PTB mean	
	CMI	0.3	6.9	-0.6	3.7	1.4	5.6	3.0	5.5	0.9	4.6	CMI	
	NMISA	0.2	9.0	-0.7	6.9	1.3	8.1	2.9	8.0	0.8	7.5	NMISA	
	DPLA	-1.5	8.2	-2.4	5.8	-0.4	7.1	1.2	7.0	-0.9	6.4	DPLA	
	CEM	-0.7	8.2	-1.6	5.8	0.4	7.1	2.0	7.0	-0.1	6.4	CEM	
	GUM			-0.9	6.9	1.1	8.1	2.7	8.0	0.6	7.4	GUM	
	METAS	0.6	6.9			2.0	5.7	3.6	5.5	1.5	4.7	METAS	
200	NMIJ	-0.4	8.1	-1.0	5.6			1.6	6.9	-0.5	6.3	NMIJ	250
	KRISS	-2.5	9.7	-3.1	7.7	-2.1	8.8			-2.1	6.2	KRISS	
	LNE	0.1	7.4	-0.5	4.6	0.5	6.3	2.6	8.2			LNE	
	NIM	1.4	8.2	0.8	5.7	1.8	7.1	3.9	8.9	1.3	6.4	NIM	
	CENAM	-0.5	7.4	-1.1	4.6	-0.1	6.3	2.0	8.2	-0.6	5.4	CENAM	
	INMETRO	0.5	7.1	-0.1	4.0	0.9	5.8	3.0	7.9	0.4	4.9	INMETRO	
	UME	-1.7	9.0	-2.3	6.9	-1.3	8.1	0.8	9.7	-1.8	7.4	UME	
	VNIIM	1.3	9.0	0.7	6.9	1.7	8.1	3.8	9.7	1.2	7.5	VNIIM	

Bilateral degrees of equivalence for the SE at 200.0 Hz and 250.0 Hz (continued)

f in Hz	j → i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j ↓ i	f in Hz
		D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in 10^{-4} $\frac{pC}{m/s^2}$	$U_{D_{ij}}$		
	PTB mean	-1.9	5.3	0.4	4.0	-0.9	3.3	1.1	6.5	-1.4	6.5	PTB mean	
	CMI	-1.0	5.7	1.3	4.6	0.0	4.0	2.0	6.9	-0.5	6.9	CMI	
	NMISA	-1.1	8.2	1.2	7.4	-0.1	7.1	1.9	9.0	-0.6	9.0	NMISA	
	DPLA	-2.8	7.2	-0.5	6.4	-1.8	6.0	0.2	8.2	-2.3	8.2	DPLA	
	CEM	-2.0	7.2	0.3	6.4	-1.0	6.0	1.0	8.2	-1.5	8.2	CEM	
	GUM	-1.3	8.2	1.0	7.4	-0.3	7.1	1.7	9.0	-0.8	9.0	GUM	
	METAS	-0.4	5.8	1.9	4.7	0.6	4.1	2.6	6.9	0.1	6.9	METAS	
200	NMIJ	-2.4	7.1	-0.1	6.3	-1.4	5.8	0.6	8.1	-1.9	8.1	NMIJ	250
	KRISS	-4.0	7.0	-1.7	6.2	-3.0	5.7	-1.0	8.0	-3.5	8.0	KRISS	
	LNE	-1.9	6.4	0.4	5.4	-0.9	4.9	1.1	7.4	-1.4	7.5	LNE	
	NIM			2.3	6.4	1.0	6.0	3.0	8.2	0.5	8.2	NIM	
	CENAM	-1.9	6.4			-1.3	4.9	0.7	7.4	-1.8	7.5	CENAM	
	INMETRO	-0.9	6.0	1.0	4.9			2.0	7.1	-0.5	7.1	INMETRO	
	UME	-3.1	8.2	-1.2	7.4	-2.2	7.1			-2.5	9.0	UME	
	VNIIM	-0.1	8.2	1.8	7.5	0.8	7.1	3.0	9.0			VNIIM	

Table 9.8: Bilateral degrees of equivalence for the SE at 315.0 Hz and 400.0 Hz

f	j →	PTB mean		CMI		NMISA		DPLA		CEM		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		↓ i	in Hz
	PTB mean			-0.7	4.0	-0.7	6.5	0.3	5.3	0.3	5.3	PTB mean	
	CMI	0.8	4.0			0.0	7.5	1.0	6.4	1.0	6.4	CMI	
	NMISA	0.8	6.5	0.0	7.5			1.0	8.2	1.0	8.2	NMISA	
	DPLA	-1.1	5.3	-1.9	6.4	-1.9	8.2			0.0	7.2	DPLA	
	CEM	-0.2	5.3	-1.0	6.4	-1.0	8.2	0.9	7.2			CEM	
	GUM	0.8	6.5	0.0	7.5	0.0	9.0	1.9	8.2	1.0	8.2	GUM	
	METAS	2.7	3.1	1.9	4.8	1.9	7.0	3.8	5.8	2.9	5.8	METAS	
315	NMIJ	0.7	5.1	-0.1	6.3	-0.1	8.1	1.8	7.1	0.9	7.1	NMIJ	400
	KRISS	-2.0	5.0	-2.8	6.2	-2.8	8.0	-0.9	7.0	-1.8	7.0	KRISS	
	LNE	-0.1	4.0	-0.9	5.4	-0.9	7.5	1.0	6.4	0.1	6.4	LNE	
	NIM	1.7	5.3	0.9	6.4	0.9	8.2	2.8	7.2	1.9	7.2	NIM	
	CENAM	-0.6	4.0	-1.4	5.4	-1.4	7.4	0.5	6.4	-0.4	6.4	CENAM	
	INMETRO	0.8	3.3	0.0	4.9	0.0	7.1	1.9	6.0	1.0	6.0	INMETRO	
	UME	-1.3	6.5	-2.1	7.4	-2.1	9.0	-0.2	8.2	-1.1	8.2	UME	
	VNIIM	1.5	6.5	0.7	7.5	0.7	9.0	2.6	8.2	1.7	8.2	VNIIM	

Bilateral degrees of equivalence for the SE at 315.0 Hz and 400.0 Hz (continued)

f	j →	GUM		METAS		NMIJ		KRISS		LNE		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		↓ i	in Hz
	PTB mean	-0.3	6.5	-2.9	3.1	0.6	5.1	1.4	5.4	0.0	4.0	PTB mean	
	CMI	0.4	7.5	-2.2	4.8	1.3	6.3	2.1	6.5	0.7	5.4	CMI	
	NMISA	0.4	9.0	-2.2	7.0	1.3	8.1	2.1	8.3	0.7	7.5	NMISA	
	DPLA	-0.6	8.2	-3.2	5.8	0.3	7.1	1.1	7.3	-0.3	6.4	DPLA	
	CEM	-0.6	8.2	-3.2	5.8	0.3	7.1	1.1	7.3	-0.3	6.4	CEM	
	GUM			-2.6	7.0	0.9	8.1	1.7	8.3	0.3	7.4	GUM	
	METAS	1.9	7.0			3.5	5.7	4.3	5.9	2.9	4.8	METAS	
315	NMIJ	-0.1	8.1	-2.0	5.7			0.8	7.2	-0.6	6.3	NMIJ	400
	KRISS	-2.8	8.0	-4.7	5.6	-2.7	7.0			-1.4	6.5	KRISS	
	LNE	-0.9	7.5	-2.8	4.8	-0.8	6.3	1.9	6.2			LNE	
	NIM	0.9	8.2	-1.0	5.8	1.0	7.1	3.7	7.0	1.8	6.4	NIM	
	CENAM	-1.4	7.4	-3.3	4.8	-1.3	6.3	1.4	6.2	-0.5	5.4	CENAM	
	INMETRO	0.0	7.1	-1.9	4.2	0.1	5.9	2.8	5.7	0.9	4.9	INMETRO	
	UME	-2.1	9.0	-4.0	7.0	-2.0	8.1	0.7	8.0	-1.2	7.4	UME	
	VNIIM	0.7	9.0	-1.2	7.0	0.8	8.1	3.5	8.0	1.6	7.5	VNIIM	

Bilateral degrees of equivalence for the SE at 315.0 Hz and 400.0 Hz (continued)

f	j →	NIM		CENAM		INMETRO		UME		VNIIM		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		↓ i	in Hz
	PTB mean	-1.9	5.3	0.5	4.0	-0.7	3.3	1.4	6.5	-1.6	6.5	PTB mean	
	CMI	-1.2	6.4	1.2	5.4	0.0	4.9	2.1	7.4	-0.9	7.5	CMI	
	NMISA	-1.2	8.2	1.2	7.5	0.0	7.1	2.1	9.0	-0.9	9.0	NMISA	
	DPLA	-2.2	7.2	0.2	6.4	-1.0	6.0	1.1	8.2	-1.9	8.2	DPLA	
	CEM	-2.2	7.2	0.2	6.4	-1.0	6.0	1.1	8.2	-1.9	8.2	CEM	
	GUM	-1.6	8.2	0.8	7.4	-0.4	7.1	1.7	9.0	-1.3	9.0	GUM	
	METAS	1.0	5.8	3.4	4.8	2.2	4.2	4.3	7.0	1.3	7.0	METAS	
315	NMIJ	-2.5	7.1	-0.1	6.3	-1.3	5.8	0.8	8.1	-2.2	8.1	NMIJ	400
	KRISS	-3.3	7.3	-0.9	6.5	-2.1	6.1	0.0	8.3	-3.0	8.3	KRISS	
	LNE	-1.9	6.4	0.5	5.4	-0.7	4.9	1.4	7.4	-1.6	7.5	LNE	
	NIM			2.4	6.4	1.2	6.0	3.3	8.2	0.3	8.2	NIM	
	CENAM	-2.3	6.4			-1.2	4.9	0.9	7.4	-2.1	7.5	CENAM	
	INMETRO	-0.9	6.0	1.4	4.9			2.1	7.1	-0.9	7.1	INMETRO	
	UME	-3.0	8.2	-0.7	7.4	-2.1	7.1			-3.0	9.0	UME	
	VNIIM	-0.2	8.2	2.1	7.5	0.7	7.1	2.8	9.0			VNIIM	

Table 9.9: Bilateral degrees of equivalence for the SE at 500.0 Hz and 630.0 Hz

f in Hz	j → i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$			
	PTB mean			-1.3	4.0	0.3	6.5	0.6	5.3	0.7	5.3	PTB mean	
	CMI	1.7	4.0			1.6	7.5	1.9	6.4	2.0	6.4	CMI	
	NMISA	0.2	6.5	-1.5	7.5			0.3	8.2	0.4	8.2	NMISA	
	DPLA	-0.5	5.3	-2.2	6.4	-0.7	8.2			0.1	7.2	DPLA	
	CEM	-0.3	5.3	-2.0	6.4	-0.5	8.2	0.2	7.2			CEM	
	GUM	0.7	6.5	-1.0	7.5	0.5	9.0	1.2	8.2	1.0	8.2	GUM	
	METAS	2.0	2.9	0.3	4.6	1.8	6.9	2.5	5.7	2.3	5.7	METAS	
500	NMIJ	0.9	5.1	-0.8	6.3	0.7	8.1	1.4	7.1	1.2	7.1	NMIJ	630
	KRISS	-0.9	6.0	-2.6	7.0	-1.1	8.7	-0.4	7.8	-0.6	7.8	KRISS	
	LNE	0.1	4.0	-1.6	5.4	-0.1	7.4	0.6	6.4	0.4	6.4	LNE	
	NIM	1.9	5.3	0.2	6.4	1.7	8.2	2.4	7.2	2.2	7.2	NIM	
	CENAM	-0.3	4.0	-2.0	5.4	-0.5	7.4	0.2	6.4	0.0	6.4	CENAM	
	INMETRO	1.1	3.3	-0.6	4.9	0.9	7.1	1.6	6.0	1.4	6.0	INMETRO	
	UME	-0.6	6.5	-2.3	7.4	-0.8	9.0	-0.1	8.2	-0.3	8.2	UME	
	VNIIM	1.9	6.5	0.2	7.5	1.7	9.0	2.4	8.2	2.2	8.2	VNIIM	

Bilateral degrees of equivalence for the SE at 500.0 Hz and 630.0 Hz (continued)

f in Hz	j → i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$			
	PTB mean	-0.8	6.5	-1.6	2.9	-0.6	5.1	0.9	5.5	-0.3	4.0	PTB mean	
	CMI	0.5	7.5	-0.3	4.6	0.7	6.3	2.2	6.6	1.0	5.4	CMI	
	NMISA	-1.1	9.0	-1.9	6.9	-0.9	8.1	0.6	8.3	-0.6	7.4	NMISA	
	DPLA	-1.4	8.2	-2.2	5.7	-1.2	7.1	0.3	7.4	-0.9	6.4	DPLA	
	CEM	-1.5	8.2	-2.3	5.7	-1.3	7.1	0.2	7.4	-1.0	6.4	CEM	
	GUM			-0.8	6.9	0.2	8.1	1.7	8.3	0.5	7.5	GUM	
	METAS	1.3	6.9			1.0	5.6	2.5	5.9	1.3	4.6	METAS	
500	NMIJ	0.2	8.1	-1.1	5.6			1.5	7.3	0.3	6.3	NMIJ	630
	KRISS	-1.6	8.7	-2.9	6.4	-1.8	7.7			-1.2	6.6	KRISS	
	LNE	-0.6	7.5	-1.9	4.6	-0.8	6.3	1.0	7.0			LNE	
	NIM	1.2	8.2	-0.1	5.7	1.0	7.1	2.8	7.8	1.8	6.4	NIM	
	CENAM	-1.0	7.5	-2.3	4.6	-1.2	6.3	0.6	7.0	-0.4	5.4	CENAM	
	INMETRO	0.4	7.1	-0.9	4.0	0.2	5.9	2.0	6.6	1.0	4.9	INMETRO	
	UME	-1.3	9.0	-2.6	6.9	-1.5	8.1	0.3	8.7	-0.7	7.4	UME	
	VNIIM	1.2	9.0	-0.1	6.9	1.0	8.1	2.8	8.7	1.8	7.5	VNIIM	

Bilateral degrees of equivalence for the SE at 500.0 Hz and 630.0 Hz (continued)

f in Hz	j → i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$			
	PTB mean	-1.9	5.3	0.1	4.0	-1.0	3.3	-0.9	6.5	-1.8	6.5	PTB mean	
	CMI	-0.6	6.4	1.4	5.4	0.3	4.9	0.4	7.5	-0.5	7.5	CMI	
	NMISA	-2.2	8.2	-0.2	7.4	-1.3	7.1	-1.2	9.0	-2.1	9.0	NMISA	
	DPLA	-2.5	7.2	-0.5	6.4	-1.6	6.0	-1.5	8.2	-2.4	8.2	DPLA	
	CEM	-2.6	7.2	-0.6	6.4	-1.7	6.0	-1.6	8.2	-2.5	8.2	CEM	
	GUM	-1.1	8.2	0.9	7.5	-0.2	7.1	-0.1	9.0	-1.0	9.0	GUM	
	METAS	-0.3	5.7	1.7	4.6	0.6	4.0	0.7	6.9	-0.2	6.9	METAS	
500	NMIJ	-1.3	7.1	0.7	6.3	-0.4	5.9	-0.3	8.1	-1.2	8.1	NMIJ	630
	KRISS	-2.8	7.4	-0.8	6.6	-1.9	6.2	-1.8	8.3	-2.7	8.3	KRISS	
	LNE	-1.6	6.4	0.4	5.4	-0.7	4.9	-0.6	7.5	-1.5	7.5	LNE	
	NIM			2.0	6.4	0.9	6.0	1.0	8.2	0.1	8.2	NIM	
	CENAM	-2.2	6.4			-1.1	4.9	-1.0	7.5	-1.9	7.5	CENAM	
	INMETRO	-0.8	6.0	1.4	4.9			0.1	7.1	-0.8	7.1	INMETRO	
	UME	-2.5	8.2	-0.3	7.4	-1.7	7.1			-0.9	9.0	UME	
	VNIIM	0.0	8.2	2.2	7.5	0.8	7.1	2.5	9.0			VNIIM	

Table 9.10: Bilateral degrees of equivalence for the SE at 800.0 Hz and 1000.0 Hz

f in Hz	j → / i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j / ↓ i	f in Hz
		D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$		
	PTB mean			-2.4	4.1	0.9	6.5	0.4	5.3	0.6	5.3	PTB mean	
	CMI	2.1	4.0			3.3	7.5	2.8	6.4	3.0	6.4	CMI	
	NMISA	-0.1	6.5	-2.2	7.5			-0.5	8.2	-0.3	8.2	NMISA	
	DPLA	-0.2	5.3	-2.3	6.4	-0.1	8.2			0.2	7.2	DPLA	
	CEM	1.1	5.3	-1.0	6.4	1.2	8.2	1.3	7.2			CEM	
	GUM	1.3	6.5	-0.8	7.5	1.4	9.0	1.5	8.2	0.2	8.2	GUM	
	METAS	1.8	2.9	-0.3	4.6	1.9	6.9	2.0	5.7	0.7	5.7	METAS	
800	NMIJ	0.9	5.1	-1.2	6.3	1.0	8.1	1.1	7.1	-0.2	7.1	NMIJ	1000
	KRISS	-1.1	5.4	-3.2	6.5	-1.0	8.3	-0.9	7.3	-2.2	7.3	KRISS	
	LNE	0.4	4.0	-1.7	5.4	0.5	7.5	0.6	6.4	-0.7	6.4	LNE	
	NIM	2.1	5.3	0.0	6.4	2.2	8.2	2.3	7.2	1.0	7.2	NIM	
	CENAM	-0.1	4.0	-2.2	5.4	0.0	7.5	0.1	6.4	-1.2	6.4	CENAM	
	INMETRO	1.1	3.3	-1.0	4.9	1.2	7.1	1.3	6.0	0.0	6.0	INMETRO	
	UME	1.2	6.5	-0.9	7.5	1.3	9.0	1.4	8.2	0.1	8.2	UME	
	VNIIM	2.1	6.5	0.0	7.5	2.2	9.0	2.3	8.2	1.0	8.2	VNIIM	

Bilateral degrees of equivalence for the SE at 800.0 Hz and 1000.0 Hz (continued)

f in Hz	j → / i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j / ↓ i	f in Hz
		D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$		
	PTB mean	-0.8	6.5	-1.5	3.2	-1.1	5.2	1.0	5.4	-0.3	4.0	PTB mean	
	CMI	1.6	7.5	0.9	4.8	1.3	6.3	3.4	6.5	2.1	5.4	CMI	
	NMISA	-1.7	9.0	-2.4	7.0	-2.0	8.1	0.1	8.3	-1.2	7.5	NMISA	
	DPLA	-1.2	8.2	-1.9	5.9	-1.5	7.1	0.6	7.3	-0.7	6.4	DPLA	
	CEM	-1.4	8.2	-2.1	5.9	-1.7	7.1	0.4	7.3	-0.9	6.4	CEM	
	GUM			-0.7	7.0	-0.3	8.1	1.8	8.3	0.5	7.5	GUM	
	METAS	0.5	6.9			0.4	5.8	2.5	6.0	1.2	4.8	METAS	
800	NMIJ	-0.4	8.1	-0.9	5.6			2.1	7.2	0.8	6.3	NMIJ	1000
	KRISS	-2.4	8.3	-2.9	5.8	-2.0	7.2			-1.3	6.5	KRISS	
	LNE	-0.9	7.5	-1.4	4.6	-0.5	6.3	1.5	6.5			LNE	
	NIM	0.8	8.2	0.3	5.7	1.2	7.1	3.2	7.3	1.7	6.4	NIM	
	CENAM	-1.4	7.5	-1.9	4.6	-1.0	6.3	1.0	6.5	-0.5	5.4	CENAM	
	INMETRO	-0.2	7.1	-0.7	4.0	0.2	5.9	2.2	6.1	0.7	4.9	INMETRO	
	UME	-0.1	9.0	-0.6	6.9	0.3	8.1	2.3	8.3	0.8	7.5	UME	
	VNIIM	0.8	9.0	0.3	6.9	1.2	8.1	3.2	8.3	1.7	7.5	VNIIM	

Bilateral degrees of equivalence for the SE at 800.0 Hz and 1000.0 Hz (continued)

f in Hz	j → / i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j / ↓ i	f in Hz
		D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$		
	PTB mean	-1.5	5.3	0.3	4.0	-0.8	3.3	-0.2	6.5	-2.0	6.5	PTB mean	
	CMI	0.9	6.4	2.7	5.4	1.6	4.9	2.2	7.5	0.4	7.5	CMI	
	NMISA	-2.4	8.2	-0.6	7.5	-1.7	7.1	-1.1	9.0	-2.9	9.0	NMISA	
	DPLA	-1.9	7.2	-0.1	6.4	-1.2	6.0	-0.6	8.2	-2.4	8.2	DPLA	
	CEM	-2.1	7.2	-0.3	6.4	-1.4	6.0	-0.8	8.2	-2.6	8.2	CEM	
	GUM	-0.7	8.2	1.1	7.5	0.0	7.1	0.6	9.0	-1.2	9.1	GUM	
	METAS	0.0	5.9	1.8	4.8	0.7	4.3	1.3	7.0	-0.5	7.0	METAS	
800	NMIJ	-0.4	7.2	1.4	6.3	0.3	5.9	0.9	8.1	-0.9	8.1	NMIJ	1000
	KRISS	-2.5	7.3	-0.7	6.5	-1.8	6.1	-1.2	8.3	-3.0	8.3	KRISS	
	LNE	-1.2	6.4	0.6	5.4	-0.5	4.9	0.1	7.5	-1.7	7.5	LNE	
	NIM			1.8	6.4	0.7	6.0	1.3	8.2	-0.5	8.2	NIM	
	CENAM	-2.2	6.4			-1.1	4.9	-0.5	7.5	-2.3	7.5	CENAM	
	INMETRO	-1.0	6.0	1.2	4.9			0.6	7.1	-1.2	7.1	INMETRO	
	UME	-0.9	8.2	1.3	7.5	0.1	7.1			-1.8	9.0	UME	
	VNIIM	0.0	8.2	2.2	7.5	1.0	7.1	0.9	9.0			VNIIM	

Table 9.11: Bilateral degrees of equivalence for the SE at 1250.0 Hz and 1500.0 Hz

f in Hz	j → i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j ↓ i	f in Hz
		D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$		
	PTB mean			-3.2	4.1	1.7	10.3	0.6	5.3	1.0	5.3	PTB mean	
	CMI	2.4	4.1			4.9	10.9	3.8	6.4	4.2	6.4	CMI	
	NMISA	-1.1	10.3	-3.5	10.9			-1.1	11.4	-0.7	11.4	NMISA	
	DPLA	-0.4	5.3	-2.8	6.4	0.7	11.4			0.4	7.2	DPLA	
	CEM	-0.8	5.3	-3.2	6.4	0.3	11.4	-0.4	7.2			CEM	
	GUM	0.7	6.5	-1.7	7.5	1.8	12.1	1.1	8.2	1.5	8.2	GUM	
	METAS	1.3	3.2	-1.1	4.8	2.4	10.6	1.7	5.9	2.1	5.9	METAS	
1250	NMIJ	2.6	5.2	0.2	6.3	3.7	11.4	3.0	7.2	3.4	7.2	NMIJ	1500
	KRISS	-1.7	5.4	-4.1	6.5	-0.6	11.5	-1.3	7.3	-0.9	7.3	KRISS	
	LNE	0.1	4.1	-2.3	5.4	1.2	10.9	0.5	6.4	0.9	6.4	LNE	
	NIM	1.5	5.3	-0.9	6.4	2.6	11.4	1.9	7.2	2.3	7.2	NIM	
	CENAM	-0.8	6.5	-3.2	7.5	0.3	12.1	-0.4	8.2	0.0	8.2	CENAM	
	INMETRO	0.4	3.3	-2.0	4.9	1.5	10.7	0.8	6.0	1.2	6.0	INMETRO	
	UME	0.3	12.9	-2.1	13.4	1.4	16.4	0.7	13.8	1.1	13.8	UME	
	VNIIM	1.6	6.5	-0.8	7.5	2.7	12.1	2.0	8.2	2.4	8.2	VNIIM	

Bilateral degrees of equivalence for the SE at 1250.0 Hz and 1500.0 Hz (continued)

f in Hz	j → i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j ↓ i	f in Hz
		D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$		
	PTB mean	-0.5	6.5	-0.9	3.2	-3.8	5.2	2.3	5.5	-0.1	4.1	PTB mean	
	CMI	2.7	7.5	2.3	4.9	-0.6	6.3	5.5	6.6	3.1	5.4	CMI	
	NMISA	-2.2	12.1	-2.6	10.7	-5.5	11.4	0.6	11.6	-1.8	10.9	NMISA	
	DPLA	-1.1	8.2	-1.5	5.9	-4.4	7.2	1.7	7.4	-0.7	6.4	DPLA	
	CEM	-1.5	8.2	-1.9	5.9	-4.8	7.2	1.3	7.4	-1.1	6.4	CEM	
	GUM			-0.4	7.1	-3.3	8.1	2.8	8.4	0.4	7.5	GUM	
	METAS	0.6	7.0			-2.9	5.8	3.2	6.1	0.8	4.9	METAS	
1250	NMIJ	1.9	8.1	1.3	5.8			6.1	7.3	3.7	6.3	NMIJ	1500
	KRISS	-2.4	8.3	-3.0	6.0	-4.3	7.2			-2.4	6.6	KRISS	
	LNE	-0.6	7.5	-1.2	4.8	-2.5	6.3	1.8	6.5			LNE	
	NIM	0.8	8.2	0.2	5.9	-1.1	7.2	3.2	7.3	1.4	6.4	NIM	
	CENAM	-1.5	9.0	-2.1	7.0	-3.4	8.1	0.9	8.3	-0.9	7.5	CENAM	
	INMETRO	-0.3	7.1	-0.9	4.3	-2.2	5.9	2.1	6.1	0.3	4.9	INMETRO	
	UME	-0.4	14.3	-1.0	13.1	-2.3	13.7	2.0	13.8	0.2	13.4	UME	
	VNIIM	0.9	9.1	0.3	7.1	-1.0	8.1	3.3	8.3	1.5	7.5	VNIIM	

Bilateral degrees of equivalence for the SE at 1250.0 Hz and 1500.0 Hz (continued)

f in Hz	j → i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j ↓ i	f in Hz
		D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$		
	PTB mean	-0.8	5.3	-0.1	6.5	-0.1	3.3	0.3	12.9	-2.1	6.5	PTB mean	
	CMI	2.4	6.4	3.1	7.5	3.1	4.9	3.5	13.4	1.1	7.5	CMI	
	NMISA	-2.5	11.4	-1.8	12.1	-1.8	10.7	-1.4	16.4	-3.8	12.1	NMISA	
	DPLA	-1.4	7.3	-0.7	8.2	-0.7	6.0	-0.3	13.8	-2.7	8.2	DPLA	
	CEM	-1.8	7.3	-1.1	8.2	-1.1	6.0	-0.7	13.8	-3.1	8.2	CEM	
	GUM	-0.3	8.2	0.4	9.1	0.4	7.1	0.8	14.3	-1.6	9.1	GUM	
	METAS	0.1	5.9	0.8	7.1	0.8	4.3	1.2	13.1	-1.2	7.1	METAS	
1250	NMIJ	3.0	7.2	3.7	8.1	3.7	5.9	4.1	13.8	1.7	8.1	NMIJ	1500
	KRISS	-3.1	7.4	-2.4	8.4	-2.4	6.2	-2.0	13.9	-4.4	8.4	KRISS	
	LNE	-0.7	6.4	0.0	7.5	0.0	4.9	0.4	13.4	-2.0	7.5	LNE	
	NIM			0.7	8.2	0.7	6.0	1.1	13.8	-1.3	8.2	NIM	
	CENAM	-2.3	8.2			0.0	7.1	0.4	14.3	-2.0	9.1	CENAM	
	INMETRO	-1.1	6.0	1.2	7.1			0.4	13.2	-2.0	7.1	INMETRO	
	UME	-1.2	13.8	1.1	14.3	-0.1	13.2			-2.4	14.3	UME	
	VNIIM	0.1	8.2	2.4	9.1	1.2	7.1	1.3	14.3			VNIIM	

Table 9.12: Bilateral degrees of equivalence for the SE at 1600.0 Hz and 2000.0 Hz

f	j →	PTB mean		CMI		NMISA		DPLA		CEM		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		↓ i	in Hz
	PTB mean			-3.6	5.3	2.0	10.3	0.1	5.3	2.4	5.3	PTB mean	
	CMI	2.8	4.1			5.6	11.5	3.7	7.3	6.0	7.3	CMI	
	NMISA	-1.3	10.3	-4.1	10.9			-1.9	11.5	0.4	11.5	NMISA	
	DPLA	-0.7	5.3	-3.5	6.4	0.6	11.5			2.3	7.3	DPLA	
	CEM	-1.0	5.3	-3.8	6.4	0.3	11.5	-0.3	7.3			CEM	
	GUM	0.7	6.5	-2.1	7.5	2.0	12.1	1.4	8.2	1.7	8.2	GUM	
	METAS	0.6	3.2	-2.2	4.9	1.9	10.7	1.3	5.9	1.6	5.9	METAS	
1600	NMIJ	1.1	5.3	-1.7	6.4	2.4	11.5	1.8	7.3	2.1	7.3	NMIJ	2000
	KRISS	-1.7	5.5	-4.5	6.6	-0.4	11.6	-1.0	7.4	-0.7	7.4	KRISS	
	LNE	0.0	4.1	-2.8	5.5	1.3	10.9	0.7	6.4	1.0	6.4	LNE	
	NIM	1.4	5.3	-1.4	6.4	2.7	11.5	2.1	7.3	2.4	7.3	NIM	
	CENAM	0.5	6.5	-2.3	7.5	1.8	12.1	1.2	8.2	1.5	8.2	CENAM	
	INMETRO	0.7	3.3	-2.1	4.9	2.0	10.7	1.4	6.0	1.7	6.0	INMETRO	
	UME	-0.2	12.9	-3.0	13.4	1.1	16.4	0.5	13.8	0.8	13.8	UME	
	VNIIM	2.5	6.6	-0.3	7.5	3.8	12.1	3.2	8.2	3.5	8.2	VNIIM	

Bilateral degrees of equivalence for the SE at 1600.0 Hz and 2000.0 Hz (continued)

f	j →	GUM		METAS		NMIJ		KRISS		LNE		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		↓ i	in Hz
	PTB mean	-0.8	6.6	-0.6	3.3	-3.5	5.3	1.3	5.4	0.2	4.1	PTB mean	
	CMI	2.8	8.2	3.0	6.0	0.1	7.3	4.9	7.4	3.8	6.4	CMI	
	NMISA	-2.8	12.1	-2.6	10.7	-5.5	11.5	-0.7	11.5	-1.8	11.0	NMISA	
	DPLA	-0.9	8.2	-0.7	5.9	-3.6	7.3	1.2	7.4	0.1	6.4	DPLA	
	CEM	-3.2	8.2	-3.0	5.9	-5.9	7.3	-1.1	7.4	-2.2	6.4	CEM	
	GUM			0.2	7.1	-2.7	8.2	2.1	8.3	1.0	7.5	GUM	
	METAS	-0.1	7.1			-2.9	6.0	1.9	6.1	0.8	4.9	METAS	
1600	NMIJ	0.4	8.2	0.5	5.9			4.8	7.4	3.7	6.4	NMIJ	2000
	KRISS	-2.4	8.4	-2.3	6.1	-2.8	7.4			-1.1	6.5	KRISS	
	LNE	-0.7	7.5	-0.6	4.9	-1.1	6.4	1.7	6.6			LNE	
	NIM	0.7	8.2	0.8	5.9	0.3	7.3	3.1	7.4	1.4	6.4	NIM	
	CENAM	-0.2	9.1	-0.1	7.1	-0.6	8.2	2.2	8.4	0.5	7.5	CENAM	
	INMETRO	0.0	7.1	0.1	4.3	-0.4	6.0	2.4	6.2	0.7	4.9	INMETRO	
	UME	-0.9	14.3	-0.8	13.1	-1.3	13.8	1.5	13.9	-0.2	13.4	UME	
	VNIIM	1.8	9.1	1.9	7.1	1.4	8.2	4.2	8.4	2.5	7.5	VNIIM	

Bilateral degrees of equivalence for the SE at 1600.0 Hz and 2000.0 Hz (continued)

f	j →	NIM		CENAM		INMETRO		UME		VNIIM		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		in 10^{-4} $\frac{pC}{m/s^2}$		↓ i	in Hz
	PTB mean	-1.2	5.3	-0.7	6.6	0.1	3.4	-0.1	12.9	-1.4	6.6	PTB mean	
	CMI	2.4	7.3	2.9	8.2	3.7	6.0	3.5	13.8	2.2	8.2	CMI	
	NMISA	-3.2	11.5	-2.7	12.1	-1.9	10.7	-2.1	16.4	-3.4	12.1	NMISA	
	DPLA	-1.3	7.3	-0.8	8.2	0.0	6.0	-0.2	13.8	-1.5	8.2	DPLA	
	CEM	-3.6	7.3	-3.1	8.2	-2.3	6.0	-2.5	13.8	-3.8	8.2	CEM	
	GUM	-0.4	8.2	0.1	9.1	0.9	7.1	0.7	14.4	-0.6	9.1	GUM	
	METAS	-0.6	5.9	-0.1	7.1	0.7	4.3	0.5	13.2	-0.8	7.1	METAS	
1600	NMIJ	2.3	7.3	2.8	8.2	3.6	6.0	3.4	13.8	2.1	8.2	NMIJ	2000
	KRISS	-2.5	7.4	-2.0	8.3	-1.2	6.1	-1.4	13.9	-2.7	8.3	KRISS	
	LNE	-1.4	6.4	-0.9	7.5	-0.1	5.0	-0.3	13.4	-1.6	7.5	LNE	
	NIM			0.5	8.2	1.3	6.0	1.1	13.8	-0.2	8.2	NIM	
	CENAM	-0.9	8.2			0.8	7.1	0.6	14.4	-0.7	9.1	CENAM	
	INMETRO	-0.7	6.0	0.2	7.1			-0.2	13.2	-1.5	7.1	INMETRO	
	UME	-1.6	13.8	-0.7	14.3	-0.9	13.2			-1.3	14.4	UME	
	VNIIM	1.1	8.2	2.0	9.1	1.8	7.1	2.7	14.3			VNIIM	

Table 9.13: Bilateral degrees of equivalence for the SE at 2500.0 Hz and 3000.0 Hz

f in Hz	j → i ↓	PTB mean D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	PTB mean $U_{D_{ij}}$	CMI D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	CMI $U_{D_{ij}}$	NMISA D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	NMISA $U_{D_{ij}}$	DPLA D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	DPLA $U_{D_{ij}}$	CEM D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	CEM $U_{D_{ij}}$	← j ↓ i	f in Hz
	PTB mean			-6.7	5.5	2.6	10.4	0.1	5.4	0.3	5.4	PTB mean	
	CMI	5.1	5.4			9.3	11.6	6.8	7.4	7.0	7.4	CMI	
	NMISA	-2.6	10.4	-7.7	11.5			-2.5	11.6	-2.3	11.6	NMISA	
	DPLA	-0.9	5.4	-6.0	7.3	1.7	11.5			0.2	7.4	DPLA	
	CEM	-3.9	5.4	-9.0	7.3	-1.3	11.5	-3.0	7.3			CEM	
	GUM	0.7	6.6	-4.4	8.3	3.3	12.2	1.6	8.3	4.6	8.3	GUM	
	METAS	0.3	3.3	-4.8	6.0	2.9	10.7	1.2	6.0	4.2	6.0	METAS	
2500	NMIJ	2.6	5.4	-2.5	7.3	5.2	11.5	3.5	7.3	6.5	7.3	NMIJ	3000
	KRISS	-3.0	6.2	-8.1	8.0	-0.4	11.9	-2.1	8.0	0.9	8.0	KRISS	
	LNE	-0.4	4.1	-5.5	6.5	2.2	11.0	0.5	6.5	3.5	6.5	LNE	
	NIM	1.1	5.4	-4.0	7.3	3.7	11.5	2.0	7.3	5.0	7.3	NIM	
	CENAM	0.7	6.6	-4.4	8.3	3.3	12.2	1.6	8.3	4.6	8.3	CENAM	
	INMETRO	-1.2	3.4	-6.3	6.1	1.4	10.8	-0.3	6.1	2.7	6.0	INMETRO	
	UME	-0.4	13.0	-5.5	13.9	2.2	16.5	0.5	13.9	3.5	13.9	UME	
	VNIIM	-0.2	13.0	-5.3	13.9	2.4	16.5	0.7	13.9	3.7	13.9	VNIIM	

Bilateral degrees of equivalence for the SE at 2500.0 Hz and 3000.0 Hz (continued)

f in Hz	j → i ↓	GUM D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	GUM $U_{D_{ij}}$	METAS D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	METAS $U_{D_{ij}}$	NMIJ D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	NMIJ $U_{D_{ij}}$	KRISS D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	KRISS $U_{D_{ij}}$	LNE D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	LNE $U_{D_{ij}}$	← j ↓ i	f in Hz
	PTB mean	-1.4	6.7	-0.7	3.4	-5.6	5.5	3.0	6.5	0.2	4.2	PTB mean	
	CMI	5.3	8.4	6.0	6.1	1.1	7.4	9.7	8.2	6.9	6.6	CMI	
	NMISA	-4.0	12.2	-3.3	10.8	-8.2	11.6	0.4	12.1	-2.4	11.1	NMISA	
	DPLA	-1.5	8.3	-0.8	6.1	-5.7	7.4	2.9	8.2	0.1	6.6	DPLA	
	CEM	-1.7	8.3	-1.0	6.1	-5.9	7.4	2.7	8.2	-0.1	6.6	CEM	
	GUM			0.7	7.2	-4.2	8.4	4.4	9.1	1.6	7.6	GUM	
	METAS	-0.4	7.1			-4.9	6.1	3.7	7.1	0.9	5.0	METAS	
2500	NMIJ	1.9	8.3	2.3	6.0			8.6	8.2	5.8	6.6	NMIJ	3000
	KRISS	-3.7	8.9	-3.3	6.8	-5.6	8.0			-2.8	7.5	KRISS	
	LNE	-1.1	7.5	-0.7	4.9	-3.0	6.5	2.6	7.2			LNE	
	NIM	0.4	8.3	0.8	6.0	-1.5	7.3	4.1	8.0	1.5	6.5	NIM	
	CENAM	0.0	9.1	0.4	7.1	-1.9	8.3	3.7	8.9	1.1	7.5	CENAM	
	INMETRO	-1.9	7.2	-1.5	4.4	-3.8	6.1	1.8	6.8	-0.8	5.0	INMETRO	
	UME	-1.1	14.4	-0.7	13.2	-3.0	13.9	2.6	14.2	0.0	13.5	UME	
	VNIIM	-0.9	14.4	-0.5	13.2	-2.8	13.9	2.8	14.2	0.2	13.5	VNIIM	

Bilateral degrees of equivalence for the SE at 2500.0 Hz and 3000.0 Hz (continued)

f in Hz	j → i ↓	NIM D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	NIM $U_{D_{ij}}$	CENAM D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	CENAM $U_{D_{ij}}$	INMETRO D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	INMETRO $U_{D_{ij}}$	UME D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	UME $U_{D_{ij}}$	VNIIM D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	VNIIM $U_{D_{ij}}$	← j ↓ i	f in Hz
	PTB mean	-1.9	5.5	-1.5	6.7	0.5	3.5	-2.2	13.0	1.5	13.0	PTB mean	
	CMI	4.8	7.4	5.2	8.4	7.2	6.2	4.5	14.0	8.2	13.9	CMI	
	NMISA	-4.5	11.6	-4.1	12.2	-2.1	10.8	-4.8	16.6	-1.1	16.5	NMISA	
	DPLA	-2.0	7.4	-1.6	8.3	0.4	6.1	-2.3	14.0	1.4	13.9	DPLA	
	CEM	-2.2	7.4	-1.8	8.3	0.2	6.1	-2.5	14.0	1.2	13.9	CEM	
	GUM	-0.5	8.4	-0.1	9.2	1.9	7.3	-0.8	14.5	2.9	14.5	GUM	
	METAS	-1.2	6.1	-0.8	7.2	1.2	4.4	-1.5	13.3	2.2	13.3	METAS	
2500	NMIJ	3.7	7.4	4.1	8.4	6.1	6.1	3.4	14.0	7.1	13.9	NMIJ	3000
	KRISS	-4.9	8.2	-4.5	9.1	-2.5	7.1	-5.2	14.4	-1.5	14.4	KRISS	
	LNE	-2.1	6.6	-1.7	7.6	0.3	5.1	-2.4	13.5	1.3	13.5	LNE	
	NIM			0.4	8.4	2.4	6.1	-0.3	14.0	3.4	13.9	NIM	
	CENAM	-0.4	8.3			2.0	7.3	-0.7	14.5	3.0	14.5	CENAM	
	INMETRO	-2.3	6.1	-1.9	7.2			-2.7	13.3	1.0	13.3	INMETRO	
	UME	-1.5	13.9	-1.1	14.4	0.8	13.3			3.7	18.3	UME	
	VNIIM	-1.3	13.9	-0.9	14.4	1.0	13.3	0.2	18.2			VNIIM	

Table 9.14: Bilateral degrees of equivalence for the SE at 3150.0 Hz and 3500.0 Hz

f in Hz	j → / i ↓	PTB mean D_{ij} in 10^{-4}	PTB mean $U_{D_{ij}}$ $\frac{pC}{m/s^2}$	CMI D_{ij} in 10^{-4}	CMI $U_{D_{ij}}$ $\frac{pC}{m/s^2}$	NMISA D_{ij} in 10^{-4}	NMISA $U_{D_{ij}}$ $\frac{pC}{m/s^2}$	DPLA D_{ij} in 10^{-4}	DPLA $U_{D_{ij}}$ $\frac{pC}{m/s^2}$	CEM D_{ij} in 10^{-4}	CEM $U_{D_{ij}}$ $\frac{pC}{m/s^2}$	← j / ↓ i	f in Hz
	PTB mean			-6.6	5.6	3.4	10.5	1.0	5.6	1.4	5.6	PTB mean	
	CMI	7.5	5.5			10.0	11.7	7.6	7.5	8.0	7.5	CMI	
	NMISA	-2.3	10.5	-9.8	11.6			-2.4	11.7	-2.0	11.7	NMISA	
	DPLA	0.1	5.5	-7.4	7.4	2.4	11.6			0.4	7.5	DPLA	
	CEM	-0.5	5.5	-8.0	7.4	1.8	11.6	-0.6	7.4			CEM	
	GUM	1.7	6.7	-5.8	8.4	4.0	12.2	1.6	8.4	2.2	8.4	GUM	
	METAS	0.7	3.5	-6.8	6.1	3.0	10.8	0.6	6.1	1.2	6.1	METAS	
3150	NMIJ	3.9	5.4	-3.6	7.4	6.2	11.6	3.8	7.3	4.4	7.3	NMIJ	3500
	KRISS	-2.4	7.3	-9.9	8.9	-0.1	12.6	-2.5	8.9	-1.9	8.9	KRISS	
	LNE	0.0	4.3	-7.5	6.6	2.3	11.1	-0.1	6.6	0.5	6.6	LNE	
	NIM	2.7	5.5	-4.8	7.4	5.0	11.6	2.6	7.4	3.2	7.4	NIM	
	CENAM	1.5	6.7	-6.0	8.4	3.8	12.2	1.4	8.4	2.0	8.4	CENAM	
	INMETRO	-0.5	4.7	-8.0	6.9	1.8	11.3	-0.6	6.9	0.0	6.9	INMETRO	
	UME	0.3	13.0	-7.2	14.0	2.6	16.6	0.2	14.0	0.8	14.0	UME	
	VNIIM	-0.3	13.0	-7.8	14.0	2.0	16.6	-0.4	14.0	0.2	14.0	VNIIM	

Bilateral degrees of equivalence for the SE at 3150.0 Hz and 3500.0 Hz (continued)

f in Hz	j → / i ↓	GUM D_{ij} in 10^{-4}	GUM $U_{D_{ij}}$ $\frac{pC}{m/s^2}$	METAS D_{ij} in 10^{-4}	METAS $U_{D_{ij}}$ $\frac{pC}{m/s^2}$	NMIJ D_{ij} in 10^{-4}	NMIJ $U_{D_{ij}}$ $\frac{pC}{m/s^2}$	KRISS D_{ij} in 10^{-4}	KRISS $U_{D_{ij}}$ $\frac{pC}{m/s^2}$	LNE D_{ij} in 10^{-4}	LNE $U_{D_{ij}}$ $\frac{pC}{m/s^2}$	← j / ↓ i	f in Hz
	PTB mean	-1.5	6.8	0.6	3.6	-3.3	5.5	-1.3	8.7	0.5	4.4	PTB mean	
	CMI	5.1	8.5	7.2	6.2	3.3	7.4	5.3	10.0	7.1	6.7	CMI	
	NMISA	-4.9	12.3	-2.8	10.9	-6.7	11.6	-4.7	13.4	-2.9	11.2	NMISA	
	DPLA	-2.5	8.4	-0.4	6.2	-4.3	7.4	-2.3	10.0	-0.5	6.7	DPLA	
	CEM	-2.9	8.4	-0.8	6.2	-4.7	7.4	-2.7	10.0	-0.9	6.7	CEM	
	GUM			2.1	7.3	-1.8	8.4	0.2	10.8	2.0	7.7	GUM	
	METAS	-1.0	7.2			-3.9	6.1	-1.9	9.1	-0.1	5.1	METAS	
3150	NMIJ	2.2	8.3	3.2	6.0			2.0	10.0	3.8	6.6	NMIJ	3500
	KRISS	-4.1	9.7	-3.1	7.8	-6.3	8.8			1.8	9.4	KRISS	
	LNE	-1.7	7.6	-0.7	5.0	-3.9	6.5	2.4	8.2			LNE	
	NIM	1.0	8.4	2.0	6.1	-1.2	7.3	5.1	8.9	2.7	6.6	NIM	
	CENAM	-0.2	9.2	0.8	7.2	-2.4	8.3	3.9	9.7	1.5	7.6	CENAM	
	INMETRO	-2.2	7.9	-1.2	5.5	-4.4	6.8	1.9	8.4	-0.5	6.0	INMETRO	
	UME	-1.4	14.5	-0.4	13.3	-3.6	13.9	2.7	14.8	0.3	13.5	UME	
	VNIIM	-2.0	14.5	-1.0	13.3	-4.2	13.9	2.1	14.8	-0.3	13.5	VNIIM	

Bilateral degrees of equivalence for the SE at 3150.0 Hz and 3500.0 Hz (continued)

f in Hz	j → / i ↓	NIM D_{ij} in 10^{-4}	NIM $U_{D_{ij}}$ $\frac{pC}{m/s^2}$	CENAM D_{ij} in 10^{-4}	CENAM $U_{D_{ij}}$ $\frac{pC}{m/s^2}$	INMETRO D_{ij} in 10^{-4}	INMETRO $U_{D_{ij}}$ $\frac{pC}{m/s^2}$	UME D_{ij} in 10^{-4}	UME $U_{D_{ij}}$ $\frac{pC}{m/s^2}$	VNIIM D_{ij} in 10^{-4}	VNIIM $U_{D_{ij}}$ $\frac{pC}{m/s^2}$	← j / ↓ i	f in Hz
	PTB mean	-0.8	5.6	-1.4	6.8	-0.5	4.9	0.0	13.1	2.0	13.1	PTB mean	
	CMI	5.8	7.5	5.2	8.5	6.1	7.0	6.6	14.1	8.6	14.0	CMI	
	NMISA	-4.2	11.7	-4.8	12.3	-3.9	11.3	-3.4	16.6	-1.4	16.6	NMISA	
	DPLA	-1.8	7.5	-2.4	8.4	-1.5	7.0	-1.0	14.0	1.0	14.0	DPLA	
	CEM	-2.2	7.5	-2.8	8.4	-1.9	7.0	-1.4	14.0	0.6	14.0	CEM	
	GUM	0.7	8.5	0.1	9.3	1.0	8.0	1.5	14.6	3.5	14.6	GUM	
	METAS	-1.4	6.2	-2.0	7.3	-1.1	5.5	-0.6	13.4	1.4	13.4	METAS	
3150	NMIJ	2.5	7.4	1.9	8.4	2.8	6.9	3.3	14.0	5.3	14.0	NMIJ	3500
	KRISS	0.5	10.0	-0.1	10.8	0.8	9.6	1.3	15.5	3.3	15.5	KRISS	
	LNE	-1.3	6.7	-1.9	7.7	-1.0	6.1	-0.5	13.6	1.5	13.6	LNE	
	NIM			-0.6	8.5	0.3	7.0	0.8	14.0	2.8	14.0	NIM	
	CENAM	-1.2	8.4			0.9	8.0	1.4	14.6	3.4	14.6	CENAM	
	INMETRO	-3.2	6.9	-2.0	7.9			0.5	13.8	2.5	13.8	INMETRO	
	UME	-2.4	14.0	-1.2	14.5	0.8	13.7			2.0	18.4	UME	
	VNIIM	-3.0	14.0	-1.8	14.5	0.2	13.7	-0.6	18.3			VNIIM	

Table 9.15: Bilateral degrees of equivalence for the SE at 4000.0 Hz and 4500.0 Hz

f in Hz	j → i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j ↓ i	f in Hz
		D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$		
	PTB mean			-8.7	6.0	3.6	10.8	-0.2	8.4	0.3	6.0	PTB mean	
	CMI	9.0	5.8			12.3	12.0	8.5	9.8	9.0	7.9	CMI	
	NMISA	-3.0	10.7	-12.0	11.8			-3.8	13.3	-3.3	12.0	NMISA	
	DPLA	0.1	5.7	-8.9	7.7	3.1	11.8			0.5	9.8	DPLA	
	CEM	0.0	5.7	-9.0	7.7	3.0	11.8	-0.1	7.6			CEM	
	GUM	2.7	7.0	-6.3	8.6	5.7	12.4	2.6	8.6	2.7	8.6	GUM	
	METAS	0.1	3.9	-8.9	6.4	3.1	11.0	0.0	6.3	0.1	6.3	METAS	
4000	NMIJ	7.0	5.7	-2.0	7.6	10.0	11.7	6.9	7.6	7.0	7.6	NMIJ	4500
	KRISS	-0.2	7.7	-9.2	9.2	2.8	12.8	-0.3	9.2	-0.2	9.2	KRISS	
	LNE	-0.2	4.6	-9.2	6.9	2.8	11.3	-0.3	6.8	-0.2	6.8	LNE	
	NIM	0.4	5.7	-8.6	7.7	3.4	11.8	0.3	7.6	0.4	7.6	NIM	
	CENAM	1.4	7.0	-7.6	8.6	4.4	12.4	1.3	8.6	1.4	8.6	CENAM	
	INMETRO	0.3	5.1	-8.7	7.2	3.3	11.5	0.2	7.1	0.3	7.1	INMETRO	
	UME	2.8	13.3	-6.2	14.2	5.8	16.8	2.7	14.2	2.8	14.2	UME	
	VNIIM	-4.0	13.2	-13.0	14.1	-1.0	16.7	-4.1	14.1	-4.0	14.1	VNIIM	

Bilateral degrees of equivalence for the SE at 4000.0 Hz and 4500.0 Hz (continued)

f in Hz	j → i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j ↓ i	f in Hz
		D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$		
	PTB mean	-1.8	7.2	0.6	4.2	-5.0	5.9	-4.8	7.1	0.8	4.9	PTB mean	
	CMI	6.9	8.8	9.3	6.6	3.7	7.8	3.9	8.7	9.5	7.1	CMI	
	NMISA	-5.4	12.6	-3.0	11.2	-8.6	11.9	-8.4	12.5	-2.8	11.4	NMISA	
	DPLA	-1.6	10.5	0.8	8.8	-4.8	9.7	-4.6	10.5	1.0	9.2	DPLA	
	CEM	-2.1	8.8	0.3	6.6	-5.3	7.8	-5.1	8.7	0.5	7.0	CEM	
	GUM			2.4	7.7	-3.2	8.7	-3.0	9.5	2.6	8.1	GUM	
	METAS	-2.6	7.5			-5.6	6.5	-5.4	7.6	0.2	5.6	METAS	
4000	NMIJ	4.3	8.5	6.9	6.3			0.2	8.6	5.8	7.0	NMIJ	4500
	KRISS	-2.9	10.0	-0.3	8.1	-7.2	9.1			5.6	8.0	KRISS	
	LNE	-2.9	7.9	-0.3	5.3	-7.2	6.7	0.0	8.5			LNE	
	NIM	-2.3	8.6	0.3	6.3	-6.6	7.6	0.6	9.2	0.6	6.8	NIM	
	CENAM	-1.3	9.4	1.3	7.5	-5.6	8.5	1.6	10.0	1.6	7.9	CENAM	
	INMETRO	-2.4	8.1	0.2	5.7	-6.7	7.1	0.5	8.8	0.5	6.2	INMETRO	
	UME	0.1	14.7	2.7	13.5	-4.2	14.1	3.0	15.1	3.0	13.8	UME	
	VNIIM	-6.7	14.7	-4.1	13.5	-11.0	14.1	-3.8	15.0	-3.8	13.7	VNIIM	

Bilateral degrees of equivalence for the SE at 4000.0 Hz and 4500.0 Hz (continued)

f in Hz	j → i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j ↓ i	f in Hz
		D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$		
	PTB mean	-0.8	6.0	-3.0	7.2	0.3	5.3	-4.7	13.4	6.9	13.3	PTB mean	
	CMI	7.9	7.9	5.7	8.8	9.0	7.4	4.0	14.4	15.6	14.3	CMI	
	NMISA	-4.4	12.0	-6.6	12.6	-3.3	11.6	-8.3	17.0	3.3	16.9	NMISA	
	DPLA	-0.6	9.8	-2.8	10.6	0.5	9.4	-4.5	15.5	7.1	15.4	DPLA	
	CEM	-1.1	7.9	-3.3	8.8	0.0	7.3	-5.0	14.4	6.6	14.3	CEM	
	GUM	1.0	8.8	-1.2	9.6	2.1	8.3	-2.9	14.9	8.7	14.8	GUM	
	METAS	-1.4	6.6	-3.6	7.7	-0.3	6.0	-5.3	13.7	6.3	13.6	METAS	
4000	NMIJ	4.2	7.8	2.0	8.7	5.3	7.3	0.3	14.3	11.9	14.2	NMIJ	4500
	KRISS	4.0	8.7	1.8	9.5	5.1	8.2	0.1	14.8	11.7	14.7	KRISS	
	LNE	-1.6	7.0	-3.8	8.1	-0.5	6.5	-5.5	13.9	6.1	13.8	LNE	
	NIM			-2.2	8.8	1.1	7.4	-3.9	14.4	7.7	14.3	NIM	
	CENAM	1.0	8.6			3.3	8.3	-1.7	14.9	9.9	14.8	CENAM	
	INMETRO	-0.1	7.1	-1.1	8.1			-5.0	14.1	6.6	14.0	INMETRO	
	UME	2.4	14.2	1.4	14.7	2.5	13.9			11.6	18.6	UME	
	VNIIM	-4.4	14.1	-5.4	14.6	-4.3	13.8	-6.8	18.5			VNIIM	

Table 9.16: Bilateral degrees of equivalence for the SE at 5000.0 Hz and 5500.0 Hz

f in Hz	j → i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j ↓ i	f in Hz
		D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$		
	PTB mean			-6.8	7.8	4.8	16.8	-0.2	9.7	1.2	12.0	PTB mean	
	CMI	6.8	6.4			11.6	17.1	6.6	10.4	8.0	12.5	CMI	
	NMISA	-4.3	16.1	-11.1	16.9			-5.0	18.1	-3.6	19.4	NMISA	
	DPLA	1.0	8.6	-5.8	10.0	5.3	17.9			1.4	13.8	DPLA	
	CEM	-1.2	6.3	-8.0	8.1	3.1	16.9	-2.2	10.0			CEM	
	GUM	2.0	8.7	-4.8	10.0	6.3	17.9	1.0	11.6	3.2	10.0	GUM	
	METAS	-0.1	4.7	-6.9	6.9	4.2	16.3	-1.1	9.1	1.1	6.9	METAS	
5000	NMIJ	4.6	6.2	-2.2	8.1	8.9	16.9	3.6	10.0	5.8	8.0	NMIJ	5500
	KRISS											KRISS	
	LNE	-1.0	8.6	-7.8	10.0	3.3	17.9	-2.0	11.6	0.2	10.0	LNE	
	NIM	2.6	6.3	-4.2	8.2	6.9	16.9	1.6	10.0	3.8	8.1	NIM	
	CENAM	4.3	13.6	-2.5	14.6	8.6	20.8	3.3	15.7	5.5	14.6	CENAM	
	INMETRO	0.8	8.6	-6.0	10.0	5.1	17.9	-0.2	11.6	2.0	10.0	INMETRO	
	UME	2.3	13.6	-4.5	14.6	6.6	20.8	1.3	15.7	3.5	14.5	UME	
	VNIIM	-13.4	13.5	-20.2	14.4	-9.1	20.7	-14.4	15.6	-12.2	14.4	VNIIM	

Bilateral degrees of equivalence for the SE at 5000.0 Hz and 5500.0 Hz (continued)

f in Hz	j → i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j ↓ i	f in Hz
		D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$		
	PTB mean	-0.5	15.6	1.4	10.6	-6.7	7.7			1.5	9.7	PTB mean	
	CMI	6.3	16.0	8.2	11.2	0.1	8.4			8.3	10.3	CMI	
	NMISA	-5.3	21.8	-3.4	18.6	-11.5	17.1			-3.3	18.1	NMISA	
	DPLA	-0.3	17.0	1.6	12.6	-6.5	10.3			1.7	11.9	DPLA	
	CEM	-1.7	18.4	0.2	14.4	-7.9	12.4			0.3	13.8	CEM	
	GUM			1.9	17.6	-6.2	15.9			2.0	17.0	GUM	
	METAS	-2.1	9.1			-8.1	11.1			0.1	12.6	METAS	
5000	NMIJ	2.6	10.0	4.7	6.8					8.2	10.3	NMIJ	5500
	KRISS											KRISS	
	LNE	-3.0	11.6	-0.9	9.1	-5.6	10.0					LNE	
	NIM	0.6	10.0	2.7	6.9	-2.0	8.1			3.6	10.0	NIM	
	CENAM	2.3	15.7	4.4	13.9	-0.3	14.5			5.3	15.7	CENAM	
	INMETRO	-1.2	11.6	0.9	9.1	-3.8	10.0			1.8	11.6	INMETRO	
	UME	0.3	15.7	2.4	13.9	-2.3	14.5			3.3	15.7	UME	
	VNIIM	-15.4	15.6	-13.3	13.7	-18.0	14.4			-12.4	15.5	VNIIM	

Bilateral degrees of equivalence for the SE at 5000.0 Hz and 5500.0 Hz (continued)

f in Hz	j → i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j ↓ i	f in Hz
		D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$		
	PTB mean	1.1	14.4	-5.3	14.4	0.5	9.7	0.3	20.6	17.2	26.7	PTB mean	
	CMI	7.9	14.8	1.5	14.8	7.3	10.4	7.1	20.9	24.0	26.9	CMI	
	NMISA	-3.7	21.0	-10.1	21.0	-4.3	18.1	-4.5	25.7	12.4	30.8	NMISA	
	DPLA	1.3	15.9	-5.1	16.0	0.7	11.9	0.5	21.7	17.4	27.6	DPLA	
	CEM	-0.1	17.4	-6.5	17.4	-0.7	13.8	-0.9	22.8	16.0	28.4	CEM	
	GUM	1.6	20.0	-4.8	20.1	1.0	17.0	0.8	24.9	17.7	30.1	GUM	
	METAS	-0.3	16.5	-6.7	16.5	-0.9	12.6	-1.1	22.1	15.8	27.9	METAS	
5000	NMIJ	7.8	14.7	1.4	14.8	7.2	10.3	7.0	20.9	23.9	26.9	NMIJ	5500
	KRISS											KRISS	
	LNE	-0.4	15.9	-6.8	16.0	-1.0	11.9	-1.2	21.7	15.7	27.6	LNE	
	NIM			-6.4	19.1	-0.6	15.9	-0.8	24.1	16.1	29.5	NIM	
	CENAM	1.7	14.6			5.8	16.0	5.6	24.2	22.5	29.5	CENAM	
	INMETRO	-1.8	10.0	-3.5	15.7			-0.2	21.7	16.7	27.6	INMETRO	
	UME	-0.3	14.5	-2.0	18.9	1.5	15.7			16.9	33.0	UME	
	VNIIM	-16.0	14.4	-17.7	18.8	-14.2	15.6	-15.7	18.8			VNIIM	

Table 9.17: Bilateral degrees of equivalence for the SE at 6000.0 Hz and 6300.0 Hz

f in Hz	j → i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j ↓ i	f in Hz
		D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$		
	PTB mean			-4.8	8.6	4.8	17.3	-1.5	10.4	1.2	12.6	PTB mean	
	CMI	3.8	8.2			9.6	17.7	3.3	11.0	6.0	13.1	CMI	
	NMISA	-5.0	17.1	-8.8	17.4			-6.3	18.6	-3.6	19.9	NMISA	
	DPLA	-0.1	10.1	-3.9	10.7	4.9	18.4			2.7	14.4	DPLA	
	CEM	-1.2	12.3	-5.0	12.8	3.8	19.7	-1.1	14.1			CEM	
	GUM	3.2	15.9	-0.6	16.3	8.2	22.2	3.3	17.4	4.4	18.7	GUM	
	METAS	-1.9	11.0	-5.7	11.5	3.1	18.9	-1.8	13.0	-0.7	14.8	METAS	
6000	NMIJ	6.7	8.2	2.9	9.0	11.7	17.4	6.8	10.7	7.9	12.8	NMIJ	6300
	KRISS											KRISS	
	LNE	-1.8	10.1	-5.6	10.7	3.2	18.4	-1.7	12.3	-0.6	14.1	LNE	
	NIM	0.3	14.7	-3.5	15.1	5.3	21.3	0.4	16.2	1.5	17.7	NIM	
	CENAM	6.3	14.8	2.5	15.2	11.3	21.3	6.4	16.3	7.5	17.7	CENAM	
	INMETRO	0.3	10.1	-3.5	10.7	5.3	18.4	0.4	12.3	1.5	14.1	INMETRO	
	UME	3.5	20.9	-0.3	21.2	8.5	26.0	3.6	22.1	4.7	23.1	UME	
	VNIIM	-20.6	26.9	-24.4	27.1	-15.6	31.0	-20.5	27.8	-19.4	28.7	VNIIM	

Bilateral degrees of equivalence for the SE at 6000.0 Hz and 6300.0 Hz (continued)

f in Hz	j → i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j ↓ i	f in Hz
		D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$		
	PTB mean	-4.1	16.2	1.4	11.3	-7.1	8.6			-0.7	10.4	PTB mean	
	CMI	0.7	16.6	6.2	11.8	-2.3	9.3			4.1	11.0	CMI	
	NMISA	-8.9	22.4	-3.4	19.1	-11.9	17.7			-5.5	18.6	NMISA	
	DPLA	-2.6	17.6	2.9	13.2	-5.6	11.0			0.8	12.5	DPLA	
	CEM	-5.3	19.0	0.2	15.0	-8.3	13.1			-1.9	14.4	CEM	
	GUM			5.5	18.1	-3.0	16.6			3.4	17.6	GUM	
	METAS	-5.1	17.9			-8.5	11.8			-2.1	13.2	METAS	
6000	NMIJ	3.5	16.3	8.6	11.5					6.4	11.0	NMIJ	6300
	KRISS											KRISS	
	LNE	-5.0	17.4	0.1	13.0	-8.5	10.7					LNE	
	NIM	-2.9	20.4	2.2	16.8	-6.4	15.1			2.1	16.2	NIM	
	CENAM	3.1	20.4	8.2	16.8	-0.4	15.2			8.1	16.3	CENAM	
	INMETRO	-2.9	17.4	2.2	13.0	-6.4	10.7			2.1	12.3	INMETRO	
	UME	0.3	25.3	5.4	22.5	-3.2	21.2			5.3	22.1	UME	
	VNIIM	-23.8	30.4	-18.7	28.1	-27.3	27.1			-18.8	27.8	VNIIM	

Bilateral degrees of equivalence for the SE at 6000.0 Hz and 6300.0 Hz (continued)

f in Hz	j → i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j ↓ i	f in Hz
		D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4}\frac{pC}{m/s^2}$	$U_{D_{ij}}$		
	PTB mean	-3.2	15.0	-7.9	15.0	0.1	10.4	-5.8	21.2	21.6	27.1	PTB mean	
	CMI	1.6	15.4	-3.1	15.4	4.9	11.0	-1.0	21.5	26.4	27.3	CMI	
	NMISA	-8.0	21.5	-12.7	21.5	-4.7	18.6	-10.6	26.2	16.8	31.2	NMISA	
	DPLA	-1.7	16.5	-6.4	16.5	1.6	12.5	-4.3	22.3	23.1	28.0	DPLA	
	CEM	-4.4	17.9	-9.1	18.0	-1.1	14.4	-7.0	23.4	20.4	28.8	CEM	
	GUM	0.9	20.6	-3.8	20.6	4.2	17.6	-1.7	25.5	25.7	30.6	GUM	
	METAS	-4.6	17.0	-9.3	17.1	-1.3	13.2	-7.2	22.7	20.2	28.3	METAS	
6000	NMIJ	3.9	15.4	-0.8	15.4	7.2	11.0	1.3	21.5	28.7	27.3	NMIJ	6300
	KRISS											KRISS	
	LNE	-2.5	16.5	-7.2	16.5	0.8	12.5	-5.1	22.3	22.3	28.0	LNE	
	NIM			-4.7	19.7	3.3	16.5	-2.6	24.7	24.8	29.9	NIM	
	CENAM	6.0	19.5			8.0	16.5	2.1	24.8	29.5	30.0	CENAM	
	INMETRO	0.0	16.2	-6.0	16.3			-5.9	22.3	21.5	28.0	INMETRO	
	UME	3.2	24.5	-2.8	24.5	3.2	22.1			27.4	33.5	UME	
	VNIIM	-20.9	29.8	-26.9	29.8	-20.9	27.8	-24.1	33.3			VNIIM	

Table 9.18: Bilateral degrees of equivalence for the SE at 6500.0 Hz and 7000.0 Hz

f in Hz	j → i ↓	PTB mean D_{ij}	$U_{D_{ij}}$	CMI D_{ij}	$U_{D_{ij}}$	NMISA D_{ij}	$U_{D_{ij}}$	DPLA D_{ij}	$U_{D_{ij}}$	CEM D_{ij}	$U_{D_{ij}}$	← j ↓ i	f in Hz
		in $10^{-4}\frac{pC}{m/s^2}$		in $10^{-4}\frac{pC}{m/s^2}$		in $10^{-4}\frac{pC}{m/s^2}$		in $10^{-4}\frac{pC}{m/s^2}$		in $10^{-4}\frac{pC}{m/s^2}$			
	PTB mean			-2.2	9.5	5.8	17.9	1.1	15.6	1.8	13.3	PTB mean	
	CMI	5.4	8.8			8.0	18.3	3.3	16.0	4.0	13.8	CMI	
	NMISA	-4.5	17.5	-9.9	17.8			-4.7	22.0	-4.0	20.5	NMISA	
	DPLA	0.6	15.1	-4.8	15.5	5.1	21.6			0.7	18.5	DPLA	
	CEM	-1.6	12.8	-7.0	13.3	2.9	20.1	-2.2	18.1			CEM	
	GUM	3.4	16.3	-2.0	16.7	7.9	22.5	2.8	20.7	5.0	19.1	GUM	
	METAS	-2.4	11.5	-7.8	12.0	2.1	19.3	-3.0	17.2	-0.8	15.1	METAS	
6500	NMIJ	7.3	8.7	1.9	9.4	11.8	17.8	6.7	15.5	8.9	13.2	NMIJ	7000
	KRISS											KRISS	
	LNE	-3.1	10.6	-8.5	11.2	1.4	18.8	-3.7	16.6	-1.5	14.5	LNE	
	NIM	3.4	15.1	-2.0	15.5	7.9	21.6	2.8	19.8	5.0	18.1	NIM	
	CENAM	9.6	15.2	4.2	15.6	14.1	21.7	9.0	19.8	11.2	18.1	CENAM	
	INMETRO	0.6	10.6	-4.8	11.2	5.1	18.8	0.0	16.6	2.2	14.5	INMETRO	
	UME	6.4	21.3	1.0	21.6	10.9	26.4	5.8	24.9	8.0	23.5	UME	
	VNIIM	-22.0	27.2	-27.4	27.5	-17.5	31.3	-22.6	30.1	-20.4	29.0	VNIIM	

Bilateral degrees of equivalence for the SE at 6500.0 Hz and 7000.0 Hz (continued)

f in Hz	j → i ↓	GUM D_{ij}	$U_{D_{ij}}$	METAS D_{ij}	$U_{D_{ij}}$	NMIJ D_{ij}	$U_{D_{ij}}$	KRISS D_{ij}	$U_{D_{ij}}$	LNE D_{ij}	$U_{D_{ij}}$	← j ↓ i	f in Hz
		in $10^{-4}\frac{pC}{m/s^2}$		in $10^{-4}\frac{pC}{m/s^2}$		in $10^{-4}\frac{pC}{m/s^2}$		in $10^{-4}\frac{pC}{m/s^2}$		in $10^{-4}\frac{pC}{m/s^2}$			
	PTB mean	-4.6	16.8	5.2	12.0	-7.4	9.5			3.6	15.6	PTB mean	
	CMI	-2.4	17.2	7.4	12.6	-5.2	10.2			5.8	16.0	CMI	
	NMISA	-10.4	22.9	-0.6	19.7	-13.2	18.3			-2.2	22.0	NMISA	
	DPLA	-5.7	21.2	4.1	17.6	-8.5	16.0			2.5	20.2	DPLA	
	CEM	-6.4	19.6	3.4	15.6	-9.2	13.8			1.8	18.5	CEM	
	GUM			9.8	18.7	-2.8	17.2			8.2	21.1	GUM	
	METAS	-5.8	18.2			-12.6	12.6			-1.6	17.6	METAS	
6500	NMIJ	3.9	16.7	9.7	11.9					11.0	16.0	NMIJ	7000
	KRISS											KRISS	
	LNE	-6.5	17.7	-0.7	13.4	-10.4	11.2					LNE	
	NIM	0.0	20.7	5.8	17.2	-3.9	15.5			6.5	16.6	NIM	
	CENAM	6.2	20.8	12.0	17.2	2.3	15.6			12.7	16.7	CENAM	
	INMETRO	-2.8	17.7	3.0	13.4	-6.7	11.2			3.7	12.7	INMETRO	
	UME	3.0	25.6	8.8	22.8	-0.9	21.6			9.5	22.4	UME	
	VNIIM	-25.4	30.7	-19.6	28.4	-29.3	27.4			-18.9	28.1	VNIIM	

Bilateral degrees of equivalence for the SE at 6500.0 Hz and 7000.0 Hz (continued)

f in Hz	j → i ↓	NIM D_{ij}	$U_{D_{ij}}$	CENAM D_{ij}	$U_{D_{ij}}$	INMETRO D_{ij}	$U_{D_{ij}}$	UME D_{ij}	$U_{D_{ij}}$	VNIIM D_{ij}	$U_{D_{ij}}$	← j ↓ i	f in Hz
		in $10^{-4}\frac{pC}{m/s^2}$		in $10^{-4}\frac{pC}{m/s^2}$		in $10^{-4}\frac{pC}{m/s^2}$		in $10^{-4}\frac{pC}{m/s^2}$		in $10^{-4}\frac{pC}{m/s^2}$			
	PTB mean	-2.2	15.6	-8.9	15.7	3.1	13.3	-7.2	21.8	25.7	27.6	PTB mean	
	CMI	0.0	16.0	-6.7	16.1	5.3	13.8	-5.0	22.1	27.9	27.8	CMI	
	NMISA	-8.0	22.1	-14.7	22.1	-2.7	20.5	-13.0	26.8	19.9	31.7	NMISA	
	DPLA	-3.3	20.2	-10.0	20.3	2.0	18.5	-8.3	25.3	24.6	30.4	DPLA	
	CEM	-4.0	18.5	-10.7	18.6	1.3	16.6	-9.0	24.0	23.9	29.3	CEM	
	GUM	2.4	21.2	-4.3	21.2	7.7	19.5	-2.6	26.1	30.3	31.1	GUM	
	METAS	-7.4	17.6	-14.1	17.7	-2.1	15.6	-12.4	23.3	20.5	28.8	METAS	
6500	NMIJ	5.2	16.0	-1.5	16.1	10.5	13.8	0.2	22.1	33.1	27.8	NMIJ	7000
	KRISS											KRISS	
	LNE	-5.8	20.2	-12.5	20.2	-0.5	18.5	-10.8	25.3	22.1	30.4	LNE	
	NIM			-6.7	20.3	5.3	18.5	-5.0	25.3	27.9	30.4	NIM	
	CENAM	6.2	19.9			12.0	18.6	1.7	25.3	34.6	30.5	CENAM	
	INMETRO	-2.8	16.6	-9.0	16.7			-10.3	24.0	22.6	29.3	INMETRO	
	UME	3.0	24.9	-3.2	24.9	5.8	22.4			32.9	34.0	UME	
	VNIIM	-25.4	30.1	-31.6	30.1	-22.6	28.1	-28.4	33.6			VNIIM	

Table 9.19: Bilateral degrees of equivalence for the SE at 7500.0 Hz and 8000.0 Hz

f	j →	PTB mean		CMI		NMISA		DPLA		CEM		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	↓ i	in Hz
	PTB mean			-3.8	11.3	7.5	19.1	0.7	16.9	2.2	14.8	PTB mean	
	CMI	3.2	10.4			11.3	19.5	4.5	17.3	6.0	15.2	CMI	
	NMISA	-6.8	18.5	-10.0	18.8			-6.8	23.2	-5.3	21.7	NMISA	
	DPLA	0.9	16.2	-2.3	16.6	7.7	22.6			1.5	19.7	DPLA	
	CEM	-1.8	14.0	-5.0	14.5	5.0	21.1	-2.7	19.1			CEM	
	GUM	3.7	17.4	0.5	17.8	10.5	23.5	2.8	21.7	5.5	20.1	GUM	
	METAS	-1.7	12.8	-4.9	13.3	5.1	20.3	-2.6	18.2	0.1	16.3	METAS	
7500	NMIJ	10.8	10.4	7.6	11.0	17.6	18.9	9.9	16.6	12.6	14.5	NMIJ	8000
	KRISS											KRISS	
	LNE	-4.2	16.2	-7.4	16.6	2.6	22.6	-5.1	20.8	-2.4	19.1	LNE	
	NIM	2.1	16.2	-1.1	16.6	8.9	22.6	1.2	20.8	3.9	19.1	NIM	
	CENAM	8.5	16.3	5.3	16.7	15.3	22.6	7.6	20.8	10.3	19.2	CENAM	
	INMETRO	-4.7	14.0	-7.9	14.4	2.1	21.0	-5.6	19.1	-2.9	17.2	INMETRO	
	UME	3.2	24.8	0.0	25.1	10.0	29.4	2.3	28.0	5.0	26.8	UME	
	VNIIM	-31.2	28.0	-34.4	28.3	-24.4	32.1	-32.1	30.9	-29.4	29.8	VNIIM	

Bilateral degrees of equivalence for the SE at 7500.0 Hz and 8000.0 Hz (continued)

f	j →	GUM		METAS		NMIJ		KRISS		LNE		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	↓ i	in Hz
	PTB mean	-7.0	18.1	5.3	13.6	-12.4	11.4			3.8	16.9	PTB mean	
	CMI	-3.2	18.5	9.1	14.1	-8.6	12.0			7.6	17.3	CMI	
	NMISA	-14.5	24.1	-2.2	20.9	-19.9	19.5			-3.7	23.2	NMISA	
	DPLA	-7.7	22.4	4.6	18.9	-13.1	17.4			3.1	21.4	DPLA	
	CEM	-9.2	20.8	3.1	17.0	-14.6	15.3			1.6	19.7	CEM	
	GUM			12.3	19.9	-5.4	18.5			10.8	22.3	GUM	
	METAS	-5.4	19.3			-17.7	14.1			-1.5	18.8	METAS	
7500	NMIJ	7.1	17.8	12.5	13.3					16.2	17.3	NMIJ	8000
	KRISS											KRISS	
	LNE	-7.9	21.7	-2.5	18.2	-15.0	16.6					LNE	
	NIM	-1.6	21.7	3.8	18.2	-8.7	16.6			6.3	20.8	NIM	
	CENAM	4.8	21.8	10.2	18.3	-2.3	16.7			12.7	20.8	CENAM	
	INMETRO	-8.4	20.1	-3.0	16.3	-15.5	14.5			-0.5	19.1	INMETRO	
	UME	-0.5	28.7	4.9	26.2	-7.6	25.1			7.4	28.0	UME	
	VNIIM	-34.9	31.5	-29.5	29.2	-42.0	28.3			-27.0	30.9	VNIIM	

Bilateral degrees of equivalence for the SE at 7500.0 Hz and 8000.0 Hz (continued)

f	j →	NIM		CENAM		INMETRO		UME		VNIIM		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	in 10^{-4}	$\frac{pC}{m/s^2}$	↓ i	in Hz
	PTB mean	-3.1	17.0	-10.7	17.0	3.7	14.8	-1.8	25.4	37.4	28.5	PTB mean	
	CMI	0.7	17.3	-6.9	17.4	7.5	15.2	2.0	25.6	41.2	28.7	CMI	
	NMISA	-10.6	23.2	-18.2	23.3	-3.8	21.7	-9.3	29.9	29.9	32.6	NMISA	
	DPLA	-3.8	21.4	-11.4	21.5	3.0	19.7	-2.5	28.5	36.7	31.3	DPLA	
	CEM	-5.3	19.8	-12.9	19.8	1.5	17.9	-4.0	27.3	35.2	30.2	CEM	
	GUM	3.9	22.4	-3.7	22.4	10.7	20.8	5.2	29.3	44.4	32.0	GUM	
	METAS	-8.4	18.9	-16.0	18.9	-1.6	17.0	-7.1	26.7	32.1	29.7	METAS	
7500	NMIJ	9.3	17.4	1.7	17.5	16.1	15.3	10.6	25.7	49.8	28.7	NMIJ	8000
	KRISS											KRISS	
	LNE	-6.9	21.4	-14.5	21.4	-0.1	19.7	-5.6	28.5	33.6	31.3	LNE	
	NIM			-7.6	21.5	6.8	19.8	1.3	28.6	40.5	31.4	NIM	
	CENAM	6.4	20.8			14.4	19.8	8.9	28.6	48.1	31.4	CENAM	
	INMETRO	-6.8	19.1	-13.2	19.1			-5.5	27.3	33.7	30.2	INMETRO	
	UME	1.1	28.0	-5.3	28.0	7.9	26.8			39.2	36.6	UME	
	VNIIM	-33.3	30.9	-39.7	30.9	-26.5	29.8	-34.4	36.1			VNIIM	

Table 9.20: Bilateral degrees of equivalence for the SE at 8500.0 Hz and 9000.0 Hz

f in Hz	j → i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j ↓ i	f in Hz
		D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$		
	PTB mean			4.4	13.7	7.3	20.9	-20.7	24.7	1.4	16.8	PTB mean	
	CMI	-0.1	12.4			2.9	21.2	-25.1	25.0	-3.0	17.2	CMI	
	NMISA	-7.2	19.9	-7.1	20.3			-28.0	29.5	-5.9	23.3	NMISA	
	DPLA	2.7	17.8	2.8	18.2	9.9	23.9			22.1	26.8	DPLA	
	CEM	-1.1	15.7	-1.0	16.1	6.1	22.4	-3.8	20.5			CEM	
	GUM	7.8	18.9	7.9	19.3	15.0	24.8	5.1	23.1	8.9	21.5	GUM	
	METAS	-2.4	14.6	-2.3	15.0	4.8	21.6	-5.1	19.7	-1.3	17.8	METAS	
8500	NMIJ	13.5	12.5	13.6	13.0	20.7	20.3	10.8	18.2	14.6	16.1	NMIJ	9000
	KRISS											KRISS	
	LNE	-4.8	17.7	-4.7	18.1	2.4	23.9	-7.5	22.1	-3.7	20.5	LNE	
	NIM	2.3	17.8	2.4	18.2	9.5	23.9	-0.4	22.2	3.4	20.5	NIM	
	CENAM	11.3	17.8	11.4	18.2	18.5	24.0	8.6	22.2	12.4	20.6	CENAM	
	INMETRO	-2.0	15.7	-1.9	16.1	5.2	22.4	-4.7	20.5	-0.9	18.7	INMETRO	
	UME	3.9	26.1	4.0	26.3	11.1	30.6	1.2	29.3	5.0	28.0	UME	
	VNIIM	-42.3	29.1	-42.2	29.3	-35.1	33.2	-45.0	31.9	-41.2	30.8	VNIIM	

Bilateral degrees of equivalence for the SE at 8500.0 Hz and 9000.0 Hz (continued)

f in Hz	j → i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j ↓ i	f in Hz
		D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$		
	PTB mean	-2.5	19.9	2.1	15.7	-9.3	13.8			10.8	18.7	PTB mean	
	CMI	-6.9	20.2	-2.3	16.1	-13.7	14.2			6.4	19.0	CMI	
	NMISA	-9.8	25.6	-5.2	22.5	-16.6	21.2			3.5	24.7	NMISA	
	DPLA	18.2	28.8	22.8	26.1	11.4	25.0			31.5	28.0	DPLA	
	CEM	-3.9	22.4	0.7	18.8	-10.7	17.2			9.4	21.4	CEM	
	GUM			4.6	21.6	-6.8	20.2			13.3	23.9	GUM	
	METAS	-10.2	20.7			-11.4	16.2			8.7	20.5	METAS	
8500	NMIJ	5.7	19.3	15.9	15.0					20.1	19.1	NMIJ	9000
	KRISS											KRISS	
	LNE	-12.6	23.0	-2.4	19.6	-18.3	18.1					LNE	
	NIM	-5.5	23.1	4.7	19.7	-11.2	18.2			7.1	22.1	NIM	
	CENAM	3.5	23.1	13.7	19.7	-2.2	18.2			16.1	22.2	CENAM	
	INMETRO	-9.8	21.5	0.4	17.8	-15.5	16.1			2.8	20.5	INMETRO	
	UME	-3.9	30.0	6.3	27.4	-9.6	26.4			8.7	29.2	UME	
	VNIIM	-50.1	32.6	-39.9	30.2	-55.8	29.3			-37.5	31.9	VNIIM	

Bilateral degrees of equivalence for the SE at 8500.0 Hz and 9000.0 Hz (continued)

f in Hz	j → i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j ↓ i	f in Hz
		D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$	D_{ij} in 10^{-4}	$U_{D_{ij}}$ $\frac{pC}{m/s^2}$		
	PTB mean	-6.9	18.8	-11.3	18.8	4.4	16.8	-0.6	26.9	53.6	29.7	PTB mean	
	CMI	-11.3	19.2	-15.7	19.2	0.0	17.2	-5.0	27.1	49.2	29.9	CMI	
	NMISA	-14.2	24.8	-18.6	24.8	-2.9	23.3	-7.9	31.4	46.3	33.8	NMISA	
	DPLA	13.8	28.1	9.4	28.1	25.1	26.8	20.1	34.1	74.3	36.3	DPLA	
	CEM	-8.3	21.5	-12.7	21.5	3.0	19.7	-2.0	28.8	52.2	31.4	CEM	
	GUM	-4.4	24.0	-8.8	24.0	6.9	22.4	1.9	30.7	56.1	33.2	GUM	
	METAS	-9.0	20.7	-13.4	20.7	2.3	18.8	-2.7	28.2	51.5	30.9	METAS	
8500	NMIJ	2.4	19.2	-2.0	19.3	13.7	17.2	8.7	27.2	62.9	30.0	NMIJ	9000
	KRISS											KRISS	
	LNE	-17.7	23.0	-22.1	23.0	-6.4	21.4	-11.4	30.0	42.8	32.5	LNE	
	NIM			-4.4	23.1	11.3	21.5	6.3	30.1	60.5	32.6	NIM	
	CENAM	9.0	22.2			15.7	21.5	10.7	30.1	64.9	32.6	CENAM	
	INMETRO	-4.3	20.5	-13.3	20.6			-5.0	28.8	49.2	31.4	INMETRO	
	UME	1.6	29.2	-7.4	29.3	5.9	28.0			54.2	37.8	UME	
	VNIIM	-44.6	31.9	-53.6	32.0	-40.3	30.8	-46.2	37.2			VNIIM	

Table 9.21: Bilateral degrees of equivalence for the SE at 9500.0 Hz and 10000.0 Hz

f in Hz	j → i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j ↓ i	f in Hz
		D_{ij} in $10^{-4} \frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4} \frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4} \frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4} \frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4} \frac{pC}{m/s^2}$	$U_{D_{ij}}$		
	PTB mean			1.3	16.6	11.8	23.1	3.4	21.1	5.3	19.3	PTB mean	
	CMI	-3.5	15.1			10.5	23.4	2.1	21.5	4.0	19.7	CMI	
	NMISA	-12.9	21.9	-9.4	22.2			-8.4	26.8	-6.5	25.4	NMISA	
	DPLA	-0.1	19.9	3.4	20.2	12.8	25.7			1.9	23.6	DPLA	
	CEM	-8.5	17.9	-5.0	18.3	4.4	24.2	-8.4	22.4			CEM	
	GUM	15.3	21.0	18.8	21.4	28.2	26.6	15.4	25.0	23.8	23.5	GUM	
	METAS	-17.0	16.9	-13.5	17.3	-4.1	23.5	-16.9	21.6	-8.5	19.8	METAS	
9500	NMIJ	9.2	15.2	12.7	15.6	22.1	22.3	9.3	20.3	17.7	18.4	NMIJ	10000
	KRISS											KRISS	
	LNE	1.7	19.9	5.2	20.2	14.6	25.7	1.8	24.0	10.2	22.4	LNE	
	NIM	7.9	19.9	11.4	20.3	20.8	25.7	8.0	24.1	16.4	22.5	NIM	
	CENAM	11.5	20.0	15.0	20.3	24.4	25.7	11.6	24.1	20.0	22.5	CENAM	
	INMETRO	-4.7	17.9	-1.2	18.3	8.2	24.2	-4.6	22.5	3.8	20.7	INMETRO	
	UME	-0.3	27.8	3.2	28.0	12.6	32.2	-0.2	30.9	8.2	29.7	UME	
	VNIIM	-62.0	30.4	-58.5	30.7	-49.1	34.5	-61.9	33.3	-53.5	32.2	VNIIM	

Bilateral degrees of equivalence for the SE at 9500.0 Hz and 10000.0 Hz (continued)

f in Hz	j → i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j ↓ i	f in Hz
		D_{ij} in $10^{-4} \frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4} \frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4} \frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4} \frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4} \frac{pC}{m/s^2}$	$U_{D_{ij}}$		
	PTB mean	-13.3	24.4	10.2	18.3	-11.9	17.1			3.1	21.1	PTB mean	
	CMI	-14.6	24.7	8.9	18.7	-13.2	17.5			1.8	21.5	CMI	
	NMISA	-25.1	29.4	-1.6	24.7	-23.7	23.7			-8.7	26.8	NMISA	
	DPLA	-16.7	27.9	6.8	22.8	-15.3	21.8			-0.3	25.1	DPLA	
	CEM	-18.6	26.6	4.9	21.2	-17.2	20.1			-2.2	23.6	CEM	
	GUM			23.5	25.9	1.4	25.0			16.4	27.9	GUM	
	METAS	-32.3	22.7			-22.1	19.1			-7.1	22.8	METAS	
9500	NMIJ	-6.1	21.4	26.2	17.4					15.0	21.8	NMIJ	10000
	KRISS											KRISS	
	LNE	-13.6	25.0	18.7	21.6	-7.5	20.3					LNE	
	NIM	-7.4	25.0	24.9	21.7	-1.3	20.4			6.2	24.1	NIM	
	CENAM	-3.8	25.1	28.5	21.7	2.3	20.4			9.8	24.1	CENAM	
	INMETRO	-20.0	23.5	12.3	19.9	-13.9	18.4			-6.4	22.5	INMETRO	
	UME	-15.6	31.7	16.7	29.1	-9.5	28.1			-2.0	30.9	UME	
	VNIIM	-77.3	34.0	-45.0	31.6	-71.2	30.7			-63.7	33.3	VNIIM	

Bilateral degrees of equivalence for the SE at 9500.0 Hz and 10000.0 Hz (continued)

f in Hz	j → i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j ↓ i	f in Hz
		D_{ij} in $10^{-4} \frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4} \frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4} \frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4} \frac{pC}{m/s^2}$	$U_{D_{ij}}$	D_{ij} in $10^{-4} \frac{pC}{m/s^2}$	$U_{D_{ij}}$		
	PTB mean	-5.1	21.2	-15.9	21.3	3.8	19.3	-11.9	29.1	62.5	31.5	PTB mean	
	CMI	-6.4	21.5	-17.2	21.6	2.5	19.7	-13.2	29.3	61.2	31.7	CMI	
	NMISA	-16.9	26.8	-27.7	26.9	-8.0	25.4	-23.7	33.4	50.7	35.5	NMISA	
	DPLA	-8.5	25.2	-19.3	25.3	0.4	23.6	-15.3	32.1	59.1	34.3	DPLA	
	CEM	-10.4	23.7	-21.2	23.7	-1.5	22.0	-17.2	30.9	57.2	33.2	CEM	
	GUM	8.2	28.0	-2.6	28.0	17.1	26.6	1.4	34.3	75.8	36.4	GUM	
	METAS	-15.3	22.9	-26.1	23.0	-6.4	21.2	-22.1	30.3	52.3	32.7	METAS	
9500	NMIJ	6.8	21.9	-4.0	22.0	15.7	20.1	0.0	29.6	74.4	32.0	NMIJ	10000
	KRISS											KRISS	
	LNE	-8.2	25.2	-19.0	25.3	0.7	23.6	-15.0	32.1	59.4	34.3	LNE	
	NIM			-10.8	25.3	8.9	23.7	-6.8	32.1	67.6	34.3	NIM	
	CENAM	3.6	24.1			19.7	23.8	4.0	32.2	78.4	34.4	CENAM	
	INMETRO	-12.6	22.5	-16.2	22.5			-15.7	30.9	58.7	33.2	INMETRO	
	UME	-8.2	30.9	-11.8	31.0	4.4	29.7			74.4	39.7	UME	
	VNIIM	-69.9	33.3	-73.5	33.3	-57.3	32.2	-61.7	38.6			VNIIM	

9.2 Phase of complex sensitivity of the SE

The bilateral degree of equivalence for the phase between each two participants is calculated according to

$$D_{i,j}(f) = x_i(f) - x_j(f) \tag{9.4}$$

$$u^2_{D_{i,j}}(f) = u^2_i(f) + u^2_j(f) \tag{9.5}$$

As the material effect for the phase is negligible, the variance is given only by two terms in contrast to equation (9.3).

Table 9.22: Bilateral degrees of equivalence for the SE at 10.0 Hz and 12.5 Hz.

f in Hz	j → / i ↓	PTB mean D_{ij} in °	PTB mean $U_{D_{ij}}$ in °	CMI D_{ij} in °	CMI $U_{D_{ij}}$ in °	NMISA D_{ij} in °	NMISA $U_{D_{ij}}$ in °	DPLA D_{ij} in °	DPLA $U_{D_{ij}}$ in °	CEM D_{ij} in °	CEM $U_{D_{ij}}$ in °	← j / ↓ i	f in Hz
	PTB mean			0.01	0.54	0.06	0.45	0.04	0.36	0.02	0.54	PTB mean	
	CMI	0.06	0.54			0.05	0.64	0.03	0.58	0.01	0.71	CMI	
	NMISA	-0.03	0.45	-0.09	0.64			-0.02	0.50	-0.04	0.64	NMISA	
	DPLA	-0.03	0.36	-0.09	0.58	0.00	0.50			-0.02	0.58	DPLA	
	CEM	-0.02	0.54	-0.08	0.71	0.01	0.64	0.01	0.58			CEM	
	GUM	0.00	0.73	-0.06	0.86	0.03	0.81	0.03	0.76	0.02	0.86	GUM	
	METAS	0.03	0.45	-0.03	0.64	0.06	0.57	0.06	0.50	0.05	0.64	METAS	
10	NMIJ	-0.01	0.84	-0.07	0.96	0.02	0.91	0.02	0.87	0.01	0.96	NMIJ	12.5
	KRISS											KRISS	
	LNE	-0.31	2.01	-0.37	2.06	-0.28	2.04	-0.28	2.02	-0.29	2.06	LNE	
	NIM	0.19	0.54	0.13	0.71	0.22	0.64	0.22	0.58	0.21	0.71	NIM	
	CENAM	0.05	1.02	-0.01	1.12	0.08	1.08	0.08	1.04	0.07	1.12	CENAM	
	INMETRO	0.03	0.31	-0.03	0.55	0.06	0.47	0.06	0.38	0.05	0.55	INMETRO	
	UME	0.08	0.54	0.02	0.71	0.11	0.64	0.11	0.58	0.10	0.71	UME	
	VNIIM	2.34	1.02	2.28	1.12	2.37	1.08	2.37	1.04	2.36	1.12	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 10.0 Hz and 12.5 Hz.

f in Hz	j → / i ↓	GUM D_{ij} in °	GUM $U_{D_{ij}}$ in °	METAS D_{ij} in °	METAS $U_{D_{ij}}$ in °	NMIJ D_{ij} in °	NMIJ $U_{D_{ij}}$ in °	KRISS D_{ij} in °	KRISS $U_{D_{ij}}$ in °	LNE D_{ij} in °	LNE $U_{D_{ij}}$ in °	← j / ↓ i	f in Hz
	PTB mean	0.02	0.73	0.01	0.45	-0.02	0.86			0.11	2.01	PTB mean	
	CMI	0.01	0.86	0.00	0.64	-0.03	0.98			0.10	2.06	CMI	
	NMISA	-0.04	0.81	-0.05	0.57	-0.08	0.93			0.05	2.04	NMISA	
	DPLA	-0.02	0.76	-0.03	0.50	-0.06	0.89			0.07	2.02	DPLA	
	CEM	0.00	0.86	-0.01	0.64	-0.04	0.98			0.09	2.06	CEM	
	GUM			-0.01	0.81	-0.04	1.09			0.09	2.12	GUM	
	METAS	0.03	0.81			-0.03	0.93			0.10	2.04	METAS	
10	NMIJ	-0.01	1.08	-0.04	0.91					0.13	2.17	NMIJ	12.5
	KRISS											KRISS	
	LNE	-0.31	2.12	-0.34	2.04	-0.30	2.16					LNE	
	NIM	0.19	0.86	0.16	0.64	0.20	0.96			0.50	2.06	NIM	
	CENAM	0.05	1.22	0.02	1.08	0.06	1.29			0.36	2.24	CENAM	
	INMETRO	0.03	0.74	0.00	0.47	0.04	0.85			0.34	2.01	INMETRO	
	UME	0.08	0.86	0.05	0.64	0.09	0.96			0.39	2.06	UME	
	VNIIM	2.34	1.22	2.31	1.08	2.35	1.29			2.65	2.24	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 10.0 Hz and 12.5 Hz.

f in Hz	j → / i ↓	NIM D_{ij} in °	NIM $U_{D_{ij}}$ in °	CENAM D_{ij} in °	CENAM $U_{D_{ij}}$ in °	INMETRO D_{ij} in °	INMETRO $U_{D_{ij}}$ in °	UME D_{ij} in °	UME $U_{D_{ij}}$ in °	VNIIM D_{ij} in °	VNIIM $U_{D_{ij}}$ in °	← j / ↓ i	f in Hz
	PTB mean	-0.15	0.54	0.03	1.02	0.00	0.31	-0.04	0.54	-1.76	1.02	PTB mean	
	CMI	-0.16	0.71	0.02	1.12	-0.01	0.55	-0.05	0.71	-1.77	1.12	CMI	
	NMISA	-0.21	0.64	-0.03	1.08	-0.06	0.47	-0.10	0.64	-1.82	1.08	NMISA	
	DPLA	-0.19	0.58	-0.01	1.04	-0.04	0.38	-0.08	0.58	-1.80	1.04	DPLA	
	CEM	-0.17	0.71	0.01	1.12	-0.02	0.55	-0.06	0.71	-1.78	1.12	CEM	
	GUM	-0.17	0.86	0.01	1.22	-0.02	0.74	-0.06	0.86	-1.78	1.22	GUM	
	METAS	-0.16	0.64	0.02	1.08	-0.01	0.47	-0.05	0.64	-1.77	1.08	METAS	
10	NMIJ	-0.13	0.98	0.05	1.31	0.02	0.87	-0.02	0.98	-1.74	1.31	NMIJ	12.5
	KRISS											KRISS	
	LNE	-0.26	2.06	-0.08	2.24	-0.11	2.01	-0.15	2.06	-1.87	2.24	LNE	
	NIM			0.18	1.12	0.15	0.55	0.11	0.71	-1.61	1.12	NIM	
	CENAM	-0.14	1.12			-0.03	1.03	-0.07	1.12	-1.79	1.41	CENAM	
	INMETRO	-0.16	0.55	-0.02	1.03			-0.04	0.55	-1.76	1.03	INMETRO	
	UME	-0.11	0.71	0.03	1.12	0.05	0.55			-1.72	1.12	UME	
	VNIIM	2.15	1.12	2.29	1.41	2.31	1.03	2.26	1.12			VNIIM	

Table 9.23: Bilateral degrees of equivalence for the SE at 16.0 Hz and 20.0 Hz.

f in Hz	j → i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
		in °		in °		in °		in °		in °			
	PTB mean			0.01	0.54	0.04	0.45	-0.01	0.36	-0.01	0.54	PTB mean	
	CMI	0.03	0.54			0.03	0.64	-0.02	0.58	-0.02	0.71	CMI	
	NMISA	0.00	0.45	-0.03	0.64			-0.05	0.50	-0.05	0.64	NMISA	
	DPLA	0.01	0.36	-0.02	0.58	0.01	0.50			0.00	0.58	DPLA	
	CEM	0.02	0.54	-0.01	0.71	0.02	0.64	0.01	0.58			CEM	
	GUM	0.00	0.73	-0.03	0.86	0.00	0.81	-0.01	0.76	-0.02	0.86	GUM	
	METAS	0.03	0.45	0.00	0.64	0.03	0.57	0.02	0.50	0.01	0.64	METAS	
16	NMIJ	0.06	0.63	0.03	0.78	0.06	0.72	0.05	0.67	0.04	0.78	NMIJ	20
	KRISS											KRISS	
	LNE	-0.12	2.01	-0.15	2.06	-0.12	2.04	-0.13	2.02	-0.14	2.06	LNE	
	NIM	0.19	0.54	0.16	0.71	0.19	0.64	0.18	0.58	0.17	0.71	NIM	
	CENAM	0.05	1.02	0.02	1.12	0.05	1.08	0.04	1.04	0.03	1.12	CENAM	
	INMETRO	0.05	0.31	0.02	0.55	0.05	0.47	0.04	0.38	0.03	0.55	INMETRO	
	UME	0.07	0.54	0.04	0.71	0.07	0.64	0.06	0.58	0.05	0.71	UME	
	VNIIM	1.35	1.02	1.32	1.12	1.35	1.08	1.34	1.04	1.33	1.12	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 16.0 Hz and 20.0 Hz.

f in Hz	j → i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
		in °		in °		in °		in °		in °			
	PTB mean	0.01	0.63	0.00	0.43	0.00	0.48			0.13	2.01	PTB mean	
	CMI	0.00	0.78	-0.01	0.63	-0.01	0.67			0.12	2.06	CMI	
	NMISA	-0.03	0.72	-0.04	0.55	-0.04	0.59			0.09	2.04	NMISA	
	DPLA	0.02	0.67	0.01	0.48	0.01	0.53			0.14	2.02	DPLA	
	CEM	0.02	0.78	0.01	0.63	0.01	0.67			0.14	2.06	CEM	
	GUM			-0.01	0.71	-0.01	0.74			0.12	2.09	GUM	
	METAS	0.03	0.81			0.00	0.58			0.13	2.04	METAS	
16	NMIJ	0.06	0.92	0.03	0.72					0.13	2.05	NMIJ	20
	KRISS											KRISS	
	LNE	-0.12	2.12	-0.15	2.04	-0.18	2.09					LNE	
	NIM	0.19	0.86	0.16	0.64	0.13	0.78			0.31	2.06	NIM	
	CENAM	0.05	1.22	0.02	1.08	-0.01	1.17			0.17	2.24	CENAM	
	INMETRO	0.05	0.74	0.02	0.47	-0.01	0.65			0.17	2.01	INMETRO	
	UME	0.07	0.86	0.04	0.64	0.01	0.78			0.19	2.06	UME	
	VNIIM	1.35	1.22	1.32	1.08	1.29	1.17			1.47	2.24	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 16.0 Hz and 20.0 Hz.

f in Hz	j → i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
		in °		in °		in °		in °		in °			
	PTB mean	-0.12	0.54	0.00	1.02	-0.03	0.31	-0.07	0.54	-1.06	0.79	PTB mean	
	CMI	-0.13	0.71	-0.01	1.12	-0.04	0.55	-0.08	0.71	-1.07	0.91	CMI	
	NMISA	-0.16	0.64	-0.04	1.08	-0.07	0.47	-0.11	0.64	-1.10	0.86	NMISA	
	DPLA	-0.11	0.58	0.01	1.04	-0.02	0.38	-0.06	0.58	-1.05	0.82	DPLA	
	CEM	-0.11	0.71	0.01	1.12	-0.02	0.55	-0.06	0.71	-1.05	0.91	CEM	
	GUM	-0.13	0.78	-0.01	1.17	-0.04	0.65	-0.08	0.78	-1.07	0.97	GUM	
	METAS	-0.12	0.63	0.00	1.07	-0.03	0.45	-0.07	0.63	-1.06	0.85	METAS	
16	NMIJ	-0.12	0.67	0.00	1.09	-0.03	0.50	-0.07	0.67	-1.06	0.88	NMIJ	20
	KRISS											KRISS	
	LNE	-0.25	2.06	-0.13	2.24	-0.16	2.01	-0.20	2.06	-1.19	2.14	LNE	
	NIM			0.12	1.12	0.09	0.55	0.05	0.71	-0.94	0.91	NIM	
	CENAM	-0.14	1.12			-0.03	1.03	-0.07	1.12	-1.06	1.26	CENAM	
	INMETRO	-0.14	0.55	-0.00	1.03			-0.04	0.55	-1.03	0.80	INMETRO	
	UME	-0.12	0.71	0.02	1.12	0.02	0.55			-0.99	0.91	UME	
	VNIIM	1.16	1.12	1.30	1.41	1.30	1.03	1.28	1.12			VNIIM	

Table 9.24: Bilateral degrees of equivalence for the SE at 25.0 Hz and 31.5 Hz.

f in Hz	j → / i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j / ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
		in °		in °		in °		in °		in °			
	PTB mean			-0.03	0.54	0.04	0.45	-0.03	0.36	-0.04	0.54	PTB mean	
	CMI	0.02	0.54			0.07	0.64	0.00	0.58	-0.01	0.71	CMI	
	NMISA	-0.06	0.45	-0.08	0.64			-0.07	0.50	-0.08	0.64	NMISA	
	DPLA	0.01	0.36	-0.01	0.58	0.07	0.50			-0.01	0.58	DPLA	
	CEM	0.03	0.54	0.01	0.71	0.09	0.64	0.02	0.58			CEM	
	GUM	0.00	0.63	-0.02	0.78	0.06	0.72	-0.01	0.67	-0.03	0.78	GUM	
	METAS	0.03	0.43	0.01	0.63	0.09	0.55	0.02	0.48	0.00	0.63	METAS	
25	NMIJ	-0.01	0.47	-0.03	0.65	0.05	0.58	-0.02	0.52	-0.04	0.65	NMIJ	31.5
	KRISS											KRISS	
	LNE	-0.09	2.01	-0.11	2.06	-0.03	2.04	-0.10	2.02	-0.12	2.06	LNE	
	NIM	0.12	0.54	0.10	0.71	0.18	0.64	0.11	0.58	0.09	0.71	NIM	
	CENAM	0.03	1.02	0.01	1.12	0.09	1.08	0.02	1.04	0.00	1.12	CENAM	
	INMETRO	0.04	0.31	0.02	0.55	0.10	0.47	0.03	0.38	0.01	0.55	INMETRO	
	UME	0.00	0.54	-0.02	0.71	0.06	0.64	-0.01	0.58	-0.03	0.71	UME	
	VNIIM	0.52	0.79	0.50	0.91	0.58	0.86	0.51	0.82	0.49	0.91	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 25.0 Hz and 31.5 Hz.

f in Hz	j → / i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j / ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
		in °		in °		in °		in °		in °			
	PTB mean	0.00	0.63	-0.05	0.43	0.00	0.52			0.07	2.01	PTB mean	
	CMI	0.03	0.78	-0.02	0.63	0.03	0.69			0.10	2.06	CMI	
	NMISA	-0.04	0.72	-0.09	0.55	-0.04	0.62			0.03	2.04	NMISA	
	DPLA	0.03	0.67	-0.02	0.48	0.03	0.57			0.10	2.02	DPLA	
	CEM	0.04	0.78	-0.01	0.63	0.04	0.69			0.11	2.06	CEM	
	GUM			-0.05	0.71	0.00	0.77			0.07	2.09	GUM	
	METAS	0.03	0.71			0.05	0.61			0.12	2.04	METAS	
25	NMIJ	-0.01	0.73	-0.04	0.57					0.07	2.06	NMIJ	31.5
	KRISS											KRISS	
	LNE	-0.09	2.09	-0.12	2.04	-0.08	2.04					LNE	
	NIM	0.12	0.78	0.09	0.63	0.13	0.65			0.21	2.06	NIM	
	CENAM	0.03	1.17	0.00	1.07	0.04	1.08			0.12	2.24	CENAM	
	INMETRO	0.04	0.65	0.01	0.45	0.05	0.48			0.13	2.01	INMETRO	
	UME	0.00	0.78	-0.03	0.63	0.01	0.65			0.09	2.06	UME	
	VNIIM	0.52	0.97	0.49	0.85	0.53	0.87			0.61	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 25.0 Hz and 31.5 Hz.

f in Hz	j → / i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j / ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
		in °		in °		in °		in °		in °			
	PTB mean	-0.11	0.54	-0.03	1.02	-0.05	0.31	-0.03	0.54	-0.34	0.79	PTB mean	
	CMI	-0.08	0.71	0.00	1.12	-0.02	0.55	0.00	0.71	-0.31	0.91	CMI	
	NMISA	-0.15	0.64	-0.07	1.08	-0.09	0.47	-0.07	0.64	-0.38	0.86	NMISA	
	DPLA	-0.08	0.58	0.00	1.04	-0.02	0.38	0.00	0.58	-0.31	0.82	DPLA	
	CEM	-0.07	0.71	0.01	1.12	-0.01	0.55	0.01	0.71	-0.30	0.91	CEM	
	GUM	-0.11	0.78	-0.03	1.17	-0.05	0.65	-0.03	0.78	-0.34	0.97	GUM	
	METAS	-0.06	0.63	0.02	1.07	-0.00	0.45	0.02	0.63	-0.29	0.85	METAS	
25	NMIJ	-0.11	0.69	-0.03	1.11	-0.05	0.54	-0.03	0.69	-0.34	0.90	NMIJ	31.5
	KRISS											KRISS	
	LNE	-0.18	2.06	-0.10	2.24	-0.12	2.01	-0.10	2.06	-0.41	2.14	LNE	
	NIM			0.08	1.12	0.06	0.55	0.08	0.71	-0.23	0.91	NIM	
	CENAM	-0.09	1.12			-0.02	1.03	0.00	1.12	-0.31	1.26	CENAM	
	INMETRO	-0.08	0.55	0.01	1.03			0.02	0.55	-0.29	0.80	INMETRO	
	UME	-0.12	0.71	-0.03	1.12	-0.04	0.55			-0.31	0.91	UME	
	VNIIM	0.40	0.91	0.49	1.26	0.48	0.80	0.52	0.91			VNIIM	

Table 9.25: Bilateral degrees of equivalence for the SE at 40.0 Hz and 63.0 Hz.

f in Hz	j → i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j ↓ i	f in Hz
		D_{ij} in °	$u_{D_{ij}}$	D_{ij} in °	$u_{D_{ij}}$	D_{ij} in °	$u_{D_{ij}}$	D_{ij} in °	$u_{D_{ij}}$	D_{ij} in °	$u_{D_{ij}}$		
	PTB mean			-0.01	0.54	0.02	0.45	-0.01	0.36	-0.05	0.54	PTB mean	
	CMI	0.03	0.54			0.03	0.64	0.00	0.58	-0.04	0.71	CMI	
	NMISA	-0.03	0.45	-0.06	0.64			-0.03	0.50	-0.07	0.64	NMISA	
	DPLA	0.02	0.36	-0.01	0.58	0.05	0.50			-0.04	0.58	DPLA	
	CEM	0.05	0.54	0.02	0.71	0.08	0.64	0.03	0.58			CEM	
	GUM	-0.01	0.63	-0.04	0.78	0.02	0.72	-0.03	0.67	-0.06	0.78	GUM	
	METAS	0.05	0.43	0.02	0.63	0.08	0.55	0.03	0.48	0.00	0.63	METAS	
40	NMIJ	0.02	0.47	-0.01	0.65	0.05	0.58	0.00	0.52	-0.03	0.65	NMIJ	63
	KRISS											KRISS	
	LNE	-0.04	2.01	-0.07	2.06	-0.01	2.04	-0.06	2.02	-0.09	2.06	LNE	
	NIM	0.09	0.54	0.06	0.71	0.12	0.64	0.07	0.58	0.04	0.71	NIM	
	CENAM	0.00	1.02	-0.03	1.12	0.03	1.08	-0.02	1.04	-0.05	1.12	CENAM	
	INMETRO	0.04	0.31	0.01	0.55	0.07	0.47	0.02	0.38	-0.01	0.55	INMETRO	
	UME	0.06	0.54	0.03	0.71	0.09	0.64	0.04	0.58	0.01	0.71	UME	
	VNIIM	0.37	0.79	0.34	0.91	0.40	0.86	0.35	0.82	0.32	0.91	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 40.0 Hz and 63.0 Hz.

f in Hz	j → i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j ↓ i	f in Hz
		D_{ij} in °	$u_{D_{ij}}$	D_{ij} in °	$u_{D_{ij}}$	D_{ij} in °	$u_{D_{ij}}$	D_{ij} in °	$u_{D_{ij}}$	D_{ij} in °	$u_{D_{ij}}$		
	PTB mean	0.02	0.63	0.00	0.43	0.00	0.48			-0.11	2.01	PTB mean	
	CMI	0.03	0.78	0.01	0.63	0.01	0.67			-0.10	2.06	CMI	
	NMISA	0.00	0.72	-0.02	0.55	-0.02	0.59			-0.13	2.04	NMISA	
	DPLA	0.03	0.67	0.01	0.48	0.01	0.53			-0.10	2.02	DPLA	
	CEM	0.07	0.78	0.05	0.63	0.05	0.67			-0.06	2.06	CEM	
	GUM			-0.02	0.71	-0.02	0.74			-0.13	2.09	GUM	
	METAS	0.06	0.71			0.00	0.58			-0.11	2.04	METAS	
40	NMIJ	0.03	0.73	-0.03	0.57					-0.11	2.05	NMIJ	63
	KRISS											KRISS	
	LNE	-0.03	2.09	-0.09	2.04	-0.06	2.04					LNE	
	NIM	0.10	0.78	0.04	0.63	0.07	0.65			0.13	2.06	NIM	
	CENAM	0.01	1.17	-0.05	1.07	-0.02	1.08			0.04	2.24	CENAM	
	INMETRO	0.05	0.65	-0.01	0.45	0.02	0.48			0.08	2.01	INMETRO	
	UME	0.07	0.78	0.01	0.63	0.04	0.65			0.10	2.06	UME	
	VNIIM	0.38	0.97	0.32	0.85	0.35	0.87			0.41	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 40.0 Hz and 63.0 Hz.

f in Hz	j → i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j ↓ i	f in Hz
		D_{ij} in °	$u_{D_{ij}}$	D_{ij} in °	$u_{D_{ij}}$	D_{ij} in °	$u_{D_{ij}}$	D_{ij} in °	$u_{D_{ij}}$	D_{ij} in °	$u_{D_{ij}}$		
	PTB mean	-0.06	0.54	-0.02	1.02	-0.03	0.31	-0.05	0.54	-0.11	0.79	PTB mean	
	CMI	-0.05	0.71	-0.01	1.12	-0.02	0.55	-0.04	0.71	-0.10	0.91	CMI	
	NMISA	-0.08	0.64	-0.04	1.08	-0.05	0.47	-0.07	0.64	-0.13	0.86	NMISA	
	DPLA	-0.05	0.58	-0.01	1.04	-0.02	0.38	-0.04	0.58	-0.10	0.82	DPLA	
	CEM	-0.01	0.71	0.03	1.12	0.02	0.55	0.00	0.71	-0.06	0.91	CEM	
	GUM	-0.08	0.78	-0.04	1.17	-0.05	0.65	-0.07	0.78	-0.13	0.97	GUM	
	METAS	-0.06	0.63	-0.02	1.07	-0.03	0.45	-0.05	0.63	-0.11	0.85	METAS	
40	NMIJ	-0.06	0.67	-0.02	1.09	-0.03	0.50	-0.05	0.67	-0.11	0.88	NMIJ	63
	KRISS											KRISS	
	LNE	0.05	2.06	0.09	2.24	0.08	2.01	0.06	2.06	0.00	2.14	LNE	
	NIM			0.04	1.12	0.03	0.55	0.01	0.71	-0.05	0.91	NIM	
	CENAM	-0.09	1.12			-0.01	1.03	-0.03	1.12	-0.09	1.26	CENAM	
	INMETRO	-0.05	0.55	0.04	1.03			-0.02	0.55	-0.08	0.80	INMETRO	
	UME	-0.03	0.71	0.06	1.12	0.02	0.55			-0.06	0.91	UME	
	VNIIM	0.28	0.91	0.37	1.26	0.33	0.80	0.31	0.91			VNIIM	

Table 9.26: Bilateral degrees of equivalence for the SE at 80.0 Hz and 100.0 Hz.

f in Hz	j → i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$ in °	D_{ij}	$U_{D_{ij}}$ in °	D_{ij}	$U_{D_{ij}}$ in °	D_{ij}	$U_{D_{ij}}$ in °	D_{ij}	$U_{D_{ij}}$ in °		
	PTB mean			0.01	0.54	0.02	0.45	-0.01	0.36	-0.05	0.54	PTB mean	
	CMI	-0.01	0.54			0.01	0.64	-0.02	0.58	-0.06	0.71	CMI	
	NMISA	-0.02	0.45	-0.01	0.64			-0.03	0.50	-0.07	0.64	NMISA	
	DPLA	0.01	0.36	0.02	0.58	0.03	0.50			-0.04	0.58	DPLA	
	CEM	0.05	0.54	0.06	0.71	0.07	0.64	0.04	0.58			CEM	
	GUM	-0.02	0.63	-0.01	0.78	0.00	0.72	-0.03	0.67	-0.07	0.78	GUM	
	METAS	-0.02	0.43	-0.01	0.63	0.00	0.55	-0.03	0.48	-0.07	0.63	METAS	
80	NMIJ	0.04	0.52	0.05	0.69	0.06	0.62	0.03	0.57	-0.01	0.69	NMIJ	100
	KRISS											KRISS	
	LNE	0.18	2.01	0.19	2.06	0.20	2.04	0.17	2.02	0.13	2.06	LNE	
	NIM	0.07	0.54	0.08	0.71	0.09	0.64	0.06	0.58	0.02	0.71	NIM	
	CENAM	-0.01	1.02	0.00	1.12	0.01	1.08	-0.02	1.04	-0.06	1.12	CENAM	
	INMETRO	0.04	0.31	0.05	0.55	0.06	0.47	0.03	0.38	-0.01	0.55	INMETRO	
	UME	0.03	0.54	0.04	0.71	0.05	0.64	0.02	0.58	-0.02	0.71	UME	
	VNIIM	-0.10	0.79	-0.09	0.91	-0.08	0.86	-0.11	0.82	-0.15	0.91	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 80.0 Hz and 100.0 Hz.

f in Hz	j → i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$ in °	D_{ij}	$U_{D_{ij}}$ in °	D_{ij}	$U_{D_{ij}}$ in °	D_{ij}	$U_{D_{ij}}$ in °	D_{ij}	$U_{D_{ij}}$ in °		
	PTB mean	0.02	0.63	-0.04	0.43	-0.02	0.52			-0.10	2.01	PTB mean	
	CMI	0.01	0.78	-0.05	0.63	-0.03	0.69			-0.11	2.06	CMI	
	NMISA	0.00	0.72	-0.06	0.55	-0.04	0.62			-0.12	2.04	NMISA	
	DPLA	0.03	0.67	-0.03	0.48	-0.01	0.57			-0.09	2.02	DPLA	
	CEM	0.07	0.78	0.01	0.63	0.03	0.69			-0.05	2.06	CEM	
	GUM			-0.06	0.71	-0.04	0.77			-0.12	2.09	GUM	
	METAS	0.00	0.71			0.02	0.61			-0.06	2.04	METAS	
80	NMIJ	0.06	0.77	0.06	0.61					-0.08	2.06	NMIJ	100
	KRISS											KRISS	
	LNE	0.20	2.09	0.20	2.04	0.14	2.06					LNE	
	NIM	0.09	0.78	0.09	0.63	0.03	0.69			-0.11	2.06	NIM	
	CENAM	0.01	1.17	0.01	1.07	-0.05	1.11			-0.19	2.24	CENAM	
	INMETRO	0.06	0.65	0.06	0.45	0.00	0.54			-0.14	2.01	INMETRO	
	UME	0.05	0.78	0.05	0.63	-0.01	0.69			-0.15	2.06	UME	
	VNIIM	-0.08	0.97	-0.08	0.85	-0.14	0.90			-0.28	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 80.0 Hz and 100.0 Hz.

f in Hz	j → i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$ in °	D_{ij}	$U_{D_{ij}}$ in °	D_{ij}	$U_{D_{ij}}$ in °	D_{ij}	$U_{D_{ij}}$ in °	D_{ij}	$U_{D_{ij}}$ in °		
	PTB mean	-0.04	0.54	-0.01	1.02	-0.04	0.31	-0.02	0.54	0.23	0.79	PTB mean	
	CMI	-0.05	0.71	-0.02	1.12	-0.05	0.55	-0.03	0.71	0.22	0.91	CMI	
	NMISA	-0.06	0.64	-0.03	1.08	-0.06	0.47	-0.04	0.64	0.21	0.86	NMISA	
	DPLA	-0.03	0.58	0.00	1.04	-0.03	0.38	-0.01	0.58	0.24	0.82	DPLA	
	CEM	0.01	0.71	0.04	1.12	0.01	0.55	0.03	0.71	0.28	0.91	CEM	
	GUM	-0.06	0.78	-0.03	1.17	-0.06	0.65	-0.04	0.78	0.21	0.97	GUM	
	METAS	0.00	0.63	0.03	1.07	0.00	0.45	0.02	0.63	0.27	0.85	METAS	
80	NMIJ	-0.02	0.69	0.01	1.11	-0.02	0.54	0.00	0.69	0.25	0.90	NMIJ	100
	KRISS											KRISS	
	LNE	0.06	2.06	0.09	2.24	0.06	2.01	0.08	2.06	0.33	2.14	LNE	
	NIM			0.03	1.12	0.00	0.55	0.02	0.71	0.27	0.91	NIM	
	CENAM	-0.08	1.12			-0.03	1.03	-0.01	1.12	0.24	1.26	CENAM	
	INMETRO	-0.03	0.55	0.05	1.03			0.02	0.55	0.27	0.80	INMETRO	
	UME	-0.04	0.71	0.04	1.12	-0.01	0.55			0.25	0.91	UME	
	VNIIM	-0.17	0.91	-0.09	1.26	-0.14	0.80	-0.13	0.91			VNIIM	

Table 9.27: Bilateral degrees of equivalence for the SE at 125.0 Hz and 160.0 Hz.

f in Hz	j → / i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j / ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °		
	PTB mean			0.05	0.54	0.08	0.45	0.01	0.36	-0.08	0.54	PTB mean	
	CMI	-0.02	0.54			0.03	0.64	-0.04	0.58	-0.13	0.71	CMI	
	NMISA	-0.04	0.45	-0.02	0.64			-0.07	0.50	-0.16	0.64	NMISA	
	DPLA	0.01	0.36	0.03	0.58	0.05	0.50			-0.09	0.58	DPLA	
	CEM	0.05	0.54	0.07	0.71	0.09	0.64	0.04	0.58			CEM	
	GUM	0.00	0.63	0.02	0.78	0.04	0.72	-0.01	0.67	-0.05	0.78	GUM	
	METAS	0.04	0.43	0.06	0.63	0.08	0.55	0.03	0.48	-0.01	0.63	METAS	
125	NMIJ	0.00	0.54	0.02	0.71	0.04	0.64	-0.01	0.58	-0.05	0.71	NMIJ	160
	KRISS											KRISS	
	LNE	0.08	2.01	0.10	2.06	0.12	2.04	0.07	2.02	0.03	2.06	LNE	
	NIM	0.04	0.54	0.06	0.71	0.08	0.64	0.03	0.58	-0.01	0.71	NIM	
	CENAM	0.02	1.02	0.04	1.12	0.06	1.08	0.01	1.04	-0.03	1.12	CENAM	
	INMETRO	0.04	0.31	0.06	0.55	0.08	0.47	0.03	0.38	-0.01	0.55	INMETRO	
	UME	0.04	0.54	0.06	0.71	0.08	0.64	0.03	0.58	-0.01	0.71	UME	
	VNIIM	-0.07	0.79	-0.05	0.91	-0.03	0.86	-0.08	0.82	-0.12	0.91	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 125.0 Hz and 160.0 Hz.

f in Hz	j → / i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j / ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °		
	PTB mean	0.00	0.63	-0.04	0.43	0.01	0.56			-0.12	2.01	PTB mean	
	CMI	-0.05	0.78	-0.09	0.63	-0.04	0.72			-0.17	2.06	CMI	
	NMISA	-0.08	0.72	-0.12	0.55	-0.07	0.66			-0.20	2.04	NMISA	
	DPLA	-0.01	0.67	-0.05	0.48	0.00	0.60			-0.13	2.02	DPLA	
	CEM	0.08	0.78	0.04	0.63	0.09	0.72			-0.04	2.06	CEM	
	GUM			-0.04	0.71	0.01	0.79			-0.12	2.09	GUM	
	METAS	0.04	0.71			0.05	0.64			-0.08	2.04	METAS	
125	NMIJ	0.00	0.78	-0.04	0.63					-0.13	2.07	NMIJ	160
	KRISS											KRISS	
	LNE	0.08	2.09	0.04	2.04	0.08	2.06					LNE	
	NIM	0.04	0.78	0.00	0.63	0.04	0.71			-0.04	2.06	NIM	
	CENAM	0.02	1.17	-0.02	1.07	0.02	1.12			-0.06	2.24	CENAM	
	INMETRO	0.04	0.65	0.00	0.45	0.04	0.55			-0.04	2.01	INMETRO	
	UME	0.04	0.78	0.00	0.63	0.04	0.71			-0.04	2.06	UME	
	VNIIM	-0.07	0.97	-0.11	0.85	-0.07	0.91			-0.15	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 125.0 Hz and 160.0 Hz.

f in Hz	j → / i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j / ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °		
	PTB mean	-0.01	0.54	-0.01	1.02	-0.04	0.31	0.03	0.54	0.21	0.79	PTB mean	
	CMI	-0.06	0.71	-0.06	1.12	-0.09	0.55	-0.02	0.71	0.16	0.91	CMI	
	NMISA	-0.09	0.64	-0.09	1.08	-0.12	0.47	-0.05	0.64	0.13	0.86	NMISA	
	DPLA	-0.02	0.58	-0.02	1.04	-0.05	0.38	0.02	0.58	0.20	0.82	DPLA	
	CEM	0.07	0.71	0.07	1.12	0.04	0.55	0.11	0.71	0.29	0.91	CEM	
	GUM	-0.01	0.78	-0.01	1.17	-0.04	0.65	0.03	0.78	0.21	0.97	GUM	
	METAS	0.03	0.63	0.03	1.07	0.00	0.45	0.07	0.63	0.25	0.85	METAS	
125	NMIJ	-0.02	0.72	-0.02	1.13	-0.05	0.57	0.02	0.72	0.20	0.92	NMIJ	160
	KRISS											KRISS	
	LNE	0.11	2.06	0.11	2.24	0.08	2.01	0.15	2.06	0.33	2.14	LNE	
	NIM			0.00	1.12	-0.03	0.55	0.04	0.71	0.22	0.91	NIM	
	CENAM	-0.02	1.12			-0.03	1.03	0.04	1.12	0.22	1.26	CENAM	
	INMETRO	0.00	0.55	0.02	1.03			0.07	0.55	0.25	0.80	INMETRO	
	UME	0.00	0.71	0.02	1.12	0.00	0.55			0.18	0.91	UME	
	VNIIM	-0.11	0.91	-0.09	1.26	-0.11	0.80	-0.11	0.91			VNIIM	

Table 9.28: Bilateral degrees of equivalence for the SE at 200.0 Hz and 250.0 Hz.

f in Hz	j → i ↓	PTB mean D_{ij}	PTB mean $U_{D_{ij}}$	CMI D_{ij}	CMI $U_{D_{ij}}$	NMISA D_{ij}	NMISA $U_{D_{ij}}$	DPLA D_{ij}	DPLA $U_{D_{ij}}$	CEM D_{ij}	CEM $U_{D_{ij}}$	← j ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean			0.11	0.54	0.04	0.45	0.01	0.36	-0.03	0.54	PTB mean	
	CMI	-0.07	0.54			-0.07	0.64	-0.10	0.58	-0.14	0.71	CMI	
	NMISA	-0.03	0.45	0.04	0.64			-0.03	0.50	-0.07	0.64	NMISA	
	DPLA	-0.05	0.36	0.02	0.58	-0.02	0.50			-0.04	0.58	DPLA	
	CEM	0.05	0.54	0.12	0.71	0.08	0.64	0.10	0.58			CEM	
	GUM	-0.02	0.63	0.05	0.78	0.01	0.72	0.03	0.67	-0.07	0.78	GUM	
	METAS	0.05	0.43	0.12	0.63	0.08	0.55	0.10	0.48	0.00	0.63	METAS	
200	NMIJ	-0.03	0.58	0.04	0.74	0.00	0.67	0.02	0.62	-0.08	0.74	NMIJ	250
	KRISS											KRISS	
	LNE	0.08	2.01	0.15	2.06	0.11	2.04	0.13	2.02	0.03	2.06	LNE	
	NIM	0.01	0.54	0.08	0.71	0.04	0.64	0.06	0.58	-0.04	0.71	NIM	
	CENAM	0.00	1.02	0.07	1.12	0.03	1.08	0.05	1.04	-0.05	1.12	CENAM	
	INMETRO	0.04	0.31	0.11	0.55	0.07	0.47	0.09	0.38	-0.01	0.55	INMETRO	
	UME	0.02	0.54	0.09	0.71	0.05	0.64	0.07	0.58	-0.03	0.71	UME	
	VNIIM	-0.16	0.79	-0.09	0.91	-0.13	0.86	-0.11	0.82	-0.21	0.91	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 200.0 Hz and 250.0 Hz.

f in Hz	j → i ↓	GUM D_{ij}	GUM $U_{D_{ij}}$	METAS D_{ij}	METAS $U_{D_{ij}}$	NMIJ D_{ij}	NMIJ $U_{D_{ij}}$	KRISS D_{ij}	KRISS $U_{D_{ij}}$	LNE D_{ij}	LNE $U_{D_{ij}}$	← j ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean	0.03	0.63	-0.05	0.43	0.05	0.59			-0.07	2.01	PTB mean	
	CMI	-0.08	0.78	-0.16	0.63	-0.06	0.75			-0.18	2.06	CMI	
	NMISA	-0.01	0.72	-0.09	0.55	0.01	0.69			-0.11	2.04	NMISA	
	DPLA	0.02	0.67	-0.06	0.48	0.04	0.64			-0.08	2.02	DPLA	
	CEM	0.06	0.78	-0.02	0.63	0.08	0.75			-0.04	2.06	CEM	
	GUM			-0.08	0.71	0.02	0.82			-0.10	2.09	GUM	
	METAS	0.07	0.71			0.10	0.68			-0.02	2.04	METAS	
200	NMIJ	-0.01	0.81	-0.08	0.66					-0.12	2.08	NMIJ	250
	KRISS											KRISS	
	LNE	0.10	2.09	0.03	2.04	0.11	2.07					LNE	
	NIM	0.03	0.78	-0.04	0.63	0.04	0.74			-0.07	2.06	NIM	
	CENAM	0.02	1.17	-0.05	1.07	0.03	1.14			-0.08	2.24	CENAM	
	INMETRO	0.06	0.65	-0.01	0.45	0.07	0.59			-0.04	2.01	INMETRO	
	UME	0.04	0.78	-0.03	0.63	0.05	0.74			-0.06	2.06	UME	
	VNIIM	-0.14	0.97	-0.21	0.85	-0.13	0.93			-0.24	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 200.0 Hz and 250.0 Hz.

f in Hz	j → i ↓	NIM D_{ij}	NIM $U_{D_{ij}}$	CENAM D_{ij}	CENAM $U_{D_{ij}}$	INMETRO D_{ij}	INMETRO $U_{D_{ij}}$	UME D_{ij}	UME $U_{D_{ij}}$	VNIIM D_{ij}	VNIIM $U_{D_{ij}}$	← j ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean	0.02	0.54	0.03	1.02	-0.01	0.31	0.02	0.54	0.21	0.79	PTB mean	
	CMI	-0.09	0.71	-0.08	1.12	-0.12	0.55	-0.09	0.71	0.10	0.91	CMI	
	NMISA	-0.02	0.64	-0.01	1.08	-0.05	0.47	-0.02	0.64	0.17	0.86	NMISA	
	DPLA	0.01	0.58	0.02	1.04	-0.02	0.38	0.01	0.58	0.20	0.82	DPLA	
	CEM	0.05	0.71	0.06	1.12	0.02	0.55	0.05	0.71	0.24	0.91	CEM	
	GUM	-0.01	0.78	0.00	1.17	-0.04	0.65	-0.01	0.78	0.18	0.97	GUM	
	METAS	0.07	0.63	0.08	1.07	0.04	0.45	0.07	0.63	0.26	0.85	METAS	
200	NMIJ	-0.03	0.75	-0.02	1.15	-0.06	0.61	-0.03	0.75	0.16	0.94	NMIJ	250
	KRISS											KRISS	
	LNE	0.09	2.06	0.10	2.24	0.06	2.01	0.09	2.06	0.28	2.14	LNE	
	NIM			0.01	1.12	-0.03	0.55	0.00	0.71	0.19	0.91	NIM	
	CENAM	-0.01	1.12			-0.04	1.03	-0.01	1.12	0.18	1.26	CENAM	
	INMETRO	0.03	0.55	0.04	1.03			0.03	0.55	0.22	0.80	INMETRO	
	UME	0.01	0.71	0.02	1.12	-0.02	0.55			0.19	0.91	UME	
	VNIIM	-0.17	0.91	-0.16	1.26	-0.20	0.80	-0.18	0.91			VNIIM	

Table 9.29: Bilateral degrees of equivalence for the SE at 315.0 Hz and 400.0 Hz.

f in Hz	j → i ↓	PTB mean D_{ij} in °	PTB mean $U_{D_{ij}}$ in °	CMI D_{ij} in °	CMI $U_{D_{ij}}$ in °	NMISA D_{ij} in °	NMISA $U_{D_{ij}}$ in °	DPLA D_{ij} in °	DPLA $U_{D_{ij}}$ in °	CEM D_{ij} in °	CEM $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean			0.15	0.54	0.01	0.45	0.05	0.36	-0.03	0.54	PTB mean	
	CMI	-0.11	0.54			-0.14	0.64	-0.10	0.58	-0.18	0.71	CMI	
	NMISA	-0.02	0.45	0.09	0.64			0.04	0.50	-0.04	0.64	NMISA	
	DPLA	-0.06	0.36	0.05	0.58	-0.04	0.50			-0.08	0.58	DPLA	
	CEM	0.04	0.54	0.15	0.71	0.06	0.64	0.10	0.58			CEM	
	GUM	0.00	0.63	0.11	0.78	0.02	0.72	0.06	0.67	-0.04	0.78	GUM	
	METAS	0.06	0.43	0.17	0.63	0.08	0.55	0.12	0.48	0.02	0.63	METAS	
315	NMIJ	-0.11	0.36	0.00	0.58	-0.09	0.50	-0.05	0.42	-0.15	0.58	NMIJ	400
	KRISS											KRISS	
	LNE	0.10	2.01	0.21	2.06	0.12	2.04	0.16	2.02	0.06	2.06	LNE	
	NIM	-0.02	0.54	0.09	0.71	0.00	0.64	0.04	0.58	-0.06	0.71	NIM	
	CENAM	-0.01	1.02	0.10	1.12	0.01	1.08	0.05	1.04	-0.05	1.12	CENAM	
	INMETRO	0.03	0.31	0.14	0.55	0.05	0.47	0.09	0.38	-0.01	0.55	INMETRO	
	UME	-0.03	0.54	0.08	0.71	-0.01	0.64	0.03	0.58	-0.07	0.71	UME	
	VNIIM	-0.37	0.79	-0.26	0.91	-0.35	0.86	-0.31	0.82	-0.41	0.91	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 315.0 Hz and 400.0 Hz.

f in Hz	j → i ↓	GUM D_{ij} in °	GUM $U_{D_{ij}}$ in °	METAS D_{ij} in °	METAS $U_{D_{ij}}$ in °	NMIJ D_{ij} in °	NMIJ $U_{D_{ij}}$ in °	KRISS D_{ij} in °	KRISS $U_{D_{ij}}$ in °	LNE D_{ij} in °	LNE $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean	-0.00	0.63	-0.00	0.43	0.04	0.36			-0.08	2.01	PTB mean	
	CMI	-0.15	0.78	-0.15	0.63	-0.11	0.58			-0.23	2.06	CMI	
	NMISA	-0.01	0.72	-0.01	0.55	0.03	0.50			-0.09	2.04	NMISA	
	DPLA	-0.05	0.67	-0.05	0.48	-0.01	0.42			-0.13	2.02	DPLA	
	CEM	0.03	0.78	0.03	0.63	0.07	0.58			-0.05	2.06	CEM	
	GUM			0.00	0.71	0.04	0.67			-0.08	2.09	GUM	
	METAS	0.06	0.71			0.04	0.48			-0.08	2.04	METAS	
315	NMIJ	-0.11	0.67	-0.17	0.48					-0.12	2.02	NMIJ	400
	KRISS											KRISS	
	LNE	0.10	2.09	0.04	2.04	0.21	2.02					LNE	
	NIM	-0.02	0.78	-0.08	0.63	0.09	0.58			-0.12	2.06	NIM	
	CENAM	-0.01	1.17	-0.07	1.07	0.10	1.04			-0.11	2.24	CENAM	
	INMETRO	0.03	0.65	-0.03	0.45	0.14	0.38			-0.07	2.01	INMETRO	
	UME	-0.03	0.78	-0.09	0.63	0.08	0.58			-0.13	2.06	UME	
	VNIIM	-0.37	0.97	-0.43	0.85	-0.26	0.82			-0.47	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 315.0 Hz and 400.0 Hz.

f in Hz	j → i ↓	NIM D_{ij} in °	NIM $U_{D_{ij}}$ in °	CENAM D_{ij} in °	CENAM $U_{D_{ij}}$ in °	INMETRO D_{ij} in °	INMETRO $U_{D_{ij}}$ in °	UME D_{ij} in °	UME $U_{D_{ij}}$ in °	VNIIM D_{ij} in °	VNIIM $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean	0.03	0.54	0.01	1.02	-0.02	0.31	0.04	0.54	0.31	0.79	PTB mean	
	CMI	-0.12	0.71	-0.14	1.12	-0.17	0.55	-0.11	0.71	0.16	0.91	CMI	
	NMISA	0.02	0.64	0.00	1.08	-0.03	0.47	0.03	0.64	0.30	0.86	NMISA	
	DPLA	-0.02	0.58	-0.04	1.04	-0.07	0.38	-0.01	0.58	0.26	0.82	DPLA	
	CEM	0.06	0.71	0.04	1.12	0.01	0.55	0.07	0.71	0.34	0.91	CEM	
	GUM	0.03	0.78	0.01	1.17	-0.02	0.65	0.04	0.78	0.31	0.97	GUM	
	METAS	0.03	0.63	0.01	1.07	-0.02	0.45	0.04	0.63	0.31	0.85	METAS	
315	NMIJ	-0.01	0.58	-0.03	1.04	-0.06	0.38	0.00	0.58	0.27	0.82	NMIJ	400
	KRISS											KRISS	
	LNE	0.11	2.06	0.09	2.24	0.06	2.01	0.12	2.06	0.39	2.14	LNE	
	NIM			-0.02	1.12	-0.05	0.55	0.01	0.71	0.28	0.91	NIM	
	CENAM	0.01	1.12			-0.03	1.03	0.03	1.12	0.30	1.26	CENAM	
	INMETRO	0.05	0.55	0.04	1.03			0.06	0.55	0.33	0.80	INMETRO	
	UME	-0.01	0.71	-0.02	1.12	-0.06	0.55			0.27	0.91	UME	
	VNIIM	-0.35	0.91	-0.36	1.26	-0.40	0.80	-0.34	0.91			VNIIM	

Table 9.30: Bilateral degrees of equivalence for the SE at 500.0 Hz and 630.0 Hz.

f in Hz	j → / i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j / ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$		
	PTB mean			0.23	0.54	-0.03	0.45	0.08	0.36	-0.08	0.54	PTB mean	
	CMI	-0.20	0.54			-0.26	0.64	-0.15	0.58	-0.31	0.71	CMI	
	NMISA	0.01	0.45	0.21	0.64			0.11	0.50	-0.05	0.64	NMISA	
	DPLA	-0.07	0.36	0.13	0.58	-0.08	0.50			-0.16	0.58	DPLA	
	CEM	0.04	0.54	0.24	0.71	0.03	0.64	0.11	0.58			CEM	
	GUM	0.03	0.63	0.23	0.78	0.02	0.72	0.10	0.67	-0.01	0.78	GUM	
	METAS	0.03	0.43	0.23	0.63	0.02	0.55	0.10	0.48	-0.01	0.63	METAS	
500	NMIJ	-0.10	0.38	0.10	0.59	-0.11	0.51	-0.03	0.44	-0.14	0.59	NMIJ	630
	KRISS											KRISS	
	LNE	0.09	2.01	0.29	2.06	0.08	2.04	0.16	2.02	0.05	2.06	LNE	
	NIM	-0.03	0.54	0.17	0.71	-0.04	0.64	0.04	0.58	-0.07	0.71	NIM	
	CENAM	0.00	1.02	0.20	1.12	-0.01	1.08	0.07	1.04	-0.04	1.12	CENAM	
	INMETRO	0.08	0.31	0.28	0.55	0.07	0.47	0.15	0.38	0.04	0.55	INMETRO	
	UME	-0.02	0.54	0.18	0.71	-0.03	0.64	0.05	0.58	-0.06	0.71	UME	
	VNIIM	-0.31	0.79	-0.11	0.91	-0.32	0.86	-0.24	0.82	-0.35	0.91	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 500.0 Hz and 630.0 Hz.

f in Hz	j → / i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j / ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$		
	PTB mean	-0.05	0.63	-0.02	0.43	0.07	0.36			-0.12	2.01	PTB mean	
	CMI	-0.28	0.78	-0.25	0.63	-0.16	0.58			-0.35	2.06	CMI	
	NMISA	-0.02	0.72	0.01	0.55	0.10	0.50			-0.09	2.04	NMISA	
	DPLA	-0.13	0.67	-0.10	0.48	-0.01	0.42			-0.20	2.02	DPLA	
	CEM	0.03	0.78	0.06	0.63	0.15	0.58			-0.04	2.06	CEM	
	GUM			0.03	0.71	0.12	0.67			-0.07	2.09	GUM	
	METAS	0.00	0.71			0.09	0.48			-0.10	2.04	METAS	
500	NMIJ	-0.13	0.68	-0.13	0.50					-0.19	2.02	NMIJ	630
	KRISS											KRISS	
	LNE	0.06	2.09	0.06	2.04	0.19	2.03					LNE	
	NIM	-0.06	0.78	-0.06	0.63	0.07	0.59			-0.12	2.06	NIM	
	CENAM	-0.03	1.17	-0.03	1.07	0.10	1.05			-0.09	2.24	CENAM	
	INMETRO	0.05	0.65	0.05	0.45	0.18	0.40			-0.01	2.01	INMETRO	
	UME	-0.05	0.78	-0.05	0.63	0.08	0.59			-0.11	2.06	UME	
	VNIIM	-0.34	0.97	-0.34	0.85	-0.21	0.82			-0.40	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 500.0 Hz and 630.0 Hz.

f in Hz	j → / i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j / ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$		
	PTB mean	0.07	0.54	0.01	1.02	-0.04	0.31	0.09	0.54	0.58	0.79	PTB mean	
	CMI	-0.16	0.71	-0.22	1.12	-0.27	0.55	-0.14	0.71	0.35	0.91	CMI	
	NMISA	0.10	0.64	0.04	1.08	-0.01	0.47	0.12	0.64	0.61	0.86	NMISA	
	DPLA	-0.01	0.58	-0.07	1.04	-0.12	0.38	0.01	0.58	0.50	0.82	DPLA	
	CEM	0.15	0.71	0.09	1.12	0.04	0.55	0.17	0.71	0.66	0.91	CEM	
	GUM	0.12	0.78	0.06	1.17	0.01	0.65	0.14	0.78	0.63	0.97	GUM	
	METAS	0.09	0.63	0.03	1.07	-0.02	0.45	0.11	0.63	0.60	0.85	METAS	
500	NMIJ	0.00	0.58	-0.06	1.04	-0.11	0.38	0.02	0.58	0.51	0.82	NMIJ	630
	KRISS											KRISS	
	LNE	0.19	2.06	0.13	2.24	0.08	2.01	0.21	2.06	0.70	2.14	LNE	
	NIM			-0.06	1.12	-0.11	0.55	0.02	0.71	0.51	0.91	NIM	
	CENAM	0.03	1.12			-0.05	1.03	0.08	1.12	0.57	1.26	CENAM	
	INMETRO	0.11	0.55	0.08	1.03			0.13	0.55	0.62	0.80	INMETRO	
	UME	0.01	0.71	-0.02	1.12	-0.10	0.55			0.49	0.91	UME	
	VNIIM	-0.28	0.91	-0.31	1.26	-0.39	0.80	-0.29	0.91			VNIIM	

Table 9.31: Bilateral degrees of equivalence for the SE at 800.0 Hz and 1000.0 Hz.

f	j →	PTB mean		CMI		NMISA		DPLA		CEM		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean			0.36	0.54	-0.05	0.45	0.15	0.36	-0.07	0.54	PTB mean	
	CMI	-0.30	0.54			-0.41	0.64	-0.21	0.58	-0.43	0.71	CMI	
	NMISA	0.05	0.45	0.35	0.64			0.20	0.50	-0.02	0.64	NMISA	
	DPLA	-0.08	0.36	0.22	0.58	-0.13	0.50			-0.22	0.58	DPLA	
	CEM	0.06	0.54	0.36	0.71	0.01	0.64	0.14	0.58			CEM	
	GUM	0.03	0.63	0.33	0.78	-0.02	0.72	0.11	0.67	-0.03	0.78	GUM	
	METAS	0.04	0.43	0.34	0.63	-0.01	0.55	0.12	0.48	-0.02	0.63	METAS	
800	NMIJ	-0.02	0.36	0.28	0.58	-0.07	0.50	0.06	0.42	-0.08	0.58	NMIJ	1000
	KRISS											KRISS	
	LNE	0.15	2.01	0.45	2.06	0.10	2.04	0.23	2.02	0.09	2.06	LNE	
	NIM	-0.08	0.54	0.22	0.71	-0.13	0.64	0.00	0.58	-0.14	0.71	NIM	
	CENAM	-0.02	1.02	0.28	1.12	-0.07	1.08	0.06	1.04	-0.08	1.12	CENAM	
	INMETRO	0.06	0.31	0.36	0.55	0.01	0.47	0.14	0.38	0.00	0.55	INMETRO	
	UME	-0.04	0.54	0.26	0.71	-0.09	0.64	0.04	0.58	-0.10	0.71	UME	
	VNIIM	-0.57	0.79	-0.27	0.91	-0.62	0.86	-0.49	0.82	-0.63	0.91	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 800.0 Hz and 1000.0 Hz.

f	j →	GUM		METAS		NMIJ		KRISS		LNE		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean	-0.03	0.63	-0.02	0.52	0.04	0.36			-0.17	2.01	PTB mean	
	CMI	-0.39	0.78	-0.38	0.69	-0.32	0.58			-0.53	2.06	CMI	
	NMISA	0.02	0.72	0.03	0.62	0.09	0.50			-0.12	2.04	NMISA	
	DPLA	-0.18	0.67	-0.17	0.57	-0.11	0.42			-0.32	2.02	DPLA	
	CEM	0.04	0.78	0.05	0.69	0.11	0.58			-0.10	2.06	CEM	
	GUM			0.01	0.77	0.07	0.67			-0.14	2.09	GUM	
	METAS	0.01	0.71			0.06	0.57			-0.15	2.06	METAS	
800	NMIJ	-0.05	0.67	-0.06	0.48					-0.21	2.02	NMIJ	1000
	KRISS											KRISS	
	LNE	0.12	2.09	0.11	2.04	0.17	2.02					LNE	
	NIM	-0.11	0.78	-0.12	0.63	-0.06	0.58			-0.23	2.06	NIM	
	CENAM	-0.05	1.17	-0.06	1.07	0.00	1.04			-0.17	2.24	CENAM	
	INMETRO	0.03	0.65	0.02	0.45	0.08	0.38			-0.09	2.01	INMETRO	
	UME	-0.07	0.78	-0.08	0.63	-0.02	0.58			-0.19	2.06	UME	
	VNIIM	-0.60	0.97	-0.61	0.85	-0.55	0.82			-0.72	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 800.0 Hz and 1000.0 Hz.

f	j →	NIM		CENAM		INMETRO		UME		VNIIM		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean	0.13	0.54	0.03	1.02	-0.04	0.31	0.12	0.54	0.50	0.79	PTB mean	
	CMI	-0.23	0.71	-0.33	1.12	-0.40	0.55	-0.24	0.71	0.14	0.91	CMI	
	NMISA	0.18	0.64	0.08	1.08	0.01	0.47	0.17	0.64	0.55	0.86	NMISA	
	DPLA	-0.02	0.58	-0.12	1.04	-0.19	0.38	-0.03	0.58	0.35	0.82	DPLA	
	CEM	0.20	0.71	0.10	1.12	0.03	0.55	0.19	0.71	0.57	0.91	CEM	
	GUM	0.16	0.78	0.06	1.17	-0.01	0.65	0.15	0.78	0.53	0.97	GUM	
	METAS	0.15	0.69	0.05	1.11	-0.02	0.54	0.14	0.69	0.52	0.90	METAS	
800	NMIJ	0.09	0.58	-0.01	1.04	-0.08	0.38	0.08	0.58	0.46	0.82	NMIJ	1000
	KRISS											KRISS	
	LNE	0.30	2.06	0.20	2.24	0.13	2.01	0.29	2.06	0.67	2.14	LNE	
	NIM			-0.10	1.12	-0.17	0.55	-0.01	0.71	0.37	0.91	NIM	
	CENAM	0.06	1.12			-0.07	1.03	0.09	1.12	0.47	1.26	CENAM	
	INMETRO	0.14	0.55	0.08	1.03			0.16	0.55	0.54	0.80	INMETRO	
	UME	0.04	0.71	-0.02	1.12	-0.10	0.55			0.38	0.91	UME	
	VNIIM	-0.49	0.91	-0.55	1.26	-0.63	0.80	-0.53	0.91			VNIIM	

Table 9.32: Bilateral degrees of equivalence for the SE at 1250.0 Hz and 1500.0 Hz.

f in Hz	j → i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$		
	PTB mean			0.50	0.71	-0.12	0.71	0.13	0.58	-0.09	1.12	PTB mean	
	CMI	-0.42	0.71			-0.62	0.71	-0.37	0.58	-0.59	1.12	CMI	
	NMISA	0.08	0.71	0.50	0.71			0.25	0.58	0.03	1.12	NMISA	
	DPLA	-0.13	0.58	0.29	0.58	-0.21	0.58			-0.22	1.04	DPLA	
	CEM	0.07	1.12	0.49	1.12	-0.01	1.12	0.20	1.04			CEM	
	GUM	0.07	0.78	0.49	0.78	-0.01	0.78	0.20	0.67	0.00	1.17	GUM	
	METAS	0.04	0.69	0.46	0.69	-0.04	0.69	0.17	0.57	-0.03	1.11	METAS	
1250	NMIJ	-0.06	0.58	0.36	0.58	-0.14	0.58	0.07	0.42	-0.13	1.04	NMIJ	1500
	KRISS											KRISS	
	LNE	0.26	2.06	0.68	2.06	0.18	2.06	0.39	2.02	0.19	2.24	LNE	
	NIM	-0.16	0.71	0.26	0.71	-0.24	0.71	-0.03	0.58	-0.23	1.12	NIM	
	CENAM	-0.02	1.12	0.40	1.12	-0.10	1.12	0.11	1.04	-0.09	1.41	CENAM	
	INMETRO	0.10	0.55	0.52	0.55	0.02	0.55	0.23	0.38	0.03	1.03	INMETRO	
	UME	-0.20	1.12	0.22	1.12	-0.28	1.12	-0.07	1.04	-0.27	1.41	UME	
	VNIIM	-0.49	0.91	-0.07	0.91	-0.57	0.91	-0.36	0.82	-0.56	1.26	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 1250.0 Hz and 1500.0 Hz.

f in Hz	j → i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$		
	PTB mean	-0.09	0.78	-0.04	0.69	-0.09	0.57			-0.32	2.06	PTB mean	
	CMI	-0.59	0.78	-0.54	0.69	-0.59	0.57			-0.82	2.06	CMI	
	NMISA	0.03	0.78	0.08	0.69	0.03	0.57			-0.20	2.06	NMISA	
	DPLA	-0.22	0.67	-0.17	0.57	-0.22	0.41			-0.45	2.02	DPLA	
	CEM	0.00	1.17	0.05	1.11	0.00	1.04			-0.23	2.24	CEM	
	GUM			0.05	0.77	0.00	0.66			-0.23	2.09	GUM	
	METAS	-0.03	0.77			-0.05	0.56			-0.28	2.06	METAS	
1250	NMIJ	-0.13	0.67	-0.10	0.57					-0.23	2.02	NMIJ	1500
	KRISS											KRISS	
	LNE	0.19	2.09	0.22	2.06	0.32	2.02					LNE	
	NIM	-0.23	0.78	-0.20	0.69	-0.10	0.58			-0.42	2.06	NIM	
	CENAM	-0.09	1.17	-0.06	1.11	0.04	1.04			-0.28	2.24	CENAM	
	INMETRO	0.03	0.65	0.06	0.54	0.16	0.38			-0.16	2.01	INMETRO	
	UME	-0.27	1.17	-0.24	1.11	-0.14	1.04			-0.46	2.24	UME	
	VNIIM	-0.56	0.97	-0.53	0.90	-0.43	0.82			-0.75	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 1250.0 Hz and 1500.0 Hz.

f in Hz	j → i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$		
	PTB mean	0.15	0.71	0.04	1.12	-0.11	0.55	0.12	1.12	0.69	0.91	PTB mean	
	CMI	-0.35	0.71	-0.46	1.12	-0.61	0.55	-0.38	1.12	0.19	0.91	CMI	
	NMISA	0.27	0.71	0.16	1.12	0.01	0.55	0.24	1.12	0.81	0.91	NMISA	
	DPLA	0.02	0.58	-0.09	1.04	-0.24	0.38	-0.01	1.04	0.56	0.82	DPLA	
	CEM	0.24	1.12	0.13	1.41	-0.02	1.03	0.21	1.41	0.78	1.26	CEM	
	GUM	0.24	0.78	0.13	1.17	-0.02	0.65	0.21	1.17	0.78	0.97	GUM	
	METAS	0.19	0.69	0.08	1.11	-0.07	0.54	0.16	1.11	0.73	0.90	METAS	
1250	NMIJ	0.24	0.57	0.13	1.04	-0.02	0.37	0.21	1.04	0.78	0.81	NMIJ	1500
	KRISS											KRISS	
	LNE	0.47	2.06	0.36	2.24	0.21	2.01	0.44	2.24	1.01	2.14	LNE	
	NIM			-0.11	1.12	-0.26	0.55	-0.03	1.12	0.54	0.91	NIM	
	CENAM	0.14	1.12			-0.15	1.03	0.08	1.41	0.65	1.26	CENAM	
	INMETRO	0.26	0.55	0.12	1.03			0.23	1.03	0.80	0.80	INMETRO	
	UME	-0.04	1.12	-0.18	1.41	-0.30	1.03			0.57	1.26	UME	
	VNIIM	-0.33	0.91	-0.47	1.26	-0.59	0.80	-0.29	1.26			VNIIM	

Table 9.33: Bilateral degrees of equivalence for the SE at 1600.0 Hz and 2000.0 Hz.

f	j →	PTB mean		CMI		NMISA		DPLA		CEM		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean			0.65	0.71	-0.16	0.71	0.18	0.58	-0.12	1.12	PTB mean	
	CMI	-0.53	0.71			-0.81	0.71	-0.47	0.58	-0.77	1.12	CMI	
	NMISA	0.13	0.71	0.66	0.71			0.34	0.58	0.04	1.12	NMISA	
	DPLA	-0.14	0.58	0.39	0.58	-0.27	0.58			-0.30	1.04	DPLA	
	CEM	0.11	1.12	0.64	1.12	-0.02	1.12	0.25	1.04			CEM	
	GUM	0.09	0.78	0.62	0.78	-0.04	0.78	0.23	0.67	-0.02	1.17	GUM	
	METAS	0.07	0.69	0.60	0.69	-0.06	0.69	0.21	0.57	-0.04	1.11	METAS	
1600	NMIJ	0.14	0.57	0.67	0.57	0.01	0.57	0.28	0.41	0.03	1.04	NMIJ	2000
	KRISS											KRISS	
	LNE	0.36	2.06	0.89	2.06	0.23	2.06	0.50	2.02	0.25	2.24	LNE	
	NIM	-0.19	0.71	0.34	0.71	-0.32	0.71	-0.05	0.58	-0.30	1.12	NIM	
	CENAM	-0.06	1.12	0.47	1.12	-0.19	1.12	0.08	1.04	-0.17	1.41	CENAM	
	INMETRO	0.12	0.55	0.65	0.55	-0.01	0.55	0.26	0.38	0.01	1.03	INMETRO	
	UME	-0.23	1.12	0.30	1.12	-0.36	1.12	-0.09	1.04	-0.34	1.41	UME	
	VNIIM	-0.82	0.91	-0.29	0.91	-0.95	0.91	-0.68	0.82	-0.93	1.26	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 1600.0 Hz and 2000.0 Hz.

f	j →	GUM		METAS		NMIJ		KRISS		LNE		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean	-0.13	0.78	-0.07	0.69	0.09	0.57			-0.42	5.02	PTB mean	
	CMI	-0.78	0.78	-0.72	0.69	-0.56	0.57			-1.07	5.02	CMI	
	NMISA	0.03	0.78	0.09	0.69	0.25	0.57			-0.26	5.02	NMISA	
	DPLA	-0.31	0.67	-0.25	0.57	-0.09	0.41			-0.60	5.01	DPLA	
	CEM	-0.01	1.17	0.05	1.11	0.21	1.04			-0.30	5.10	CEM	
	GUM			0.06	0.77	0.22	0.66			-0.29	5.04	GUM	
	METAS	-0.02	0.77			0.16	0.56			-0.35	5.02	METAS	
1600	NMIJ	0.05	0.66	0.07	0.56					-0.51	5.01	NMIJ	2000
	KRISS											KRISS	
	LNE	0.27	2.09	0.29	2.06	0.22	2.02					LNE	
	NIM	-0.28	0.78	-0.26	0.69	-0.33	0.57			-0.55	2.06	NIM	
	CENAM	-0.15	1.17	-0.13	1.11	-0.20	1.04			-0.42	2.24	CENAM	
	INMETRO	0.03	0.65	0.05	0.54	-0.02	0.37			-0.24	2.01	INMETRO	
	UME	-0.32	1.17	-0.30	1.11	-0.37	1.04			-0.59	2.24	UME	
	VNIIM	-0.91	0.97	-0.89	0.90	-0.96	0.81			-1.18	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 1600.0 Hz and 2000.0 Hz.

f	j →	NIM		CENAM		INMETRO		UME		VNIIM		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean	0.26	0.71	0.06	1.12	-0.14	0.55	0.22	1.12	0.68	0.91	PTB mean	
	CMI	-0.39	0.71	-0.59	1.12	-0.79	0.55	-0.43	1.12	0.03	0.91	CMI	
	NMISA	0.42	0.71	0.22	1.12	0.02	0.55	0.38	1.12	0.84	0.91	NMISA	
	DPLA	0.08	0.58	-0.12	1.04	-0.32	0.38	0.04	1.04	0.50	0.82	DPLA	
	CEM	0.38	1.12	0.18	1.41	-0.02	1.03	0.34	1.41	0.80	1.26	CEM	
	GUM	0.39	0.78	0.19	1.17	-0.01	0.65	0.35	1.17	0.81	0.97	GUM	
	METAS	0.33	0.69	0.13	1.11	-0.07	0.54	0.29	1.11	0.75	0.90	METAS	
1600	NMIJ	0.17	0.57	-0.03	1.04	-0.23	0.37	0.13	1.04	0.59	0.81	NMIJ	2000
	KRISS											KRISS	
	LNE	0.68	5.02	0.48	5.10	0.28	5.01	0.64	5.10	1.10	5.06	LNE	
	NIM			-0.20	1.12	-0.40	0.55	-0.04	1.12	0.42	0.91	NIM	
	CENAM	0.13	1.12			-0.20	1.03	0.16	1.41	0.62	1.26	CENAM	
	INMETRO	0.31	0.55	0.18	1.03			0.36	1.03	0.82	0.80	INMETRO	
	UME	-0.04	1.12	-0.17	1.41	-0.35	1.03			0.46	1.26	UME	
	VNIIM	-0.63	0.91	-0.76	1.26	-0.94	0.80	-0.59	1.26			VNIIM	

Table 9.34: Bilateral degrees of equivalence for the SE at 2500.0 Hz and 3000.0 Hz.

f in Hz	j → i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$		
	PTB mean			0.92	0.71	-0.27	0.71	0.19	0.58	-0.16	1.12	PTB mean	
	CMI	-0.79	0.71			-1.19	0.71	-0.73	0.58	-1.08	1.12	CMI	
	NMISA	0.20	0.71	0.99	0.71			0.46	0.58	0.11	1.12	NMISA	
	DPLA	-0.19	0.58	0.60	0.58	-0.39	0.58			-0.35	1.04	DPLA	
	CEM	0.13	1.12	0.92	1.12	-0.07	1.12	0.32	1.04			CEM	
	GUM	0.14	0.78	0.93	0.78	-0.06	0.78	0.33	0.67	0.01	1.17	GUM	
	METAS	0.08	0.69	0.87	0.69	-0.12	0.69	0.27	0.57	-0.05	1.11	METAS	
2500	NMIJ	0.17	0.58	0.96	0.58	-0.03	0.58	0.36	0.42	0.04	1.04	NMIJ	3000
	KRISS											KRISS	
	LNE	0.53	5.02	1.32	5.02	0.33	5.02	0.72	5.01	0.40	5.10	LNE	
	NIM	-0.35	0.71	0.44	0.71	-0.55	0.71	-0.16	0.58	-0.48	1.12	NIM	
	CENAM	-0.06	1.12	0.73	1.12	-0.26	1.12	0.13	1.04	-0.19	1.41	CENAM	
	INMETRO	0.19	0.55	0.98	0.55	-0.01	0.55	0.38	0.38	0.06	1.03	INMETRO	
	UME	-0.29	1.12	0.50	1.12	-0.49	1.12	-0.10	1.04	-0.42	1.41	UME	
	VNIIM	-0.72	1.12	0.07	1.12	-0.92	1.12	-0.53	1.04	-0.85	1.41	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 2500.0 Hz and 3000.0 Hz.

f in Hz	j → i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$		
	PTB mean	-0.17	0.78	-0.10	0.69	-0.08	0.58			-0.67	5.02	PTB mean	
	CMI	-1.09	0.78	-1.02	0.69	-1.00	0.58			-1.59	5.02	CMI	
	NMISA	0.10	0.78	0.17	0.69	0.19	0.58			-0.40	5.02	NMISA	
	DPLA	-0.36	0.67	-0.29	0.57	-0.27	0.42			-0.86	5.01	DPLA	
	CEM	-0.01	1.17	0.06	1.11	0.08	1.04			-0.51	5.10	CEM	
	GUM			0.07	0.77	0.09	0.67			-0.50	5.04	GUM	
	METAS	-0.06	0.77			0.02	0.57			-0.57	5.02	METAS	
2500	NMIJ	0.03	0.67	0.09	0.57					-0.59	5.01	NMIJ	3000
	KRISS											KRISS	
	LNE	0.39	5.04	0.45	5.02	0.36	5.01					LNE	
	NIM	-0.49	0.78	-0.43	0.69	-0.52	0.58			-0.88	5.02	NIM	
	CENAM	-0.20	1.17	-0.14	1.11	-0.23	1.04			-0.59	5.10	CENAM	
	INMETRO	0.05	0.65	0.11	0.54	0.02	0.38			-0.34	5.01	INMETRO	
	UME	-0.43	1.17	-0.37	1.11	-0.46	1.04			-0.82	5.10	UME	
	VNIIM	-0.86	1.17	-0.80	1.11	-0.89	1.04			-1.25	5.10	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 2500.0 Hz and 3000.0 Hz.

f in Hz	j → i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$		
	PTB mean	0.33	0.71	0.04	1.12	-0.22	0.55	0.54	1.12	0.75	1.12	PTB mean	
	CMI	-0.59	0.71	-0.88	1.12	-1.14	0.55	-0.38	1.12	-0.17	1.12	CMI	
	NMISA	0.60	0.71	0.31	1.12	0.05	0.55	0.81	1.12	1.02	1.12	NMISA	
	DPLA	0.14	0.58	-0.15	1.04	-0.41	0.38	0.35	1.04	0.56	1.04	DPLA	
	CEM	0.49	1.12	0.20	1.41	-0.06	1.03	0.70	1.41	0.91	1.41	CEM	
	GUM	0.50	0.78	0.21	1.17	-0.05	0.65	0.71	1.17	0.92	1.17	GUM	
	METAS	0.43	0.69	0.14	1.11	-0.12	0.54	0.64	1.11	0.85	1.11	METAS	
2500	NMIJ	0.41	0.58	0.12	1.04	-0.14	0.38	0.62	1.04	0.83	1.04	NMIJ	3000
	KRISS											KRISS	
	LNE	1.00	5.02	0.71	5.10	0.45	5.01	1.21	5.10	1.42	5.10	LNE	
	NIM			-0.29	1.12	-0.55	0.55	0.21	1.12	0.42	1.12	NIM	
	CENAM	0.29	1.12			-0.26	1.03	0.50	1.41	0.71	1.41	CENAM	
	INMETRO	0.54	0.55	0.25	1.03			0.76	1.03	0.97	1.03	INMETRO	
	UME	0.06	1.12	-0.23	1.41	-0.48	1.03			0.21	1.41	UME	
	VNIIM	-0.37	1.12	-0.66	1.41	-0.91	1.03	-0.43	1.41			VNIIM	

Table 9.35: Bilateral degrees of equivalence for the SE at 3150.0 Hz and 3500.0 Hz.

f in Hz	j → i ↓	PTB mean D_{ij} in °	PTB mean $U_{D_{ij}}$ in °	CMI D_{ij} in °	CMI $U_{D_{ij}}$ in °	NMISA D_{ij} in °	NMISA $U_{D_{ij}}$ in °	DPLA D_{ij} in °	DPLA $U_{D_{ij}}$ in °	CEM D_{ij} in °	CEM $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean			1.05	0.71	-0.34	0.71	0.26	0.58	-0.17	1.12	PTB mean	
	CMI	-0.97	0.71			-1.39	0.71	-0.79	0.58	-1.22	1.12	CMI	
	NMISA	0.27	0.71	1.24	0.71			0.60	0.58	0.17	1.12	NMISA	
	DPLA	-0.22	0.58	0.75	0.58	-0.49	0.58			-0.43	1.04	DPLA	
	CEM	0.16	1.12	1.13	1.12	-0.11	1.12	0.38	1.04			CEM	
	GUM	0.19	0.78	1.16	0.78	-0.08	0.78	0.41	0.67	0.03	1.17	GUM	
	METAS	0.09	0.69	1.06	0.69	-0.18	0.69	0.31	0.57	-0.07	1.11	METAS	
3150	NMIJ	0.15	0.57	1.12	0.57	-0.12	0.57	0.37	0.41	-0.01	1.04	NMIJ	3500
	KRISS											KRISS	
	LNE	0.69	5.02	1.66	5.02	0.42	5.02	0.91	5.01	0.53	5.10	LNE	
	NIM	-0.44	0.71	0.53	0.71	-0.71	0.71	-0.22	0.58	-0.60	1.12	NIM	
	CENAM	-0.05	1.12	0.92	1.12	-0.32	1.12	0.17	1.04	-0.21	1.41	CENAM	
	INMETRO	0.24	0.60	1.21	0.60	-0.03	0.60	0.46	0.45	0.08	1.06	INMETRO	
	UME	-0.47	1.12	0.50	1.12	-0.74	1.12	-0.25	1.04	-0.63	1.41	UME	
	VNIIM	-0.77	1.12	0.20	1.12	-1.04	1.12	-0.55	1.04	-0.93	1.41	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 3150.0 Hz and 3500.0 Hz.

f in Hz	j → i ↓	GUM D_{ij} in °	GUM $U_{D_{ij}}$ in °	METAS D_{ij} in °	METAS $U_{D_{ij}}$ in °	NMIJ D_{ij} in °	NMIJ $U_{D_{ij}}$ in °	KRISS D_{ij} in °	KRISS $U_{D_{ij}}$ in °	LNE D_{ij} in °	LNE $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean	-0.20	0.78	-0.11	0.69	-0.15	0.57			-0.77	5.02	PTB mean	
	CMI	-1.25	0.78	-1.16	0.69	-1.20	0.57			-1.82	5.02	CMI	
	NMISA	0.14	0.78	0.23	0.69	0.19	0.57			-0.43	5.02	NMISA	
	DPLA	-0.46	0.67	-0.37	0.57	-0.41	0.41			-1.03	5.01	DPLA	
	CEM	-0.03	1.17	0.06	1.11	0.02	1.04			-0.60	5.10	CEM	
	GUM			0.09	0.77	0.05	0.66			-0.57	5.04	GUM	
	METAS	-0.10	0.77			-0.04	0.56			-0.66	5.02	METAS	
3150	NMIJ	-0.04	0.66	0.06	0.56					-0.62	5.01	NMIJ	3500
	KRISS											KRISS	
	LNE	0.50	5.04	0.60	5.02	0.54	5.01					LNE	
	NIM	-0.63	0.78	-0.53	0.69	-0.59	0.57			-1.13	5.02	NIM	
	CENAM	-0.24	1.17	-0.14	1.11	-0.20	1.04			-0.74	5.10	CENAM	
	INMETRO	0.05	0.69	0.15	0.59	0.09	0.44			-0.45	5.01	INMETRO	
	UME	-0.66	1.17	-0.56	1.11	-0.62	1.04			-1.16	5.10	UME	
	VNIIM	-0.96	1.17	-0.86	1.11	-0.92	1.04			-1.46	5.10	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 3150.0 Hz and 3500.0 Hz.

f in Hz	j → i ↓	NIM D_{ij} in °	NIM $U_{D_{ij}}$ in °	CENAM D_{ij} in °	CENAM $U_{D_{ij}}$ in °	INMETRO D_{ij} in °	INMETRO $U_{D_{ij}}$ in °	UME D_{ij} in °	UME $U_{D_{ij}}$ in °	VNIIM D_{ij} in °	VNIIM $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean	0.49	0.71	0.05	1.12	-0.30	0.60	0.40	1.12	0.80	1.12	PTB mean	
	CMI	-0.56	0.71	-1.00	1.12	-1.35	0.60	-0.65	1.12	-0.25	1.12	CMI	
	NMISA	0.83	0.71	0.39	1.12	0.04	0.60	0.74	1.12	1.14	1.12	NMISA	
	DPLA	0.23	0.58	-0.21	1.04	-0.56	0.45	0.14	1.04	0.54	1.04	DPLA	
	CEM	0.66	1.12	0.22	1.41	-0.13	1.06	0.57	1.41	0.97	1.41	CEM	
	GUM	0.69	0.78	0.25	1.17	-0.10	0.69	0.60	1.17	1.00	1.17	GUM	
	METAS	0.60	0.69	0.16	1.11	-0.19	0.59	0.51	1.11	0.91	1.11	METAS	
3150	NMIJ	0.64	0.57	0.20	1.04	-0.15	0.44	0.55	1.04	0.95	1.04	NMIJ	3500
	KRISS											KRISS	
	LNE	1.26	5.02	0.82	5.10	0.47	5.01	1.17	5.10	1.57	5.10	LNE	
	NIM			-0.44	1.12	-0.79	0.60	-0.09	1.12	0.31	1.12	NIM	
	CENAM	0.39	1.12			-0.35	1.06	0.35	1.41	0.75	1.41	CENAM	
	INMETRO	0.68	0.60	0.29	1.06			0.70	1.06	1.10	1.06	INMETRO	
	UME	-0.03	1.12	-0.42	1.41	-0.71	1.06			0.40	1.41	UME	
	VNIIM	-0.33	1.12	-0.72	1.41	-1.01	1.06	-0.30	1.41			VNIIM	

Table 9.36: Bilateral degrees of equivalence for the SE at 4000.0 Hz and 4500.0 Hz.

f in Hz	j → i ↓	PTB mean D_{ij}	PTB mean $U_{D_{ij}}$	CMI D_{ij}	CMI $U_{D_{ij}}$	NMISA D_{ij}	NMISA $U_{D_{ij}}$	DPLA D_{ij}	DPLA $U_{D_{ij}}$	CEM D_{ij}	CEM $U_{D_{ij}}$	← j ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean			1.29	0.71	-0.39	0.71	0.28	0.58	-0.22	1.12	PTB mean	
	CMI	-1.21	0.71			-1.68	0.71	-1.01	0.58	-1.51	1.12	CMI	
	NMISA	0.35	0.71	1.56	0.71			0.67	0.58	0.17	1.12	NMISA	
	DPLA	-0.28	0.58	0.93	0.58	-0.63	0.58			-0.50	1.04	DPLA	
	CEM	0.19	1.12	1.40	1.12	-0.16	1.12	0.47	1.04			CEM	
	GUM	0.20	0.78	1.41	0.78	-0.15	0.78	0.48	0.67	0.01	1.17	GUM	
	METAS	0.12	0.69	1.33	0.69	-0.23	0.69	0.40	0.57	-0.07	1.11	METAS	
4000	NMIJ	0.18	0.57	1.39	0.57	-0.17	0.57	0.46	0.41	-0.01	1.04	NMIJ	4500
	KRISS											KRISS	
	LNE	0.86	5.02	2.07	5.02	0.51	5.02	1.14	5.01	0.67	5.10	LNE	
	NIM	-0.53	0.71	0.68	0.71	-0.88	0.71	-0.25	0.58	-0.72	1.12	NIM	
	CENAM	-0.10	1.12	1.11	1.12	-0.45	1.12	0.18	1.04	-0.29	1.41	CENAM	
	INMETRO	0.29	0.71	1.50	0.71	-0.06	0.71	0.57	0.58	0.10	1.12	INMETRO	
	UME	-0.56	1.12	0.65	1.12	-0.91	1.12	-0.28	1.04	-0.75	1.41	UME	
	VNIIM	-0.87	1.12	0.34	1.12	-1.22	1.12	-0.59	1.04	-1.06	1.41	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 4000.0 Hz and 4500.0 Hz.

f in Hz	j → i ↓	GUM D_{ij}	GUM $U_{D_{ij}}$	METAS D_{ij}	METAS $U_{D_{ij}}$	NMIJ D_{ij}	NMIJ $U_{D_{ij}}$	KRISS D_{ij}	KRISS $U_{D_{ij}}$	LNE D_{ij}	LNE $U_{D_{ij}}$	← j ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean	-0.24	0.78	-0.14	0.69	-0.20	0.57			-0.99	5.02	PTB mean	
	CMI	-1.53	0.78	-1.43	0.69	-1.49	0.57			-2.28	5.02	CMI	
	NMISA	0.15	0.78	0.25	0.69	0.19	0.57			-0.60	5.02	NMISA	
	DPLA	-0.52	0.67	-0.42	0.57	-0.48	0.41			-1.27	5.01	DPLA	
	CEM	-0.02	1.17	0.08	1.11	0.02	1.04			-0.77	5.10	CEM	
	GUM			0.10	0.77	0.04	0.66			-0.75	5.04	GUM	
	METAS	-0.08	0.77			-0.06	0.56			-0.85	5.02	METAS	
4000	NMIJ	-0.02	0.66	0.06	0.56					-0.79	5.01	NMIJ	4500
	KRISS											KRISS	
	LNE	0.66	5.04	0.74	5.02	0.68	5.01					LNE	
	NIM	-0.73	0.78	-0.65	0.69	-0.71	0.57			-1.39	5.02	NIM	
	CENAM	-0.30	1.17	-0.22	1.11	-0.28	1.04			-0.96	5.10	CENAM	
	INMETRO	0.09	0.78	0.17	0.69	0.11	0.57			-0.57	5.02	INMETRO	
	UME	-0.76	1.17	-0.68	1.11	-0.74	1.04			-1.42	5.10	UME	
	VNIIM	-1.07	1.17	-0.99	1.11	-1.05	1.04			-1.73	5.10	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 4000.0 Hz and 4500.0 Hz.

f in Hz	j → i ↓	NIM D_{ij}	NIM $U_{D_{ij}}$	CENAM D_{ij}	CENAM $U_{D_{ij}}$	INMETRO D_{ij}	INMETRO $U_{D_{ij}}$	UME D_{ij}	UME $U_{D_{ij}}$	VNIIM D_{ij}	VNIIM $U_{D_{ij}}$	← j ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean	0.55	0.71	0.08	1.12	-0.38	0.71	0.78	1.12	1.07	1.12	PTB mean	
	CMI	-0.74	0.71	-1.21	1.12	-1.67	0.71	-0.51	1.12	-0.22	1.12	CMI	
	NMISA	0.94	0.71	0.47	1.12	0.01	0.71	1.17	1.12	1.46	1.12	NMISA	
	DPLA	0.27	0.58	-0.20	1.04	-0.66	0.58	0.50	1.04	0.79	1.04	DPLA	
	CEM	0.77	1.12	0.30	1.41	-0.16	1.12	1.00	1.41	1.29	1.41	CEM	
	GUM	0.79	0.78	0.32	1.17	-0.14	0.78	1.02	1.17	1.31	1.17	GUM	
	METAS	0.69	0.69	0.22	1.11	-0.24	0.69	0.92	1.11	1.21	1.11	METAS	
4000	NMIJ	0.75	0.57	0.28	1.04	-0.18	0.57	0.98	1.04	1.27	1.04	NMIJ	4500
	KRISS											KRISS	
	LNE	1.54	5.02	1.07	5.10	0.61	5.02	1.77	5.10	2.06	5.10	LNE	
	NIM			-0.47	1.12	-0.93	0.71	0.23	1.12	0.52	1.12	NIM	
	CENAM	0.43	1.12			-0.46	1.12	0.70	1.41	0.99	1.41	CENAM	
	INMETRO	0.82	0.71	0.39	1.12			1.16	1.12	1.45	1.12	INMETRO	
	UME	-0.03	1.12	-0.46	1.41	-0.85	1.12			0.29	1.41	UME	
	VNIIM	-0.34	1.12	-0.77	1.41	-1.16	1.12	-0.31	1.41			VNIIM	

Table 9.37: Bilateral degrees of equivalence for the SE at 5000.0 Hz and 5500.0 Hz.

f	j →	PTB mean		CMI		NMISA		DPLA		CEM		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean			1.57	0.71	-0.47	0.94	0.36	0.71	-0.27	1.12	PTB mean	
	CMI	-1.41	0.71			-2.04	0.94	-1.21	0.71	-1.84	1.12	CMI	
	NMISA	0.44	0.94	1.85	0.94			0.83	0.94	0.20	1.28	NMISA	
	DPLA	-0.30	0.58	1.11	0.58	-0.74	0.85			-0.63	1.12	DPLA	
	CEM	0.27	1.12	1.68	1.12	-0.17	1.28	0.57	1.04			CEM	
	GUM	0.29	0.94	1.70	0.94	-0.15	1.13	0.59	0.85	0.02	1.28	GUM	
	METAS	0.21	0.69	1.62	0.69	-0.23	0.93	0.51	0.57	-0.06	1.11	METAS	
5000	NMIJ	0.17	0.57	1.58	0.57	-0.27	0.85	0.47	0.41	-0.10	1.04	NMIJ	5500
	KRISS											KRISS	
	LNE	1.10	5.02	2.51	5.02	0.66	5.06	1.40	5.01	0.83	5.10	LNE	
	NIM	-0.62	0.71	0.79	0.71	-1.06	0.94	-0.32	0.58	-0.89	1.12	NIM	
	CENAM	-0.11	1.12	1.30	1.12	-0.55	1.28	0.19	1.04	-0.38	1.41	CENAM	
	INMETRO	0.40	0.71	1.81	0.71	-0.04	0.94	0.70	0.58	0.13	1.12	INMETRO	
	UME	-0.84	1.12	0.57	1.12	-1.28	1.28	-0.54	1.04	-1.11	1.41	UME	
	VNIIM	-0.91	1.12	0.50	1.12	-1.35	1.28	-0.61	1.04	-1.18	1.41	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 5000.0 Hz and 5500.0 Hz.

f	j →	GUM		METAS		NMIJ		KRISS		LNE		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean	-0.30	1.12	-0.12	0.99	-0.24	0.57			-1.20	5.02	PTB mean	
	CMI	-1.87	1.12	-1.69	0.99	-1.81	0.57			-2.77	5.02	CMI	
	NMISA	0.17	1.28	0.35	1.17	0.23	0.85			-0.73	5.06	NMISA	
	DPLA	-0.66	1.12	-0.48	0.99	-0.60	0.57			-1.56	5.02	DPLA	
	CEM	-0.03	1.41	0.15	1.32	0.03	1.04			-0.93	5.10	CEM	
	GUM			0.18	1.32	0.06	1.04			-0.90	5.10	GUM	
	METAS	-0.08	0.93			-0.12	0.90			-1.08	5.07	METAS	
5000	NMIJ	-0.12	0.85	-0.04	0.56					-0.96	5.01	NMIJ	5500
	KRISS											KRISS	
	LNE	0.81	5.06	0.89	5.02	0.93	5.01					LNE	
	NIM	-0.91	0.94	-0.83	0.69	-0.79	0.57			-1.72	5.02	NIM	
	CENAM	-0.40	1.28	-0.32	1.11	-0.28	1.04			-1.21	5.10	CENAM	
	INMETRO	0.11	0.94	0.19	0.69	0.23	0.57			-0.70	5.02	INMETRO	
	UME	-1.13	1.28	-1.05	1.11	-1.01	1.04			-1.94	5.10	UME	
	VNIIM	-1.20	1.28	-1.12	1.11	-1.08	1.04			-2.01	5.10	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 5000.0 Hz and 5500.0 Hz.

f	j →	NIM		CENAM		INMETRO		UME		VNIIM		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean	0.68	1.12	0.08	1.12	-0.35	0.94	1.06	1.58	1.24	1.58	PTB mean	
	CMI	-0.89	1.12	-1.49	1.12	-1.92	0.94	-0.51	1.58	-0.33	1.58	CMI	
	NMISA	1.15	1.28	0.55	1.28	0.12	1.13	1.53	1.70	1.71	1.70	NMISA	
	DPLA	0.32	1.12	-0.28	1.12	-0.71	0.94	0.70	1.58	0.88	1.58	DPLA	
	CEM	0.95	1.41	0.35	1.41	-0.08	1.28	1.33	1.80	1.51	1.80	CEM	
	GUM	0.98	1.41	0.38	1.41	-0.05	1.28	1.36	1.80	1.54	1.80	GUM	
	METAS	0.80	1.32	0.20	1.32	-0.23	1.17	1.18	1.73	1.36	1.73	METAS	
5000	NMIJ	0.92	1.04	0.32	1.04	-0.11	0.85	1.30	1.53	1.48	1.53	NMIJ	5500
	KRISS											KRISS	
	LNE	1.88	5.10	1.28	5.10	0.85	5.06	2.26	5.22	2.44	5.22	LNE	
	NIM			-0.60	1.41	-1.03	1.28	0.38	1.80	0.56	1.80	NIM	
	CENAM	0.51	1.12			-0.43	1.28	0.98	1.80	1.16	1.80	CENAM	
	INMETRO	1.02	0.71	0.51	1.12			1.41	1.70	1.59	1.70	INMETRO	
	UME	-0.22	1.12	-0.73	1.41	-1.24	1.12			0.18	2.12	UME	
	VNIIM	-0.29	1.12	-0.80	1.41	-1.31	1.12	-0.07	1.41			VNIIM	

Table 9.38: Bilateral degrees of equivalence for the SE at 6000.0 Hz and 6300.0 Hz.

f in Hz	j → / i ↓	PTB mean D_{ij}	PTB mean $U_{D_{ij}}$	CMI D_{ij}	CMI $U_{D_{ij}}$	NMISA D_{ij}	NMISA $U_{D_{ij}}$	DPLA D_{ij}	DPLA $U_{D_{ij}}$	CEM D_{ij}	CEM $U_{D_{ij}}$	← j / ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean			1.79	0.71	-0.52	0.94	0.32	0.71	-0.24	1.12	PTB mean	
	CMI	-1.70	0.71			-2.31	0.94	-1.47	0.71	-2.03	1.12	CMI	
	NMISA	0.52	0.94	2.22	0.94			0.84	0.94	0.28	1.28	NMISA	
	DPLA	-0.35	0.71	1.35	0.71	-0.87	0.94			-0.56	1.12	DPLA	
	CEM	0.28	1.12	1.98	1.12	-0.24	1.28	0.63	1.12			CEM	
	GUM	0.31	1.12	2.01	1.12	-0.21	1.28	0.66	1.12	0.03	1.41	GUM	
	METAS	0.17	0.99	1.87	0.99	-0.35	1.17	0.52	0.99	-0.11	1.32	METAS	
6000	NMIJ	0.28	0.57	1.98	0.57	-0.24	0.85	0.63	0.57	0.00	1.04	NMIJ	6300
	KRISS											KRISS	
	LNE	1.34	5.02	3.04	5.02	0.82	5.06	1.69	5.02	1.06	5.10	LNE	
	NIM	-0.75	1.12	0.95	1.12	-1.27	1.28	-0.40	1.12	-1.03	1.41	NIM	
	CENAM	-0.06	1.12	1.64	1.12	-0.58	1.28	0.29	1.12	-0.34	1.41	CENAM	
	INMETRO	0.40	0.94	2.10	0.94	-0.12	1.13	0.75	0.94	0.12	1.28	INMETRO	
	UME	-1.12	1.58	0.58	1.58	-1.64	1.70	-0.77	1.58	-1.40	1.80	UME	
	VNIIM	-1.16	1.58	0.54	1.58	-1.68	1.70	-0.81	1.58	-1.44	1.80	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 6000.0 Hz and 6300.0 Hz.

f in Hz	j → / i ↓	GUM D_{ij}	GUM $U_{D_{ij}}$	METAS D_{ij}	METAS $U_{D_{ij}}$	NMIJ D_{ij}	NMIJ $U_{D_{ij}}$	KRISS D_{ij}	KRISS $U_{D_{ij}}$	LNE D_{ij}	LNE $U_{D_{ij}}$	← j / ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean	-0.37	1.12	-0.10	0.99	-0.23	0.57			-1.35	5.02	PTB mean	
	CMI	-2.16	1.12	-1.89	0.99	-2.02	0.57			-3.14	5.02	CMI	
	NMISA	0.15	1.28	0.42	1.17	0.29	0.85			-0.83	5.06	NMISA	
	DPLA	-0.69	1.12	-0.42	0.99	-0.55	0.57			-1.67	5.02	DPLA	
	CEM	-0.13	1.41	0.14	1.32	0.01	1.04			-1.11	5.10	CEM	
	GUM			0.27	1.32	0.14	1.04			-0.98	5.10	GUM	
	METAS	-0.14	1.32			-0.13	0.90			-1.25	5.07	METAS	
6000	NMIJ	-0.03	1.04	0.11	0.90					-1.12	5.01	NMIJ	6300
	KRISS											KRISS	
	LNE	1.03	5.10	1.17	5.07	1.06	5.01					LNE	
	NIM	-1.06	1.41	-0.92	1.32	-1.03	1.04			-2.09	5.10	NIM	
	CENAM	-0.37	1.41	-0.23	1.32	-0.34	1.04			-1.40	5.10	CENAM	
	INMETRO	0.09	1.28	0.23	1.17	0.12	0.85			-0.94	5.06	INMETRO	
	UME	-1.43	1.80	-1.29	1.73	-1.40	1.53			-2.46	5.22	UME	
	VNIIM	-1.47	1.80	-1.33	1.73	-1.44	1.53			-2.50	5.22	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 6000.0 Hz and 6300.0 Hz.

f in Hz	j → / i ↓	NIM D_{ij}	NIM $U_{D_{ij}}$	CENAM D_{ij}	CENAM $U_{D_{ij}}$	INMETRO D_{ij}	INMETRO $U_{D_{ij}}$	UME D_{ij}	UME $U_{D_{ij}}$	VNIIM D_{ij}	VNIIM $U_{D_{ij}}$	← j / ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean	0.79	1.12	0.10	1.12	-0.33	0.94	0.92	1.58	1.49	1.58	PTB mean	
	CMI	-1.00	1.12	-1.69	1.12	-2.12	0.94	-0.87	1.58	-0.30	1.58	CMI	
	NMISA	1.31	1.28	0.62	1.28	0.19	1.13	1.44	1.70	2.01	1.70	NMISA	
	DPLA	0.47	1.12	-0.22	1.12	-0.65	0.94	0.60	1.58	1.17	1.58	DPLA	
	CEM	1.03	1.41	0.34	1.41	-0.09	1.28	1.16	1.80	1.73	1.80	CEM	
	GUM	1.16	1.41	0.47	1.41	0.04	1.28	1.29	1.80	1.86	1.80	GUM	
	METAS	0.89	1.32	0.20	1.32	-0.23	1.17	1.02	1.73	1.59	1.73	METAS	
6000	NMIJ	1.02	1.04	0.33	1.04	-0.10	0.85	1.15	1.53	1.72	1.53	NMIJ	6300
	KRISS											KRISS	
	LNE	2.14	5.10	1.45	5.10	1.02	5.06	2.27	5.22	2.84	5.22	LNE	
	NIM			-0.69	1.41	-1.12	1.28	0.13	1.80	0.70	1.80	NIM	
	CENAM	0.69	1.41			-0.43	1.28	0.82	1.80	1.39	1.80	CENAM	
	INMETRO	1.15	1.28	0.46	1.28			1.25	1.70	1.82	1.70	INMETRO	
	UME	-0.37	1.80	-1.06	1.80	-1.52	1.70			0.57	2.12	UME	
	VNIIM	-0.41	1.80	-1.10	1.80	-1.56	1.70	-0.04	2.12			VNIIM	

Table 9.39: Bilateral degrees of equivalence for the SE at 6500.0 Hz and 7000.0 Hz.

f	j →	PTB mean		CMI		NMISA		DPLA		CEM		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in °		in °		in °		in °		in °		↓ i	in Hz
	PTB mean			1.92	0.71	-0.61	0.94	0.42	0.71	-0.32	1.12	PTB mean	
	CMI	-1.77	0.71			-2.53	0.94	-1.50	0.71	-2.24	1.12	CMI	
	NMISA	0.55	0.94	2.32	0.94			1.03	0.94	0.29	1.28	NMISA	
	DPLA	-0.35	0.71	1.42	0.71	-0.90	0.94			-0.74	1.12	DPLA	
	CEM	0.28	1.12	2.05	1.12	-0.27	1.28	0.63	1.12			CEM	
	GUM	0.35	1.12	2.12	1.12	-0.20	1.28	0.70	1.12	0.07	1.41	GUM	
	METAS	0.12	0.99	1.89	0.99	-0.43	1.17	0.47	0.99	-0.16	1.32	METAS	
6500	NMIJ	0.26	0.58	2.03	0.58	-0.29	0.85	0.61	0.58	-0.02	1.04	NMIJ	7000
	KRISS											KRISS	
	LNE	1.49	5.02	3.26	5.02	0.94	5.06	1.84	5.02	1.21	5.10	LNE	
	NIM	-0.75	1.12	1.02	1.12	-1.30	1.28	-0.40	1.12	-1.03	1.41	NIM	
	CENAM	-0.06	1.12	1.71	1.12	-0.61	1.28	0.29	1.12	-0.34	1.41	CENAM	
	INMETRO	0.31	0.94	2.08	0.94	-0.24	1.13	0.66	0.94	0.03	1.28	INMETRO	
	UME	-0.98	1.58	0.79	1.58	-1.53	1.70	-0.63	1.58	-1.26	1.80	UME	
	VNIIM	-1.66	1.58	0.11	1.58	-2.21	1.70	-1.31	1.58	-1.94	1.80	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 6500.0 Hz and 7000.0 Hz.

f	j →	GUM		METAS		NMIJ		KRISS		LNE		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in °		in °		in °		in °		in °		↓ i	in Hz
	PTB mean	-0.46	1.12	-0.13	0.99	-0.35	0.58			-1.55	5.02	PTB mean	
	CMI	-2.38	1.12	-2.05	0.99	-2.27	0.58			-3.47	5.02	CMI	
	NMISA	0.15	1.28	0.48	1.17	0.26	0.85			-0.94	5.06	NMISA	
	DPLA	-0.88	1.12	-0.55	0.99	-0.77	0.58			-1.97	5.02	DPLA	
	CEM	-0.14	1.41	0.19	1.32	-0.03	1.04			-1.23	5.10	CEM	
	GUM			0.33	1.32	0.11	1.04			-1.09	5.10	GUM	
	METAS	-0.23	1.32			-0.22	0.91			-1.42	5.07	METAS	
6500	NMIJ	-0.09	1.04	0.14	0.91					-1.20	5.01	NMIJ	7000
	KRISS											KRISS	
	LNE	1.14	5.10	1.37	5.07	1.23	5.01					LNE	
	NIM	-1.10	1.41	-0.87	1.32	-1.01	1.04			-2.24	5.10	NIM	
	CENAM	-0.41	1.41	-0.18	1.32	-0.32	1.04			-1.55	5.10	CENAM	
	INMETRO	-0.04	1.28	0.19	1.17	0.05	0.85			-1.18	5.06	INMETRO	
	UME	-1.33	1.80	-1.10	1.73	-1.24	1.53			-2.47	5.22	UME	
	VNIIM	-2.01	1.80	-1.78	1.73	-1.92	1.53			-3.15	5.22	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 6500.0 Hz and 7000.0 Hz.

f	j →	NIM		CENAM		INMETRO		UME		VNIIM		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in °		in °		in °		in °		in °		↓ i	in Hz
	PTB mean	0.86	1.12	0.10	1.12	-0.29	0.94	1.18	1.58	1.57	1.58	PTB mean	
	CMI	-1.06	1.12	-1.82	1.12	-2.21	0.94	-0.74	1.58	-0.35	1.58	CMI	
	NMISA	1.47	1.28	0.71	1.28	0.32	1.13	1.79	1.70	2.18	1.70	NMISA	
	DPLA	0.44	1.12	-0.32	1.12	-0.71	0.94	0.76	1.58	1.15	1.58	DPLA	
	CEM	1.18	1.41	0.42	1.41	0.03	1.28	1.50	1.80	1.89	1.80	CEM	
	GUM	1.32	1.41	0.56	1.41	0.17	1.28	1.64	1.80	2.03	1.80	GUM	
	METAS	0.99	1.32	0.23	1.32	-0.16	1.17	1.31	1.73	1.70	1.73	METAS	
6500	NMIJ	1.21	1.04	0.45	1.04	0.06	0.85	1.53	1.53	1.92	1.53	NMIJ	7000
	KRISS											KRISS	
	LNE	2.41	5.10	1.65	5.10	1.26	5.06	2.73	5.22	3.12	5.22	LNE	
	NIM			-0.76	1.41	-1.15	1.28	0.32	1.80	0.71	1.80	NIM	
	CENAM	0.69	1.41			-0.39	1.28	1.08	1.80	1.47	1.80	CENAM	
	INMETRO	1.06	1.28	0.37	1.28			1.47	1.70	1.86	1.70	INMETRO	
	UME	-0.23	1.80	-0.92	1.80	-1.29	1.70			0.39	2.12	UME	
	VNIIM	-0.91	1.80	-1.60	1.80	-1.97	1.70	-0.68	2.12			VNIIM	

Table 9.40: Bilateral degrees of equivalence for the SE at 7500.0 Hz and 8000.0 Hz.

f in Hz	j → i ↓	PTB mean D_{ij} in °	$U_{D_{ij}}$	CMI D_{ij} in °	$U_{D_{ij}}$	NMISA D_{ij} in °	$U_{D_{ij}}$	DPLA D_{ij} in °	$U_{D_{ij}}$	CEM D_{ij} in °	$U_{D_{ij}}$	← j ↓ i	f in Hz
	PTB mean			2.07	0.71	-0.71	0.94	0.51	1.12	-0.32	1.12	PTB mean	
	CMI	-2.21	0.71			-2.78	0.94	-1.56	1.12	-2.39	1.12	CMI	
	NMISA	0.64	0.94	2.85	0.94			1.22	1.28	0.39	1.28	NMISA	
	DPLA	-0.56	1.12	1.65	1.12	-1.20	1.28			-0.83	1.41	DPLA	
	CEM	0.29	1.12	2.50	1.12	-0.35	1.28	0.85	1.41			CEM	
	GUM	0.34	1.12	2.55	1.12	-0.30	1.28	0.90	1.41	0.05	1.41	GUM	
	METAS	0.13	0.99	2.34	0.99	-0.51	1.17	0.69	1.32	-0.16	1.32	METAS	
7500	NMIJ	0.30	0.58	2.51	0.58	-0.34	0.85	0.86	1.04	0.01	1.04	NMIJ	8000
	KRISS											KRISS	
	LNE	1.55	5.02	3.76	5.02	0.91	5.06	2.11	5.10	1.26	5.10	LNE	
	NIM	-1.01	1.12	1.20	1.12	-1.65	1.28	-0.45	1.41	-1.30	1.41	NIM	
	CENAM	-0.13	1.12	2.08	1.12	-0.77	1.28	0.43	1.41	-0.42	1.41	CENAM	
	INMETRO	0.39	1.12	2.60	1.12	-0.25	1.28	0.95	1.41	0.10	1.41	INMETRO	
	UME	-1.01	1.58	1.20	1.58	-1.65	1.70	-0.45	1.80	-1.30	1.80	UME	
	VNIIM	-1.76	1.58	0.45	1.58	-2.40	1.70	-1.20	1.80	-2.05	1.80	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 7500.0 Hz and 8000.0 Hz.

f in Hz	j → i ↓	GUM D_{ij} in °	$U_{D_{ij}}$	METAS D_{ij} in °	$U_{D_{ij}}$	NMIJ D_{ij} in °	$U_{D_{ij}}$	KRISS D_{ij} in °	$U_{D_{ij}}$	LNE D_{ij} in °	$U_{D_{ij}}$	← j ↓ i	f in Hz
	PTB mean	-0.43	1.12	-0.11	0.99	-0.30	0.58			-1.74	5.02	PTB mean	
	CMI	-2.50	1.12	-2.18	0.99	-2.37	0.58			-3.81	5.02	CMI	
	NMISA	0.28	1.28	0.60	1.17	0.41	0.85			-1.03	5.06	NMISA	
	DPLA	-0.94	1.41	-0.62	1.32	-0.81	1.04			-2.25	5.10	DPLA	
	CEM	-0.11	1.41	0.21	1.32	0.02	1.04			-1.42	5.10	CEM	
	GUM			0.32	1.32	0.13	1.04			-1.31	5.10	GUM	
	METAS	-0.21	1.32			-0.19	0.91			-1.63	5.07	METAS	
7500	NMIJ	-0.04	1.04	0.17	0.91					-1.44	5.01	NMIJ	8000
	KRISS											KRISS	
	LNE	1.21	5.10	1.42	5.07	1.25	5.01					LNE	
	NIM	-1.35	1.41	-1.14	1.32	-1.31	1.04			-2.56	5.10	NIM	
	CENAM	-0.47	1.41	-0.26	1.32	-0.43	1.04			-1.68	5.10	CENAM	
	INMETRO	0.05	1.41	0.26	1.32	0.09	1.04			-1.16	5.10	INMETRO	
	UME	-1.35	1.80	-1.14	1.73	-1.31	1.53			-2.56	5.22	UME	
	VNIIM	-2.10	1.80	-1.89	1.73	-2.06	1.53			-3.31	5.22	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 7500.0 Hz and 8000.0 Hz.

f in Hz	j → i ↓	NIM D_{ij} in °	$U_{D_{ij}}$	CENAM D_{ij} in °	$U_{D_{ij}}$	INMETRO D_{ij} in °	$U_{D_{ij}}$	UME D_{ij} in °	$U_{D_{ij}}$	VNIIM D_{ij} in °	$U_{D_{ij}}$	← j ↓ i	f in Hz
	PTB mean	1.03	1.12	0.09	1.12	-0.45	1.12	1.08	1.58	2.06	1.58	PTB mean	
	CMI	-1.04	1.12	-1.98	1.12	-2.52	1.12	-0.99	1.58	-0.01	1.58	CMI	
	NMISA	1.74	1.28	0.80	1.28	0.26	1.28	1.79	1.70	2.77	1.70	NMISA	
	DPLA	0.52	1.41	-0.42	1.41	-0.96	1.41	0.57	1.80	1.55	1.80	DPLA	
	CEM	1.35	1.41	0.41	1.41	-0.13	1.41	1.40	1.80	2.38	1.80	CEM	
	GUM	1.46	1.41	0.52	1.41	-0.02	1.41	1.51	1.80	2.49	1.80	GUM	
	METAS	1.14	1.32	0.20	1.32	-0.34	1.32	1.19	1.73	2.17	1.73	METAS	
7500	NMIJ	1.33	1.04	0.39	1.04	-0.15	1.04	1.38	1.53	2.36	1.53	NMIJ	8000
	KRISS											KRISS	
	LNE	2.77	5.10	1.83	5.10	1.29	5.10	2.82	5.22	3.80	5.22	LNE	
	NIM			-0.94	1.41	-1.48	1.41	0.05	1.80	1.03	1.80	NIM	
	CENAM	0.88	1.41			-0.54	1.41	0.99	1.80	1.97	1.80	CENAM	
	INMETRO	1.40	1.41	0.52	1.41			1.53	1.80	2.51	1.80	INMETRO	
	UME	0.00	1.80	-0.88	1.80	-1.40	1.80			0.98	2.12	UME	
	VNIIM	-0.75	1.80	-1.63	1.80	-2.15	1.80	-0.75	2.12			VNIIM	

Table 9.41: Bilateral degrees of equivalence for the SE at 8500.0 Hz and 9000.0 Hz.

f	j →	PTB mean		CMI		NMISA		DPLA		CEM		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in °		in °		in °		in °		in °		↓ i	in Hz
	PTB mean			2.42	0.71	-0.87	0.94	0.27	1.12	-0.34	1.12	PTB mean	
	CMI	-2.18	0.71			-3.29	0.94	-2.15	1.12	-2.76	1.12	CMI	
	NMISA	0.75	0.94	2.93	0.94			1.14	1.28	0.53	1.28	NMISA	
	DPLA	-0.66	1.12	1.52	1.12	-1.41	1.28			-0.61	1.41	DPLA	
	CEM	0.30	1.12	2.48	1.12	-0.45	1.28	0.96	1.41			CEM	
	GUM	0.30	1.12	2.48	1.12	-0.45	1.28	0.96	1.41	0.00	1.41	GUM	
	METAS	0.09	0.99	2.27	0.99	-0.66	1.17	0.75	1.32	-0.21	1.32	METAS	
8500	NMIJ	0.24	0.58	2.42	0.58	-0.51	0.85	0.90	1.04	-0.06	1.04	NMIJ	9000
	KRISS											KRISS	
	LNE	1.82	5.02	4.00	5.02	1.07	5.06	2.48	5.10	1.52	5.10	LNE	
	NIM	-1.16	1.12	1.02	1.12	-1.91	1.28	-0.50	1.41	-1.46	1.41	NIM	
	CENAM	-0.07	1.12	2.11	1.12	-0.82	1.28	0.59	1.41	-0.37	1.41	CENAM	
	INMETRO	0.49	1.12	2.67	1.12	-0.26	1.28	1.15	1.41	0.19	1.41	INMETRO	
	UME	-1.35	1.58	0.83	1.58	-2.10	1.70	-0.69	1.80	-1.65	1.80	UME	
	VNIIM	-2.29	1.58	-0.11	1.58	-3.04	1.70	-1.63	1.80	-2.59	1.80	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 8500.0 Hz and 9000.0 Hz.

f	j →	GUM		METAS		NMIJ		KRISS		LNE		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in °		in °		in °		in °		in °		↓ i	in Hz
	PTB mean	-0.44	1.12	-0.14	0.99	-0.46	0.58			-1.90	5.02	PTB mean	
	CMI	-2.86	1.12	-2.56	0.99	-2.88	0.58			-4.32	5.02	CMI	
	NMISA	0.43	1.28	0.73	1.17	0.41	0.85			-1.03	5.06	NMISA	
	DPLA	-0.71	1.41	-0.41	1.32	-0.73	1.04			-2.17	5.10	DPLA	
	CEM	-0.10	1.41	0.20	1.32	-0.12	1.04			-1.56	5.10	CEM	
	GUM			0.30	1.32	-0.02	1.04			-1.46	5.10	GUM	
	METAS	-0.21	1.32			-0.32	0.91			-1.76	5.07	METAS	
8500	NMIJ	-0.06	1.04	0.15	0.91					-1.44	5.01	NMIJ	9000
	KRISS											KRISS	
	LNE	1.52	5.10	1.73	5.07	1.58	5.01					LNE	
	NIM	-1.46	1.41	-1.25	1.32	-1.40	1.04			-2.98	5.10	NIM	
	CENAM	-0.37	1.41	-0.16	1.32	-0.31	1.04			-1.89	5.10	CENAM	
	INMETRO	0.19	1.41	0.40	1.32	0.25	1.04			-1.33	5.10	INMETRO	
	UME	-1.65	1.80	-1.44	1.73	-1.59	1.53			-3.17	5.22	UME	
	VNIIM	-2.59	1.80	-2.38	1.73	-2.53	1.53			-4.11	5.22	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 8500.0 Hz and 9000.0 Hz.

f	j →	NIM		CENAM		INMETRO		UME		VNIIM		← j	f
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
in Hz	i ↓	in °		in °		in °		in °		in °		↓ i	in Hz
	PTB mean	1.15	1.12	0.08	1.12	-0.40	1.12	1.24	1.58	2.69	1.58	PTB mean	
	CMI	-1.27	1.12	-2.34	1.12	-2.82	1.12	-1.18	1.58	0.27	1.58	CMI	
	NMISA	2.02	1.28	0.95	1.28	0.47	1.28	2.11	1.70	3.56	1.70	NMISA	
	DPLA	0.88	1.41	-0.19	1.41	-0.67	1.41	0.97	1.80	2.42	1.80	DPLA	
	CEM	1.49	1.41	0.42	1.41	-0.06	1.41	1.58	1.80	3.03	1.80	CEM	
	GUM	1.59	1.41	0.52	1.41	0.04	1.41	1.68	1.80	3.13	1.80	GUM	
	METAS	1.29	1.32	0.22	1.32	-0.26	1.32	1.38	1.73	2.83	1.73	METAS	
8500	NMIJ	1.61	1.04	0.54	1.04	0.06	1.04	1.70	1.53	3.15	1.53	NMIJ	9000
	KRISS											KRISS	
	LNE	3.05	5.10	1.98	5.10	1.50	5.10	3.14	5.22	4.59	5.22	LNE	
	NIM			-1.07	1.41	-1.55	1.41	0.09	1.80	1.54	1.80	NIM	
	CENAM	1.09	1.41			-0.48	1.41	1.16	1.80	2.61	1.80	CENAM	
	INMETRO	1.65	1.41	0.56	1.41			1.64	1.80	3.09	1.80	INMETRO	
	UME	-0.19	1.80	-1.28	1.80	-1.84	1.80			1.45	2.12	UME	
	VNIIM	-1.13	1.80	-2.22	1.80	-2.78	1.80	-0.94	2.12			VNIIM	

Table 9.42: Bilateral degrees of equivalence for the SE at 9500.0 Hz and 10000.0 Hz.

f in Hz	j → / i ↓	PTB mean D_{ij} in °	$U_{D_{ij}}$	CMI D_{ij} in °	$U_{D_{ij}}$	NMISA D_{ij} in °	$U_{D_{ij}}$	DPLA D_{ij} in °	$U_{D_{ij}}$	CEM D_{ij} in °	$U_{D_{ij}}$	← j / ↓ i	f in Hz
	PTB mean			2.52	0.71	-0.86	0.94	0.39	1.12	-0.33	1.12	PTB mean	
	CMI	-2.43	0.71			-3.38	0.94	-2.13	1.12	-2.85	1.12	CMI	
	NMISA	0.81	0.94	3.24	0.94			1.25	1.28	0.53	1.28	NMISA	
	DPLA	-0.43	1.12	2.00	1.12	-1.24	1.28			-0.72	1.41	DPLA	
	CEM	0.35	1.12	2.78	1.12	-0.46	1.28	0.78	1.41			CEM	
	GUM	0.49	1.12	2.92	1.12	-0.32	1.28	0.92	1.41	0.14	1.41	GUM	
	METAS	0.03	0.99	2.46	0.99	-0.78	1.17	0.46	1.32	-0.32	1.32	METAS	
9500	NMIJ	0.51	0.58	2.94	0.58	-0.30	0.85	0.94	1.04	0.16	1.04	NMIJ	10000
	KRISS											KRISS	
	LNE	2.22	5.02	4.65	5.02	1.41	5.06	2.65	5.10	1.87	5.10	LNE	
	NIM	-1.21	1.12	1.22	1.12	-2.02	1.28	-0.78	1.41	-1.56	1.41	NIM	
	CENAM	-0.04	1.12	2.39	1.12	-0.85	1.28	0.39	1.41	-0.39	1.41	CENAM	
	INMETRO	0.44	1.12	2.87	1.12	-0.37	1.28	0.87	1.41	0.09	1.41	INMETRO	
	UME	-1.38	1.58	1.05	1.58	-2.19	1.70	-0.95	1.80	-1.73	1.80	UME	
	VNIIM	-3.19	1.58	-0.76	1.58	-4.00	1.70	-2.76	1.80	-3.54	1.80	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 9500.0 Hz and 10000.0 Hz.

f in Hz	j → / i ↓	GUM D_{ij} in °	$U_{D_{ij}}$	METAS D_{ij} in °	$U_{D_{ij}}$	NMIJ D_{ij} in °	$U_{D_{ij}}$	KRISS D_{ij} in °	$U_{D_{ij}}$	LNE D_{ij} in °	$U_{D_{ij}}$	← j / ↓ i	f in Hz
	PTB mean	-0.42	1.12	-0.04	0.99	-0.48	0.58			-2.27	5.02	PTB mean	
	CMI	-2.94	1.12	-2.56	0.99	-3.00	0.58			-4.79	5.02	CMI	
	NMISA	0.44	1.28	0.82	1.17	0.38	0.85			-1.41	5.06	NMISA	
	DPLA	-0.81	1.41	-0.43	1.32	-0.87	1.04			-2.66	5.10	DPLA	
	CEM	-0.09	1.41	0.29	1.32	-0.15	1.04			-1.94	5.10	CEM	
	GUM			0.38	1.32	-0.06	1.04			-1.85	5.10	GUM	
	METAS	-0.46	1.32			-0.44	0.91			-2.23	5.07	METAS	
9500	NMIJ	0.02	1.04	0.48	0.91					-1.79	5.01	NMIJ	10000
	KRISS											KRISS	
	LNE	1.73	5.10	2.19	5.07	1.71	5.01					LNE	
	NIM	-1.70	1.41	-1.24	1.32	-1.72	1.04			-3.43	5.10	NIM	
	CENAM	-0.53	1.41	-0.07	1.32	-0.55	1.04			-2.26	5.10	CENAM	
	INMETRO	-0.05	1.41	0.41	1.32	-0.07	1.04			-1.78	5.10	INMETRO	
	UME	-1.87	1.80	-1.41	1.73	-1.89	1.53			-3.60	5.22	UME	
	VNIIM	-3.68	1.80	-3.22	1.73	-3.70	1.53			-5.41	5.22	VNIIM	

(continued) Bilateral degrees of equivalence for the SE at 9500.0 Hz and 10000.0 Hz.

f in Hz	j → / i ↓	NIM D_{ij} in °	$U_{D_{ij}}$	CENAM D_{ij} in °	$U_{D_{ij}}$	INMETRO D_{ij} in °	$U_{D_{ij}}$	UME D_{ij} in °	$U_{D_{ij}}$	VNIIM D_{ij} in °	$U_{D_{ij}}$	← j / ↓ i	f in Hz
	PTB mean	1.24	1.12	0.04	1.12	-0.34	1.12	1.62	1.58	3.45	1.58	PTB mean	
	CMI	-1.28	1.12	-2.48	1.12	-2.86	1.12	-0.90	1.58	0.93	1.58	CMI	
	NMISA	2.10	1.28	0.90	1.28	0.52	1.28	2.48	1.70	4.31	1.70	NMISA	
	DPLA	0.85	1.41	-0.35	1.41	-0.73	1.41	1.23	1.80	3.06	1.80	DPLA	
	CEM	1.57	1.41	0.37	1.41	-0.01	1.41	1.95	1.80	3.78	1.80	CEM	
	GUM	1.66	1.41	0.46	1.41	0.08	1.41	2.04	1.80	3.87	1.80	GUM	
	METAS	1.28	1.32	0.08	1.32	-0.30	1.32	1.66	1.73	3.49	1.73	METAS	
9500	NMIJ	1.72	1.04	0.52	1.04	0.14	1.04	2.10	1.53	3.93	1.53	NMIJ	10000
	KRISS											KRISS	
	LNE	3.51	5.10	2.31	5.10	1.93	5.10	3.89	5.22	5.72	5.22	LNE	
	NIM			-1.20	1.41	-1.58	1.41	0.38	1.80	2.21	1.80	NIM	
	CENAM	1.17	1.41			-0.38	1.41	1.58	1.80	3.41	1.80	CENAM	
	INMETRO	1.65	1.41	0.48	1.41			1.96	1.80	3.79	1.80	INMETRO	
	UME	-0.17	1.80	-1.34	1.80	-1.82	1.80			1.83	2.12	UME	
	VNIIM	-1.98	1.80	-3.15	1.80	-3.63	1.80	-1.81	2.12			VNIIM	

9.3 Phase of complex sensitivity of the BB

Table 9.43: Bilateral degrees of equivalence for the BB at 10.0 Hz and 12.5 Hz.

f in Hz	j → / i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j / ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °		
	PTB mean			-0.02	0.54	-0.10	0.45	-0.01	0.36	-0.05	0.54	PTB mean	
	CMI	-0.04	0.54			-0.08	0.64	0.01	0.58	-0.03	0.71	CMI	
	NMISA	0.04	0.45	0.08	0.64			0.09	0.50	0.05	0.64	NMISA	
	DPLA	-0.08	0.36	-0.04	0.58	-0.12	0.50			-0.04	0.58	DPLA	
	CEM	-0.03	0.54	0.01	0.71	-0.07	0.64	0.05	0.58			CEM	
	GUM	-0.03	0.73	0.01	0.86	-0.07	0.81	0.05	0.76	0.00	0.86	GUM	
	METAS	0.26	0.45	0.30	0.64	0.22	0.57	0.34	0.50	0.29	0.64	METAS	
10	NMIJ	-0.09	0.81	-0.05	0.93	-0.13	0.88	-0.01	0.84	-0.06	0.93	NMIJ	12.5
	KRISS											KRISS	
	LNE	-0.36	2.01	-0.32	2.06	-0.40	2.04	-0.28	2.02	-0.33	2.06	LNE	
	NIM	0.17	0.54	0.21	0.71	0.13	0.64	0.25	0.58	0.20	0.71	NIM	
	CENAM	-0.03	1.02	0.01	1.12	-0.07	1.08	0.05	1.04	0.00	1.12	CENAM	
	INMETRO	-0.04	0.31	0.00	0.55	-0.08	0.47	0.04	0.38	-0.01	0.55	INMETRO	
	UME	0.05	0.54	0.09	0.71	0.01	0.64	0.13	0.58	0.08	0.71	UME	
	VNIIM	2.09	1.02	2.13	1.12	2.05	1.08	2.17	1.04	2.12	1.12	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 10.0 Hz and 12.5 Hz.

f in Hz	j → / i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j / ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °		
	PTB mean	-0.04	0.73	-0.09	0.45	-0.02	0.73			0.07	2.01	PTB mean	
	CMI	-0.02	0.86	-0.07	0.64	0.00	0.86			0.09	2.06	CMI	
	NMISA	0.06	0.81	0.01	0.57	0.08	0.81			0.17	2.04	NMISA	
	DPLA	-0.03	0.76	-0.08	0.50	-0.01	0.76			0.08	2.02	DPLA	
	CEM	0.01	0.86	-0.04	0.64	0.03	0.86			0.12	2.06	CEM	
	GUM			-0.05	0.81	0.02	0.99			0.11	2.12	GUM	
	METAS	0.29	0.81			0.07	0.81			0.16	2.04	METAS	
10	NMIJ	-0.06	1.05	-0.35	0.88					0.09	2.12	NMIJ	12.5
	KRISS											KRISS	
	LNE	-0.33	2.12	-0.62	2.04	-0.27	2.15					LNE	
	NIM	0.20	0.86	-0.09	0.64	0.26	0.93			0.53	2.06	NIM	
	CENAM	0.00	1.22	-0.29	1.08	0.06	1.27			0.33	2.24	CENAM	
	INMETRO	-0.01	0.74	-0.30	0.47	0.05	0.82			0.32	2.01	INMETRO	
	UME	0.08	0.86	-0.21	0.64	0.14	0.93			0.41	2.06	UME	
	VNIIM	2.12	1.22	1.83	1.08	2.18	1.27			2.45	2.24	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 10.0 Hz and 12.5 Hz.

f in Hz	j → / i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j / ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °		
	PTB mean	-0.21	0.54	0.13	1.02	-0.04	0.31	-0.11	0.54	-1.76	1.02	PTB mean	
	CMI	-0.19	0.71	0.15	1.12	-0.02	0.55	-0.09	0.71	-1.74	1.12	CMI	
	NMISA	-0.11	0.64	0.23	1.08	0.06	0.47	-0.01	0.64	-1.66	1.08	NMISA	
	DPLA	-0.20	0.58	0.14	1.04	-0.03	0.38	-0.10	0.58	-1.75	1.04	DPLA	
	CEM	-0.16	0.71	0.18	1.12	0.01	0.55	-0.06	0.71	-1.71	1.12	CEM	
	GUM	-0.17	0.86	0.17	1.22	0.00	0.74	-0.07	0.86	-1.72	1.22	GUM	
	METAS	-0.12	0.64	0.22	1.08	0.05	0.47	-0.02	0.64	-1.67	1.08	METAS	
10	NMIJ	-0.19	0.86	0.15	1.22	-0.02	0.74	-0.09	0.86	-1.74	1.22	NMIJ	12.5
	KRISS											KRISS	
	LNE	-0.28	2.06	0.06	2.24	-0.11	2.01	-0.18	2.06	-1.83	2.24	LNE	
	NIM			0.34	1.12	0.17	0.55	0.10	0.71	-1.55	1.12	NIM	
	CENAM	-0.20	1.12			-0.17	1.03	-0.24	1.12	-1.89	1.41	CENAM	
	INMETRO	-0.21	0.55	-0.01	1.03			-0.07	0.55	-1.72	1.03	INMETRO	
	UME	-0.12	0.71	0.08	1.12	0.09	0.55			-1.65	1.12	UME	
	VNIIM	1.92	1.12	2.12	1.41	2.13	1.03	2.04	1.12			VNIIM	

Table 9.44: Bilateral degrees of equivalence for the BB at 16.0 Hz and 20.0 Hz.

f in Hz	j → / i ↓	PTB mean D_{ij} in °	PTB mean $U_{D_{ij}}$ in °	CMI D_{ij} in °	CMI $U_{D_{ij}}$ in °	NMISA D_{ij} in °	NMISA $U_{D_{ij}}$ in °	DPLA D_{ij} in °	DPLA $U_{D_{ij}}$ in °	CEM D_{ij} in °	CEM $U_{D_{ij}}$ in °	← j / ↓ i	f in Hz
	PTB mean			0.08	0.54	0.01	0.45	0.06	0.36	0.04	0.54	PTB mean	
	CMI	-0.02	0.54			-0.07	0.64	-0.02	0.58	-0.04	0.71	CMI	
	NMISA	0.04	0.45	0.06	0.64			0.05	0.50	0.03	0.64	NMISA	
	DPLA	-0.02	0.36	-0.00	0.58	-0.06	0.50			-0.02	0.58	DPLA	
	CEM	0.01	0.54	0.03	0.71	-0.03	0.64	0.03	0.58			CEM	
	GUM	0.00	0.73	0.02	0.86	-0.04	0.81	0.02	0.76	-0.01	0.86	GUM	
	METAS	0.03	0.45	0.05	0.64	-0.01	0.57	0.05	0.50	0.02	0.64	METAS	
16	NMIJ	-0.01	0.52	0.01	0.69	-0.05	0.62	0.01	0.57	-0.02	0.69	NMIJ	20
	KRISS											KRISS	
	LNE	-0.16	2.01	-0.14	2.06	-0.20	2.04	-0.14	2.02	-0.17	2.06	LNE	
	NIM	0.13	0.54	0.15	0.71	0.09	0.64	0.15	0.58	0.12	0.71	NIM	
	CENAM	-0.06	1.02	-0.04	1.12	-0.10	1.08	-0.04	1.04	-0.07	1.12	CENAM	
	INMETRO	-0.01	0.31	0.01	0.55	-0.05	0.47	0.01	0.38	-0.02	0.55	INMETRO	
	UME	0.03	0.54	0.05	0.71	-0.01	0.64	0.05	0.58	0.02	0.71	UME	
	VNIIM	1.46	1.02	1.48	1.12	1.42	1.08	1.48	1.04	1.45	1.12	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 16.0 Hz and 20.0 Hz.

f in Hz	j → / i ↓	GUM D_{ij} in °	GUM $U_{D_{ij}}$ in °	METAS D_{ij} in °	METAS $U_{D_{ij}}$ in °	NMIJ D_{ij} in °	NMIJ $U_{D_{ij}}$ in °	KRISS D_{ij} in °	KRISS $U_{D_{ij}}$ in °	LNE D_{ij} in °	LNE $U_{D_{ij}}$ in °	← j / ↓ i	f in Hz
	PTB mean	0.08	0.63	0.03	0.43	0.08	0.38			0.22	2.01	PTB mean	
	CMI	-0.00	0.78	-0.05	0.63	0.00	0.59			0.14	2.06	CMI	
	NMISA	0.07	0.72	0.02	0.55	0.07	0.51			0.21	2.04	NMISA	
	DPLA	0.02	0.67	-0.03	0.48	0.02	0.44			0.16	2.02	DPLA	
	CEM	0.04	0.78	-0.01	0.63	0.04	0.59			0.18	2.06	CEM	
	GUM			-0.05	0.71	0.00	0.68			0.14	2.09	GUM	
	METAS	0.03	0.81			0.05	0.50			0.19	2.04	METAS	
16	NMIJ	-0.01	0.85	-0.04	0.62					0.14	2.03	NMIJ	20
	KRISS											KRISS	
	LNE	-0.16	2.12	-0.19	2.04	-0.15	2.06					LNE	
	NIM	0.13	0.86	0.10	0.64	0.14	0.69			0.29	2.06	NIM	
	CENAM	-0.06	1.22	-0.09	1.08	-0.05	1.11			0.10	2.24	CENAM	
	INMETRO	-0.01	0.74	-0.04	0.47	-0.00	0.54			0.15	2.01	INMETRO	
	UME	0.03	0.86	-0.00	0.64	0.04	0.69			0.19	2.06	UME	
	VNIIM	1.46	1.22	1.43	1.08	1.47	1.11			1.62	2.24	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 16.0 Hz and 20.0 Hz.

f in Hz	j → / i ↓	NIM D_{ij} in °	NIM $U_{D_{ij}}$ in °	CENAM D_{ij} in °	CENAM $U_{D_{ij}}$ in °	INMETRO D_{ij} in °	INMETRO $U_{D_{ij}}$ in °	UME D_{ij} in °	UME $U_{D_{ij}}$ in °	VNIIM D_{ij} in °	VNIIM $U_{D_{ij}}$ in °	← j / ↓ i	f in Hz
	PTB mean	-0.06	0.54	0.14	1.02	0.05	0.31	-0.00	0.54	-1.33	0.79	PTB mean	
	CMI	-0.14	0.71	0.06	1.12	-0.03	0.55	-0.08	0.71	-1.41	0.91	CMI	
	NMISA	-0.07	0.64	0.13	1.08	0.04	0.47	-0.01	0.64	-1.34	0.86	NMISA	
	DPLA	-0.12	0.58	0.08	1.04	-0.01	0.38	-0.06	0.58	-1.39	0.82	DPLA	
	CEM	-0.10	0.71	0.10	1.12	0.01	0.55	-0.04	0.71	-1.37	0.91	CEM	
	GUM	-0.14	0.78	0.06	1.17	-0.03	0.65	-0.08	0.78	-1.41	0.97	GUM	
	METAS	-0.09	0.63	0.11	1.07	0.02	0.45	-0.03	0.63	-1.36	0.85	METAS	
16	NMIJ	-0.14	0.59	0.06	1.05	-0.03	0.40	-0.08	0.59	-1.41	0.82	NMIJ	20
	KRISS											KRISS	
	LNE	-0.28	2.06	-0.08	2.24	-0.17	2.01	-0.22	2.06	-1.55	2.14	LNE	
	NIM			0.20	1.12	0.11	0.55	0.06	0.71	-1.27	0.91	NIM	
	CENAM	-0.19	1.12			-0.09	1.03	-0.14	1.12	-1.47	1.26	CENAM	
	INMETRO	-0.14	0.55	0.05	1.03			-0.05	0.55	-1.38	0.80	INMETRO	
	UME	-0.10	0.71	0.09	1.12	0.04	0.55			-1.33	0.91	UME	
	VNIIM	1.33	1.12	1.52	1.41	1.47	1.03	1.43	1.12			VNIIM	

Table 9.45: Bilateral degrees of equivalence for the BB at 25.0 Hz and 31.5 Hz.

f in Hz	j → i ↓	PTB mean D_{ij}	 $U_{D_{ij}}$ in °	CMI D_{ij}	 $U_{D_{ij}}$ in °	NMISA D_{ij}	 $U_{D_{ij}}$ in °	DPLA D_{ij}	 $U_{D_{ij}}$ in °	CEM D_{ij}	 $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean			-0.01	0.54	-0.05	0.45	-0.01	0.36	-0.03	0.54	PTB mean	
	CMI	0.03	0.54			-0.04	0.64	0.00	0.58	-0.02	0.71	CMI	
	NMISA	0.06	0.45	0.03	0.64			0.04	0.50	0.02	0.64	NMISA	
	DPLA	0.02	0.36	-0.01	0.58	-0.04	0.50			-0.02	0.58	DPLA	
	CEM	0.05	0.54	0.02	0.71	-0.01	0.64	0.03	0.58			CEM	
	GUM	0.01	0.63	-0.02	0.78	-0.05	0.72	-0.01	0.67	-0.04	0.78	GUM	
	METAS	0.06	0.43	0.03	0.63	-0.00	0.55	0.04	0.48	0.01	0.63	METAS	
25	NMIJ	0.03	0.34	0.00	0.57	-0.03	0.49	0.01	0.41	-0.02	0.57	NMIJ	31.5
	KRISS											KRISS	
	LNE	-0.11	2.01	-0.14	2.06	-0.17	2.04	-0.13	2.02	-0.16	2.06	LNE	
	NIM	0.13	0.54	0.10	0.71	0.07	0.64	0.11	0.58	0.08	0.71	NIM	
	CENAM	0.04	1.02	0.01	1.12	-0.02	1.08	0.02	1.04	-0.01	1.12	CENAM	
	INMETRO	0.04	0.31	0.01	0.55	-0.02	0.47	0.02	0.38	-0.01	0.55	INMETRO	
	UME	-0.03	0.54	-0.06	0.71	-0.09	0.64	-0.05	0.58	-0.08	0.71	UME	
	VNIIM	1.31	0.79	1.28	0.91	1.25	0.86	1.29	0.82	1.26	0.91	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 25.0 Hz and 31.5 Hz.

f in Hz	j → i ↓	GUM D_{ij}	 $U_{D_{ij}}$ in °	METAS D_{ij}	 $U_{D_{ij}}$ in °	NMIJ D_{ij}	 $U_{D_{ij}}$ in °	KRISS D_{ij}	 $U_{D_{ij}}$ in °	LNE D_{ij}	 $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean	0.02	0.63	-0.04	0.43	0.01	0.41			0.10	2.01	PTB mean	
	CMI	0.03	0.78	-0.03	0.63	0.02	0.62			0.11	2.06	CMI	
	NMISA	0.07	0.72	0.01	0.55	0.06	0.54			0.15	2.04	NMISA	
	DPLA	0.03	0.67	-0.03	0.48	0.02	0.47			0.11	2.02	DPLA	
	CEM	0.05	0.78	-0.01	0.63	0.04	0.62			0.13	2.06	CEM	
	GUM			-0.06	0.71	-0.01	0.70			0.08	2.09	GUM	
	METAS	0.05	0.71			0.05	0.52			0.14	2.04	METAS	
25	NMIJ	0.02	0.66	-0.03	0.47					0.09	2.03	NMIJ	31.5
	KRISS											KRISS	
	LNE	-0.12	2.09	-0.17	2.04	-0.14	2.02					LNE	
	NIM	0.12	0.78	0.07	0.63	0.10	0.57			0.24	2.06	NIM	
	CENAM	0.03	1.17	-0.02	1.07	0.01	1.04			0.15	2.24	CENAM	
	INMETRO	0.03	0.65	-0.02	0.45	0.01	0.37			0.15	2.01	INMETRO	
	UME	-0.04	0.78	-0.09	0.63	-0.06	0.57			0.08	2.06	UME	
	VNIIM	1.30	0.97	1.25	0.85	1.28	0.81			1.42	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 25.0 Hz and 31.5 Hz.

f in Hz	j → i ↓	NIM D_{ij}	 $U_{D_{ij}}$ in °	CENAM D_{ij}	 $U_{D_{ij}}$ in °	INMETRO D_{ij}	 $U_{D_{ij}}$ in °	UME D_{ij}	 $U_{D_{ij}}$ in °	VNIIM D_{ij}	 $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean	-0.10	0.54	0.03	1.02	-0.02	0.31	0.04	0.54	-1.22	0.79	PTB mean	
	CMI	-0.09	0.71	0.04	1.12	-0.01	0.55	0.05	0.71	-1.21	0.91	CMI	
	NMISA	-0.05	0.64	0.08	1.08	0.03	0.47	0.09	0.64	-1.17	0.86	NMISA	
	DPLA	-0.09	0.58	0.04	1.04	-0.01	0.38	0.05	0.58	-1.21	0.82	DPLA	
	CEM	-0.07	0.71	0.06	1.12	0.01	0.55	0.07	0.71	-1.19	0.91	CEM	
	GUM	-0.12	0.78	0.01	1.17	-0.04	0.65	0.02	0.78	-1.24	0.97	GUM	
	METAS	-0.06	0.63	0.07	1.07	0.02	0.45	0.08	0.63	-1.18	0.85	METAS	
25	NMIJ	-0.11	0.62	0.02	1.06	-0.03	0.43	0.03	0.62	-1.23	0.84	NMIJ	31.5
	KRISS											KRISS	
	LNE	-0.20	2.06	-0.07	2.24	-0.12	2.01	-0.06	2.06	-1.32	2.14	LNE	
	NIM			0.13	1.12	0.08	0.55	0.14	0.71	-1.12	0.91	NIM	
	CENAM	-0.09	1.12			-0.05	1.03	0.01	1.12	-1.25	1.26	CENAM	
	INMETRO	-0.09	0.55	0.00	1.03			0.06	0.55	-1.20	0.80	INMETRO	
	UME	-0.16	0.71	-0.07	1.12	-0.07	0.55			-1.26	0.91	UME	
	VNIIM	1.18	0.91	1.27	1.26	1.27	0.80	1.34	0.91			VNIIM	

Table 9.46: Bilateral degrees of equivalence for the BB at 40.0 Hz and 63.0 Hz.

f in Hz	j → / i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j / ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °		
	PTB mean			-0.05	0.54	-0.12	0.45	-0.06	0.36	-0.07	0.54	PTB mean	
	CMI	0.04	0.54			-0.07	0.64	-0.01	0.58	-0.02	0.71	CMI	
	NMISA	0.09	0.45	0.05	0.64			0.06	0.50	0.05	0.64	NMISA	
	DPLA	0.04	0.36	0.00	0.58	-0.05	0.50			-0.01	0.58	DPLA	
	CEM	0.05	0.54	0.01	0.71	-0.04	0.64	0.01	0.58			CEM	
	GUM	-0.01	0.63	-0.05	0.78	-0.10	0.72	-0.05	0.67	-0.06	0.78	GUM	
	METAS	0.06	0.43	0.02	0.63	-0.03	0.55	0.02	0.48	0.01	0.63	METAS	
40	NMIJ	0.05	0.36	0.01	0.58	-0.04	0.50	0.01	0.42	0.00	0.58	NMIJ	63
	KRISS											KRISS	
	LNE	-0.03	2.01	-0.07	2.06	-0.12	2.04	-0.07	2.02	-0.08	2.06	LNE	
	NIM	0.10	0.54	0.06	0.71	0.01	0.64	0.06	0.58	0.05	0.71	NIM	
	CENAM	-0.04	1.02	-0.08	1.12	-0.13	1.08	-0.08	1.04	-0.09	1.12	CENAM	
	INMETRO	0.04	0.31	0.00	0.55	-0.05	0.47	0.00	0.38	-0.01	0.55	INMETRO	
	UME	0.04	0.54	0.00	0.71	-0.05	0.64	-0.00	0.58	-0.01	0.71	UME	
	VNIIM	1.06	0.79	1.02	0.91	0.97	0.86	1.02	0.82	1.01	0.91	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 40.0 Hz and 63.0 Hz.

f in Hz	j → / i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j / ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °		
	PTB mean	-0.01	0.63	-0.03	0.43	-0.04	0.39			-0.14	2.01	PTB mean	
	CMI	0.04	0.78	0.02	0.63	0.01	0.60			-0.09	2.06	CMI	
	NMISA	0.11	0.72	0.09	0.55	0.08	0.52			-0.02	2.04	NMISA	
	DPLA	0.05	0.67	0.03	0.48	0.02	0.45			-0.08	2.02	DPLA	
	CEM	0.06	0.78	0.04	0.63	0.03	0.60			-0.07	2.06	CEM	
	GUM			-0.02	0.71	-0.03	0.69			-0.13	2.09	GUM	
	METAS	0.07	0.71			-0.01	0.51			-0.11	2.04	METAS	
40	NMIJ	0.06	0.67	-0.01	0.48					-0.10	2.03	NMIJ	63
	KRISS											KRISS	
	LNE	-0.02	2.09	-0.09	2.04	-0.08	2.02					LNE	
	NIM	0.11	0.78	0.04	0.63	0.05	0.58			0.13	2.06	NIM	
	CENAM	-0.03	1.17	-0.10	1.07	-0.09	1.04			-0.01	2.24	CENAM	
	INMETRO	0.05	0.65	-0.02	0.45	-0.01	0.38			0.07	2.01	INMETRO	
	UME	0.05	0.78	-0.02	0.63	-0.01	0.58			0.07	2.06	UME	
	VNIIM	1.07	0.97	1.00	0.85	1.01	0.82			1.09	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 40.0 Hz and 63.0 Hz.

f in Hz	j → / i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j / ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °		
	PTB mean	-0.09	0.54	-0.01	1.02	-0.06	0.31	-0.10	0.54	-0.97	0.79	PTB mean	
	CMI	-0.04	0.71	0.04	1.12	-0.01	0.55	-0.05	0.71	-0.92	0.91	CMI	
	NMISA	0.03	0.64	0.11	1.08	0.06	0.47	0.02	0.64	-0.85	0.86	NMISA	
	DPLA	-0.03	0.58	0.05	1.04	0.00	0.38	-0.04	0.58	-0.91	0.82	DPLA	
	CEM	-0.02	0.71	0.06	1.12	0.01	0.55	-0.03	0.71	-0.90	0.91	CEM	
	GUM	-0.08	0.78	-0.00	1.17	-0.05	0.65	-0.09	0.78	-0.96	0.97	GUM	
	METAS	-0.06	0.63	0.02	1.07	-0.03	0.45	-0.07	0.63	-0.94	0.85	METAS	
40	NMIJ	-0.05	0.60	0.03	1.06	-0.02	0.42	-0.06	0.60	-0.93	0.83	NMIJ	63
	KRISS											KRISS	
	LNE	0.05	2.06	0.13	2.24	0.08	2.01	0.04	2.06	-0.83	2.14	LNE	
	NIM			0.08	1.12	0.03	0.55	-0.01	0.71	-0.88	0.91	NIM	
	CENAM	-0.14	1.12			-0.05	1.03	-0.09	1.12	-0.96	1.26	CENAM	
	INMETRO	-0.06	0.55	0.08	1.03			-0.04	0.55	-0.91	0.80	INMETRO	
	UME	-0.06	0.71	0.08	1.12	-0.00	0.55			-0.87	0.91	UME	
	VNIIM	0.96	0.91	1.10	1.26	1.02	0.80	1.02	0.91			VNIIM	

Table 9.47: Bilateral degrees of equivalence for the BB at 80.0 Hz and 100.0 Hz.

f in Hz	j → / i ↓	PTB mean D_{ij}	$U_{D_{ij}}$ in °	CMI D_{ij}	$U_{D_{ij}}$ in °	NMISA D_{ij}	$U_{D_{ij}}$ in °	DPLA D_{ij}	$U_{D_{ij}}$ in °	CEM D_{ij}	$U_{D_{ij}}$ in °	← j / ↓ i	f in Hz
	PTB mean			0.05	0.54	-0.06	0.45	0.02	0.36	0.00	0.54	PTB mean	
	CMI	-0.00	0.54			-0.11	0.64	-0.03	0.58	-0.05	0.71	CMI	
	NMISA	0.10	0.45	0.10	0.64			0.08	0.50	0.06	0.64	NMISA	
	DPLA	0.02	0.36	0.02	0.58	-0.08	0.50			-0.02	0.58	DPLA	
	CEM	0.04	0.54	0.04	0.71	-0.06	0.64	0.02	0.58			CEM	
	GUM	-0.01	0.63	-0.01	0.78	-0.11	0.72	-0.03	0.67	-0.05	0.78	GUM	
	METAS	-0.01	0.43	-0.01	0.63	-0.11	0.55	-0.03	0.48	-0.05	0.63	METAS	
80	NMIJ	0.02	0.39	0.02	0.60	-0.08	0.52	0.00	0.45	-0.02	0.60	NMIJ	100
	KRISS											KRISS	
	LNE	0.22	2.01	0.22	2.06	0.12	2.04	0.20	2.02	0.18	2.06	LNE	
	NIM	0.07	0.54	0.07	0.71	-0.03	0.64	0.05	0.58	0.03	0.71	NIM	
	CENAM	-0.02	1.02	-0.02	1.12	-0.12	1.08	-0.04	1.04	-0.06	1.12	CENAM	
	INMETRO	0.03	0.31	0.03	0.55	-0.07	0.47	0.01	0.38	-0.01	0.55	INMETRO	
	UME	0.03	0.54	0.03	0.71	-0.07	0.64	0.01	0.58	-0.01	0.71	UME	
	VNIIM	0.69	0.79	0.69	0.91	0.59	0.86	0.67	0.82	0.65	0.91	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 80.0 Hz and 100.0 Hz.

f in Hz	j → / i ↓	GUM D_{ij}	$U_{D_{ij}}$ in °	METAS D_{ij}	$U_{D_{ij}}$ in °	NMIJ D_{ij}	$U_{D_{ij}}$ in °	KRISS D_{ij}	$U_{D_{ij}}$ in °	LNE D_{ij}	$U_{D_{ij}}$ in °	← j / ↓ i	f in Hz
	PTB mean	0.05	0.63	0.00	0.43	0.06	0.43			-0.08	2.01	PTB mean	
	CMI	0.00	0.78	-0.05	0.63	0.01	0.63			-0.13	2.06	CMI	
	NMISA	0.11	0.72	0.06	0.55	0.12	0.55			-0.02	2.04	NMISA	
	DPLA	0.03	0.67	-0.02	0.48	0.04	0.48			-0.10	2.02	DPLA	
	CEM	0.05	0.78	0.00	0.63	0.06	0.63			-0.08	2.06	CEM	
	GUM			-0.05	0.71	0.01	0.71			-0.13	2.09	GUM	
	METAS	0.00	0.71			0.06	0.54			-0.08	2.04	METAS	
80	NMIJ	0.03	0.69	0.03	0.51					-0.14	2.04	NMIJ	100
	KRISS											KRISS	
	LNE	0.23	2.09	0.23	2.04	0.20	2.03					LNE	
	NIM	0.08	0.78	0.08	0.63	0.05	0.60			-0.15	2.06	NIM	
	CENAM	-0.01	1.17	-0.01	1.07	-0.04	1.06			-0.24	2.24	CENAM	
	INMETRO	0.04	0.65	0.04	0.45	0.01	0.42			-0.19	2.01	INMETRO	
	UME	0.04	0.78	0.04	0.63	0.01	0.60			-0.19	2.06	UME	
	VNIIM	0.70	0.97	0.70	0.85	0.67	0.83			0.47	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 80.0 Hz and 100.0 Hz.

f in Hz	j → / i ↓	NIM D_{ij}	$U_{D_{ij}}$ in °	CENAM D_{ij}	$U_{D_{ij}}$ in °	INMETRO D_{ij}	$U_{D_{ij}}$ in °	UME D_{ij}	$U_{D_{ij}}$ in °	VNIIM D_{ij}	$U_{D_{ij}}$ in °	← j / ↓ i	f in Hz
	PTB mean	-0.01	0.54	0.04	1.02	0.01	0.31	0.02	0.54	-0.29	0.79	PTB mean	
	CMI	-0.06	0.71	-0.01	1.12	-0.04	0.55	-0.03	0.71	-0.34	0.91	CMI	
	NMISA	0.05	0.64	0.10	1.08	0.07	0.47	0.08	0.64	-0.23	0.86	NMISA	
	DPLA	-0.03	0.58	0.02	1.04	-0.01	0.38	-0.00	0.58	-0.31	0.82	DPLA	
	CEM	-0.01	0.71	0.04	1.12	0.01	0.55	0.02	0.71	-0.29	0.91	CEM	
	GUM	-0.06	0.78	-0.01	1.17	-0.04	0.65	-0.03	0.78	-0.34	0.97	GUM	
	METAS	-0.01	0.63	0.04	1.07	0.01	0.45	0.02	0.63	-0.29	0.85	METAS	
80	NMIJ	-0.07	0.63	-0.02	1.07	-0.05	0.45	-0.04	0.63	-0.35	0.85	NMIJ	100
	KRISS											KRISS	
	LNE	0.07	2.06	0.12	2.24	0.09	2.01	0.10	2.06	-0.21	2.14	LNE	
	NIM			0.05	1.12	0.02	0.55	0.03	0.71	-0.28	0.91	NIM	
	CENAM	-0.09	1.12			-0.03	1.03	-0.02	1.12	-0.33	1.26	CENAM	
	INMETRO	-0.04	0.55	0.05	1.03			0.01	0.55	-0.30	0.80	INMETRO	
	UME	-0.04	0.71	0.05	1.12	-0.00	0.55			-0.31	0.91	UME	
	VNIIM	0.62	0.91	0.71	1.26	0.66	0.80	0.66	0.91			VNIIM	

Table 9.48: Bilateral degrees of equivalence for the BB at 125.0 Hz and 160.0 Hz.

f in Hz	j → / i ↓	PTB mean D_{ij}	PTB mean $U_{D_{ij}}$	CMI D_{ij}	CMI $U_{D_{ij}}$	NMISA D_{ij}	NMISA $U_{D_{ij}}$	DPLA D_{ij}	DPLA $U_{D_{ij}}$	CEM D_{ij}	CEM $U_{D_{ij}}$	← j / ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean			-0.00	0.54	-0.09	0.45	0.00	0.36	-0.03	0.54	PTB mean	
	CMI	-0.03	0.54			-0.09	0.64	0.00	0.58	-0.03	0.71	CMI	
	NMISA	0.07	0.45	0.10	0.64			0.09	0.50	0.06	0.64	NMISA	
	DPLA	0.00	0.36	0.03	0.58	-0.07	0.50			-0.03	0.58	DPLA	
	CEM	0.02	0.54	0.05	0.71	-0.05	0.64	0.02	0.58			CEM	
	GUM	-0.02	0.63	0.01	0.78	-0.09	0.72	-0.02	0.67	-0.04	0.78	GUM	
	METAS	0.02	0.43	0.05	0.63	-0.05	0.55	0.02	0.48	0.00	0.63	METAS	
125	NMIJ	-0.03	0.43	0.00	0.63	-0.10	0.55	-0.03	0.48	-0.05	0.63	NMIJ	160
	KRISS											KRISS	
	LNE	0.08	2.01	0.11	2.06	0.01	2.04	0.08	2.02	0.06	2.06	LNE	
	NIM	0.02	0.54	0.05	0.71	-0.05	0.64	0.02	0.58	0.00	0.71	NIM	
	CENAM	-0.01	1.02	0.02	1.12	-0.08	1.08	-0.01	1.04	-0.03	1.12	CENAM	
	INMETRO	0.02	0.31	0.05	0.55	-0.05	0.47	0.02	0.38	0.00	0.55	INMETRO	
	UME	0.03	0.54	0.06	0.71	-0.04	0.64	0.03	0.58	0.01	0.71	UME	
	VNIIM	0.34	0.79	0.37	0.91	0.27	0.86	0.34	0.82	0.32	0.91	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 125.0 Hz and 160.0 Hz.

f in Hz	j → / i ↓	GUM D_{ij}	GUM $U_{D_{ij}}$	METAS D_{ij}	METAS $U_{D_{ij}}$	NMIJ D_{ij}	NMIJ $U_{D_{ij}}$	KRISS D_{ij}	KRISS $U_{D_{ij}}$	LNE D_{ij}	LNE $U_{D_{ij}}$	← j / ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean	0.03	0.63	-0.02	0.43	0.02	0.45			-0.14	2.01	PTB mean	
	CMI	0.03	0.78	-0.02	0.63	0.02	0.64			-0.14	2.06	CMI	
	NMISA	0.12	0.72	0.07	0.55	0.11	0.57			-0.05	2.04	NMISA	
	DPLA	0.03	0.67	-0.02	0.48	0.02	0.50			-0.14	2.02	DPLA	
	CEM	0.06	0.78	0.01	0.63	0.05	0.64			-0.11	2.06	CEM	
	GUM			-0.05	0.71	-0.01	0.72			-0.17	2.09	GUM	
	METAS	0.04	0.71			0.04	0.55			-0.12	2.04	METAS	
125	NMIJ	-0.01	0.71	-0.05	0.54					-0.16	2.04	NMIJ	160
	KRISS											KRISS	
	LNE	0.10	2.09	0.06	2.04	0.11	2.04					LNE	
	NIM	0.04	0.78	0.00	0.63	0.05	0.63			-0.06	2.06	NIM	
	CENAM	0.01	1.17	-0.03	1.07	0.02	1.07			-0.09	2.24	CENAM	
	INMETRO	0.04	0.65	0.00	0.45	0.05	0.45			-0.06	2.01	INMETRO	
	UME	0.05	0.78	0.01	0.63	0.06	0.63			-0.05	2.06	UME	
	VNIIM	0.36	0.97	0.32	0.85	0.37	0.85			0.26	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 125.0 Hz and 160.0 Hz.

f in Hz	j → / i ↓	NIM D_{ij}	NIM $U_{D_{ij}}$	CENAM D_{ij}	CENAM $U_{D_{ij}}$	INMETRO D_{ij}	INMETRO $U_{D_{ij}}$	UME D_{ij}	UME $U_{D_{ij}}$	VNIIM D_{ij}	VNIIM $U_{D_{ij}}$	← j / ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean	-0.02	0.54	-0.02	1.02	-0.04	0.31	0.01	0.54	-0.24	0.79	PTB mean	
	CMI	-0.02	0.71	-0.02	1.12	-0.04	0.55	0.01	0.71	-0.24	0.91	CMI	
	NMISA	0.07	0.64	0.07	1.08	0.05	0.47	0.10	0.64	-0.15	0.86	NMISA	
	DPLA	-0.02	0.58	-0.02	1.04	-0.04	0.38	0.01	0.58	-0.24	0.82	DPLA	
	CEM	0.01	0.71	0.01	1.12	-0.01	0.55	0.04	0.71	-0.21	0.91	CEM	
	GUM	-0.05	0.78	-0.05	1.17	-0.07	0.65	-0.02	0.78	-0.27	0.97	GUM	
	METAS	0.00	0.63	0.00	1.07	-0.02	0.45	0.03	0.63	-0.22	0.85	METAS	
125	NMIJ	-0.04	0.64	-0.04	1.08	-0.06	0.47	-0.01	0.64	-0.26	0.86	NMIJ	160
	KRISS											KRISS	
	LNE	0.12	2.06	0.12	2.24	0.10	2.01	0.15	2.06	-0.10	2.14	LNE	
	NIM			0.00	1.12	-0.02	0.55	0.03	0.71	-0.22	0.91	NIM	
	CENAM	-0.03	1.12			-0.02	1.03	0.03	1.12	-0.22	1.26	CENAM	
	INMETRO	0.00	0.55	0.03	1.03			0.05	0.55	-0.20	0.80	INMETRO	
	UME	0.01	0.71	0.04	1.12	0.01	0.55			-0.25	0.91	UME	
	VNIIM	0.32	0.91	0.35	1.26	0.32	0.80	0.31	0.91			VNIIM	

Table 9.49: Bilateral degrees of equivalence for the BB at 200.0 Hz and 250.0 Hz.

f	j →	PTB mean		CMI		NMISA		DPLA		CEM		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean			0.08	0.54	-0.08	0.45	0.02	0.36	-0.01	0.54	PTB mean	
	CMI	-0.03	0.54			-0.16	0.64	-0.06	0.58	-0.09	0.71	CMI	
	NMISA	0.10	0.45	0.13	0.64			0.10	0.50	0.07	0.64	NMISA	
	DPLA	0.02	0.36	0.05	0.58	-0.08	0.50			-0.03	0.58	DPLA	
	CEM	0.03	0.54	0.06	0.71	-0.07	0.64	0.01	0.58			CEM	
	GUM	0.01	0.63	0.04	0.78	-0.09	0.72	-0.01	0.67	-0.02	0.78	GUM	
	METAS	0.03	0.43	0.06	0.63	-0.07	0.55	0.01	0.48	0.00	0.63	METAS	
200	NMIJ	-0.04	0.47	-0.01	0.65	-0.14	0.58	-0.06	0.52	-0.07	0.65	NMIJ	250
	KRISS											KRISS	
	LNE	0.09	2.01	0.12	2.06	-0.01	2.04	0.07	2.02	0.06	2.06	LNE	
	NIM	0.01	0.54	0.04	0.71	-0.09	0.64	-0.01	0.58	-0.02	0.71	NIM	
	CENAM	-0.01	1.02	0.02	1.12	-0.11	1.08	-0.03	1.04	-0.04	1.12	CENAM	
	INMETRO	0.04	0.31	0.07	0.55	-0.06	0.47	0.02	0.38	0.01	0.55	INMETRO	
	UME	0.02	0.54	0.05	0.71	-0.08	0.64	-0.00	0.58	-0.01	0.71	UME	
	VNIIM	0.06	0.79	0.09	0.91	-0.04	0.86	0.04	0.82	0.03	0.91	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 200.0 Hz and 250.0 Hz.

f	j →	GUM		METAS		NMIJ		KRISS		LNE		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean	0.01	0.63	-0.02	0.43	0.06	0.48			-0.07	2.01	PTB mean	
	CMI	-0.07	0.78	-0.10	0.63	-0.02	0.67			-0.15	2.06	CMI	
	NMISA	0.09	0.72	0.06	0.55	0.14	0.59			0.01	2.04	NMISA	
	DPLA	-0.01	0.67	-0.04	0.48	0.04	0.53			-0.09	2.02	DPLA	
	CEM	0.02	0.78	-0.01	0.63	0.07	0.67			-0.06	2.06	CEM	
	GUM			-0.03	0.71	0.05	0.74			-0.08	2.09	GUM	
	METAS	0.02	0.71			0.08	0.58			-0.05	2.04	METAS	
200	NMIJ	-0.05	0.73	-0.07	0.57					-0.13	2.05	NMIJ	250
	KRISS											KRISS	
	LNE	0.08	2.09	0.06	2.04	0.13	2.04					LNE	
	NIM	0.00	0.78	-0.02	0.63	0.05	0.65			-0.08	2.06	NIM	
	CENAM	-0.02	1.17	-0.04	1.07	0.03	1.08			-0.10	2.24	CENAM	
	INMETRO	0.03	0.65	0.01	0.45	0.08	0.48			-0.05	2.01	INMETRO	
	UME	0.01	0.78	-0.01	0.63	0.06	0.65			-0.07	2.06	UME	
	VNIIM	0.05	0.97	0.03	0.85	0.10	0.87			-0.03	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 200.0 Hz and 250.0 Hz.

f	j →	NIM		CENAM		INMETRO		UME		VNIIM		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean	0.01	0.54	0.05	1.02	-0.02	0.31	0.03	0.54	0.04	0.79	PTB mean	
	CMI	-0.07	0.71	-0.03	1.12	-0.10	0.55	-0.05	0.71	-0.04	0.91	CMI	
	NMISA	0.09	0.64	0.13	1.08	0.06	0.47	0.11	0.64	0.12	0.86	NMISA	
	DPLA	-0.01	0.58	0.03	1.04	-0.04	0.38	0.01	0.58	0.02	0.82	DPLA	
	CEM	0.02	0.71	0.06	1.12	-0.01	0.55	0.04	0.71	0.05	0.91	CEM	
	GUM	-0.00	0.78	0.04	1.17	-0.03	0.65	0.02	0.78	0.03	0.97	GUM	
	METAS	0.03	0.63	0.07	1.07	0.00	0.45	0.05	0.63	0.06	0.85	METAS	
200	NMIJ	-0.05	0.67	-0.01	1.09	-0.08	0.50	-0.03	0.67	-0.02	0.88	NMIJ	250
	KRISS											KRISS	
	LNE	0.08	2.06	0.12	2.24	0.05	2.01	0.10	2.06	0.11	2.14	LNE	
	NIM			0.04	1.12	-0.03	0.55	0.02	0.71	0.03	0.91	NIM	
	CENAM	-0.02	1.12			-0.07	1.03	-0.02	1.12	-0.01	1.26	CENAM	
	INMETRO	0.03	0.55	0.05	1.03			0.05	0.55	0.06	0.80	INMETRO	
	UME	0.01	0.71	0.03	1.12	-0.02	0.55			0.01	0.91	UME	
	VNIIM	0.05	0.91	0.07	1.26	0.02	0.80	0.04	0.91			VNIIM	

Table 9.50: Bilateral degrees of equivalence for the BB at 315.0 Hz and 400.0 Hz.

f in Hz	j → / i ↓	PTB mean D_{ij}	PTB mean $U_{D_{ij}}$	CMI D_{ij}	CMI $U_{D_{ij}}$	NMISA D_{ij}	NMISA $U_{D_{ij}}$	DPLA D_{ij}	DPLA $U_{D_{ij}}$	CEM D_{ij}	CEM $U_{D_{ij}}$	← j / ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean			0.16	0.54	-0.07	0.45	0.04	0.36	-0.01	0.54	PTB mean	
	CMI	-0.10	0.54			-0.23	0.64	-0.12	0.58	-0.17	0.71	CMI	
	NMISA	0.09	0.45	0.19	0.64			0.11	0.50	0.06	0.64	NMISA	
	DPLA	-0.01	0.36	0.09	0.58	-0.10	0.50			-0.05	0.58	DPLA	
	CEM	0.02	0.54	0.12	0.71	-0.07	0.64	0.03	0.58			CEM	
	GUM	0.01	0.63	0.11	0.78	-0.08	0.72	0.02	0.67	-0.01	0.78	GUM	
	METAS	0.03	0.43	0.13	0.63	-0.06	0.55	0.04	0.48	0.01	0.63	METAS	
315	NMIJ	-0.04	0.24	0.06	0.52	-0.13	0.42	-0.03	0.33	-0.06	0.52	NMIJ	400
	KRISS											KRISS	
	LNE	0.13	2.01	0.23	2.06	0.04	2.04	0.14	2.02	0.11	2.06	LNE	
	NIM	-0.01	0.54	0.09	0.71	-0.10	0.64	0.00	0.58	-0.03	0.71	NIM	
	CENAM	-0.02	1.02	0.08	1.12	-0.11	1.08	-0.01	1.04	-0.04	1.12	CENAM	
	INMETRO	0.03	0.31	0.13	0.55	-0.06	0.47	0.04	0.38	0.01	0.55	INMETRO	
	UME	-0.02	0.54	0.08	0.71	-0.11	0.64	-0.01	0.58	-0.04	0.71	UME	
	VNIIM	-0.11	0.79	-0.01	0.91	-0.20	0.86	-0.10	0.82	-0.13	0.91	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 315.0 Hz and 400.0 Hz.

f in Hz	j → / i ↓	GUM D_{ij}	GUM $U_{D_{ij}}$	METAS D_{ij}	METAS $U_{D_{ij}}$	NMIJ D_{ij}	NMIJ $U_{D_{ij}}$	KRISS D_{ij}	KRISS $U_{D_{ij}}$	LNE D_{ij}	LNE $U_{D_{ij}}$	← j / ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean	-0.01	0.63	-0.01	0.43	0.09	0.26			-0.10	2.01	PTB mean	
	CMI	-0.17	0.78	-0.17	0.63	-0.07	0.52			-0.26	2.06	CMI	
	NMISA	0.06	0.72	0.06	0.55	0.16	0.43			-0.03	2.04	NMISA	
	DPLA	-0.05	0.67	-0.05	0.48	0.05	0.34			-0.14	2.02	DPLA	
	CEM	0.00	0.78	0.00	0.63	0.10	0.52			-0.09	2.06	CEM	
	GUM			0.00	0.71	0.10	0.62			-0.09	2.09	GUM	
	METAS	0.02	0.71			0.10	0.41			-0.09	2.04	METAS	
315	NMIJ	-0.05	0.62	-0.07	0.40					-0.19	2.01	NMIJ	400
	KRISS											KRISS	
	LNE	0.12	2.09	0.10	2.04	0.17	2.00					LNE	
	NIM	-0.02	0.78	-0.04	0.63	0.03	0.52			-0.14	2.06	NIM	
	CENAM	-0.03	1.17	-0.05	1.07	0.02	1.01			-0.15	2.24	CENAM	
	INMETRO	0.02	0.65	0.00	0.45	0.07	0.28			-0.10	2.01	INMETRO	
	UME	-0.03	0.78	-0.05	0.63	0.02	0.52			-0.15	2.06	UME	
	VNIIM	-0.12	0.97	-0.14	0.85	-0.07	0.77			-0.24	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 315.0 Hz and 400.0 Hz.

f in Hz	j → / i ↓	NIM D_{ij}	NIM $U_{D_{ij}}$	CENAM D_{ij}	CENAM $U_{D_{ij}}$	INMETRO D_{ij}	INMETRO $U_{D_{ij}}$	UME D_{ij}	UME $U_{D_{ij}}$	VNIIM D_{ij}	VNIIM $U_{D_{ij}}$	← j / ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean	0.03	0.54	0.02	1.02	-0.01	0.31	0.06	0.54	0.22	0.79	PTB mean	
	CMI	-0.13	0.71	-0.14	1.12	-0.17	0.55	-0.10	0.71	0.06	0.91	CMI	
	NMISA	0.10	0.64	0.09	1.08	0.06	0.47	0.13	0.64	0.29	0.86	NMISA	
	DPLA	-0.01	0.58	-0.02	1.04	-0.05	0.38	0.02	0.58	0.18	0.82	DPLA	
	CEM	0.04	0.71	0.03	1.12	0.00	0.55	0.07	0.71	0.23	0.91	CEM	
	GUM	0.04	0.78	0.03	1.17	0.00	0.65	0.07	0.78	0.23	0.97	GUM	
	METAS	0.04	0.63	0.03	1.07	0.00	0.45	0.07	0.63	0.23	0.85	METAS	
315	NMIJ	-0.06	0.52	-0.07	1.01	-0.10	0.29	-0.03	0.52	0.13	0.78	NMIJ	400
	KRISS											KRISS	
	LNE	0.13	2.06	0.12	2.24	0.09	2.01	0.16	2.06	0.32	2.14	LNE	
	NIM			-0.01	1.12	-0.04	0.55	0.03	0.71	0.19	0.91	NIM	
	CENAM	-0.01	1.12			-0.03	1.03	0.04	1.12	0.20	1.26	CENAM	
	INMETRO	0.04	0.55	0.05	1.03			0.07	0.55	0.23	0.80	INMETRO	
	UME	-0.01	0.71	0.00	1.12	-0.05	0.55			0.16	0.91	UME	
	VNIIM	-0.10	0.91	-0.09	1.26	-0.14	0.80	-0.09	0.91			VNIIM	

Table 9.51: Bilateral degrees of equivalence for the BB at 500.0 Hz and 630.0 Hz.

f in Hz	j → i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$		
	PTB mean			0.22	0.54	-0.08	0.45	0.06	0.36	-0.02	0.54	PTB mean	
	CMI	-0.18	0.54			-0.30	0.64	-0.16	0.58	-0.24	0.71	CMI	
	NMISA	0.09	0.45	0.27	0.64			0.14	0.50	0.06	0.64	NMISA	
	DPLA	-0.04	0.36	0.14	0.58	-0.13	0.50			-0.08	0.58	DPLA	
	CEM	0.02	0.54	0.20	0.71	-0.07	0.64	0.06	0.58			CEM	
	GUM	0.03	0.63	0.21	0.78	-0.06	0.72	0.07	0.67	0.01	0.78	GUM	
	METAS	0.03	0.43	0.21	0.63	-0.06	0.55	0.07	0.48	0.01	0.63	METAS	
500	NMIJ	-0.13	0.26	0.05	0.52	-0.22	0.43	-0.09	0.34	-0.15	0.52	NMIJ	630
	KRISS											KRISS	
	LNE	0.11	2.01	0.29	2.06	0.02	2.04	0.15	2.02	0.09	2.06	LNE	
	NIM	-0.03	0.54	0.15	0.71	-0.12	0.64	0.01	0.58	-0.05	0.71	NIM	
	CENAM	-0.02	1.02	0.16	1.12	-0.11	1.08	0.02	1.04	-0.04	1.12	CENAM	
	INMETRO	0.05	0.31	0.23	0.55	-0.04	0.47	0.09	0.38	0.03	0.55	INMETRO	
	UME	-0.04	0.54	0.14	0.71	-0.13	0.64	0.00	0.58	-0.06	0.71	UME	
	VNIIM	-0.26	0.79	-0.08	0.91	-0.35	0.86	-0.22	0.82	-0.28	0.91	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 500.0 Hz and 630.0 Hz.

f in Hz	j → i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$		
	PTB mean	-0.04	0.63	-0.03	0.43	0.07	0.24			-0.16	2.01	PTB mean	
	CMI	-0.26	0.78	-0.25	0.63	-0.15	0.52			-0.38	2.06	CMI	
	NMISA	0.04	0.72	0.05	0.55	0.15	0.42			-0.08	2.04	NMISA	
	DPLA	-0.10	0.67	-0.09	0.48	0.01	0.33			-0.22	2.02	DPLA	
	CEM	-0.02	0.78	-0.01	0.63	0.09	0.52			-0.14	2.06	CEM	
	GUM			0.01	0.71	0.11	0.62			-0.12	2.09	GUM	
	METAS	0.00	0.71			0.10	0.40			-0.13	2.04	METAS	
500	NMIJ	-0.16	0.62	-0.16	0.41					-0.23	2.00	NMIJ	630
	KRISS											KRISS	
	LNE	0.08	2.09	0.08	2.04	0.24	2.01					LNE	
	NIM	-0.06	0.78	-0.06	0.63	0.10	0.52			-0.14	2.06	NIM	
	CENAM	-0.05	1.17	-0.05	1.07	0.11	1.01			-0.13	2.24	CENAM	
	INMETRO	0.02	0.65	0.02	0.45	0.18	0.29			-0.06	2.01	INMETRO	
	UME	-0.07	0.78	-0.07	0.63	0.09	0.52			-0.15	2.06	UME	
	VNIIM	-0.29	0.97	-0.29	0.85	-0.13	0.78			-0.37	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 500.0 Hz and 630.0 Hz.

f in Hz	j → i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j ↓ i	f in Hz
		D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$	D_{ij} in °	$U_{D_{ij}}$		
	PTB mean	0.08	0.54	0.03	1.02	-0.03	0.31	0.03	0.54	0.32	0.79	PTB mean	
	CMI	-0.14	0.71	-0.19	1.12	-0.25	0.55	-0.19	0.71	0.10	0.91	CMI	
	NMISA	0.16	0.64	0.11	1.08	0.05	0.47	0.11	0.64	0.40	0.86	NMISA	
	DPLA	0.02	0.58	-0.03	1.04	-0.09	0.38	-0.03	0.58	0.26	0.82	DPLA	
	CEM	0.10	0.71	0.05	1.12	-0.01	0.55	0.05	0.71	0.34	0.91	CEM	
	GUM	0.12	0.78	0.07	1.17	0.01	0.65	0.07	0.78	0.36	0.97	GUM	
	METAS	0.11	0.63	0.06	1.07	0.00	0.45	0.06	0.63	0.35	0.85	METAS	
500	NMIJ	0.01	0.52	-0.04	1.01	-0.10	0.28	-0.04	0.52	0.25	0.77	NMIJ	630
	KRISS											KRISS	
	LNE	0.24	2.06	0.19	2.24	0.13	2.01	0.19	2.06	0.48	2.14	LNE	
	NIM			-0.05	1.12	-0.11	0.55	-0.05	0.71	0.24	0.91	NIM	
	CENAM	0.01	1.12			-0.06	1.03	0.00	1.12	0.29	1.26	CENAM	
	INMETRO	0.08	0.55	0.07	1.03			0.06	0.55	0.35	0.80	INMETRO	
	UME	-0.01	0.71	-0.02	1.12	-0.09	0.55			0.29	0.91	UME	
	VNIIM	-0.23	0.91	-0.24	1.26	-0.31	0.80	-0.22	0.91			VNIIM	

Table 9.52: Bilateral degrees of equivalence for the BB at 800.0 Hz and 1000.0 Hz.

f in Hz	j → i ↓	PTB mean D_{ij} in °	PTB mean $U_{D_{ij}}$ in °	CMI D_{ij} in °	CMI $U_{D_{ij}}$ in °	NMISA D_{ij} in °	NMISA $U_{D_{ij}}$ in °	DPLA D_{ij} in °	DPLA $U_{D_{ij}}$ in °	CEM D_{ij} in °	CEM $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean			0.34	0.54	-0.06	0.45	0.07	0.36	-0.03	0.54	PTB mean	
	CMI	-0.25	0.54			-0.40	0.64	-0.27	0.58	-0.37	0.71	CMI	
	NMISA	0.07	0.45	0.32	0.64			0.13	0.50	0.03	0.64	NMISA	
	DPLA	-0.07	0.36	0.18	0.58	-0.14	0.50			-0.10	0.58	DPLA	
	CEM	0.03	0.54	0.28	0.71	-0.04	0.64	0.10	0.58			CEM	
	GUM	0.04	0.63	0.29	0.78	-0.03	0.72	0.11	0.67	0.01	0.78	GUM	
	METAS	0.04	0.43	0.29	0.63	-0.03	0.55	0.11	0.48	0.01	0.63	METAS	
800	NMIJ	-0.04	0.26	0.21	0.52	-0.11	0.43	0.03	0.34	-0.07	0.52	NMIJ	1000
	KRISS											KRISS	
	LNE	0.18	2.01	0.43	2.06	0.11	2.04	0.25	2.02	0.15	2.06	LNE	
	NIM	-0.08	0.54	0.17	0.71	-0.15	0.64	-0.01	0.58	-0.11	0.71	NIM	
	CENAM	-0.02	1.02	0.23	1.12	-0.09	1.08	0.05	1.04	-0.05	1.12	CENAM	
	INMETRO	0.05	0.31	0.30	0.55	-0.02	0.47	0.12	0.38	0.02	0.55	INMETRO	
	UME	-0.07	0.54	0.18	0.71	-0.14	0.64	-0.00	0.58	-0.10	0.71	UME	
	VNIIM	-0.32	0.79	-0.07	0.91	-0.39	0.86	-0.25	0.82	-0.35	0.91	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 800.0 Hz and 1000.0 Hz.

f in Hz	j → i ↓	GUM D_{ij} in °	GUM $U_{D_{ij}}$ in °	METAS D_{ij} in °	METAS $U_{D_{ij}}$ in °	NMIJ D_{ij} in °	NMIJ $U_{D_{ij}}$ in °	KRISS D_{ij} in °	KRISS $U_{D_{ij}}$ in °	LNE D_{ij} in °	LNE $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean	-0.05	0.63	-0.02	0.52	0.07	0.24			-0.20	2.01	PTB mean	
	CMI	-0.39	0.78	-0.36	0.69	-0.27	0.52			-0.54	2.06	CMI	
	NMISA	0.01	0.72	0.04	0.62	0.13	0.42			-0.14	2.04	NMISA	
	DPLA	-0.12	0.67	-0.09	0.57	0.00	0.33			-0.27	2.02	DPLA	
	CEM	-0.02	0.78	0.01	0.69	0.10	0.52			-0.17	2.06	CEM	
	GUM			0.03	0.77	0.12	0.62			-0.15	2.09	GUM	
	METAS	0.00	0.71			0.09	0.50			-0.18	2.06	METAS	
800	NMIJ	-0.08	0.62	-0.08	0.41					-0.27	2.00	NMIJ	1000
	KRISS											KRISS	
	LNE	0.14	2.09	0.14	2.04	0.22	2.01					LNE	
	NIM	-0.12	0.78	-0.12	0.63	-0.04	0.52			-0.26	2.06	NIM	
	CENAM	-0.06	1.17	-0.06	1.07	0.02	1.01			-0.20	2.24	CENAM	
	INMETRO	0.01	0.65	0.01	0.45	0.09	0.29			-0.13	2.01	INMETRO	
	UME	-0.11	0.78	-0.11	0.63	-0.03	0.52			-0.25	2.06	UME	
	VNIIM	-0.36	0.97	-0.36	0.85	-0.28	0.78			-0.50	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 800.0 Hz and 1000.0 Hz.

f in Hz	j → i ↓	NIM D_{ij} in °	NIM $U_{D_{ij}}$ in °	CENAM D_{ij} in °	CENAM $U_{D_{ij}}$ in °	INMETRO D_{ij} in °	INMETRO $U_{D_{ij}}$ in °	UME D_{ij} in °	UME $U_{D_{ij}}$ in °	VNIIM D_{ij} in °	VNIIM $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean	0.13	0.54	0.01	1.02	-0.04	0.31	0.03	0.54	0.37	0.79	PTB mean	
	CMI	-0.21	0.71	-0.33	1.12	-0.38	0.55	-0.31	0.71	0.03	0.91	CMI	
	NMISA	0.19	0.64	0.07	1.08	0.02	0.47	0.09	0.64	0.43	0.86	NMISA	
	DPLA	0.06	0.58	-0.06	1.04	-0.11	0.38	-0.04	0.58	0.30	0.82	DPLA	
	CEM	0.16	0.71	0.04	1.12	-0.01	0.55	0.06	0.71	0.40	0.91	CEM	
	GUM	0.18	0.78	0.06	1.17	0.01	0.65	0.08	0.78	0.42	0.97	GUM	
	METAS	0.15	0.69	0.03	1.11	-0.02	0.54	0.05	0.69	0.39	0.90	METAS	
800	NMIJ	0.06	0.52	-0.06	1.01	-0.11	0.28	-0.04	0.52	0.30	0.77	NMIJ	1000
	KRISS											KRISS	
	LNE	0.33	2.06	0.21	2.24	0.16	2.01	0.23	2.06	0.57	2.14	LNE	
	NIM			-0.12	1.12	-0.17	0.55	-0.10	0.71	0.24	0.91	NIM	
	CENAM	0.06	1.12			-0.05	1.03	0.02	1.12	0.36	1.26	CENAM	
	INMETRO	0.13	0.55	0.07	1.03			0.07	0.55	0.41	0.80	INMETRO	
	UME	0.01	0.71	-0.05	1.12	-0.12	0.55			0.34	0.91	UME	
	VNIIM	-0.24	0.91	-0.30	1.26	-0.37	0.80	-0.25	0.91			VNIIM	

Table 9.53: Bilateral degrees of equivalence for the BB at 1250.0 Hz and 1500.0 Hz.

f in Hz	j → / i ↓	PTB mean D_{ij} in °	PTB mean $U_{D_{ij}}$ in °	CMI D_{ij} in °	CMI $U_{D_{ij}}$ in °	NMISA D_{ij} in °	NMISA $U_{D_{ij}}$ in °	DPLA D_{ij} in °	DPLA $U_{D_{ij}}$ in °	CEM D_{ij} in °	CEM $U_{D_{ij}}$ in °	← j / ↓ i	f in Hz
	PTB mean			0.52	0.71	-0.03	0.71	0.11	0.58	-0.03	1.12	PTB mean	
	CMI	-0.39	0.71			-0.55	0.71	-0.41	0.58	-0.55	1.12	CMI	
	NMISA	0.07	0.71	0.46	0.71			0.14	0.58	0.00	1.12	NMISA	
	DPLA	-0.07	0.58	0.32	0.58	-0.14	0.58			-0.14	1.04	DPLA	
	CEM	0.06	1.12	0.45	1.12	-0.01	1.12	0.13	1.04			CEM	
	GUM	0.09	0.78	0.48	0.78	0.02	0.78	0.16	0.67	0.03	1.17	GUM	
	METAS	0.05	0.69	0.44	0.69	-0.02	0.69	0.12	0.57	-0.01	1.11	METAS	
1250	NMIJ	-0.05	0.52	0.34	0.52	-0.12	0.52	0.02	0.33	-0.11	1.01	NMIJ	1500
	KRISS											KRISS	
	LNE	0.30	2.06	0.69	2.06	0.23	2.06	0.37	2.02	0.24	2.24	LNE	
	NIM	-0.15	0.71	0.24	0.71	-0.22	0.71	-0.08	0.58	-0.21	1.12	NIM	
	CENAM	-0.02	1.12	0.37	1.12	-0.09	1.12	0.05	1.04	-0.08	1.41	CENAM	
	INMETRO	0.12	0.55	0.51	0.55	0.05	0.55	0.19	0.38	0.06	1.03	INMETRO	
	UME	-0.20	1.12	0.19	1.12	-0.27	1.12	-0.13	1.04	-0.26	1.41	UME	
	VNIIM	-0.50	0.91	-0.11	0.91	-0.57	0.91	-0.43	0.82	-0.56	1.26	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 1250.0 Hz and 1500.0 Hz.

f in Hz	j → / i ↓	GUM D_{ij} in °	GUM $U_{D_{ij}}$ in °	METAS D_{ij} in °	METAS $U_{D_{ij}}$ in °	NMIJ D_{ij} in °	NMIJ $U_{D_{ij}}$ in °	KRISS D_{ij} in °	KRISS $U_{D_{ij}}$ in °	LNE D_{ij} in °	LNE $U_{D_{ij}}$ in °	← j / ↓ i	f in Hz
	PTB mean	-0.07	0.78	-0.02	0.69	-0.05	0.51			-0.32	2.06	PTB mean	
	CMI	-0.59	0.78	-0.54	0.69	-0.57	0.51			-0.84	2.06	CMI	
	NMISA	-0.04	0.78	0.01	0.69	-0.02	0.51			-0.29	2.06	NMISA	
	DPLA	-0.18	0.67	-0.13	0.57	-0.16	0.32			-0.43	2.02	DPLA	
	CEM	-0.04	1.17	0.01	1.11	-0.02	1.01			-0.29	2.24	CEM	
	GUM			0.05	0.77	0.02	0.61			-0.25	2.09	GUM	
	METAS	-0.04	0.77			-0.03	0.49			-0.30	2.06	METAS	
1250	NMIJ	-0.14	0.62	-0.10	0.50					-0.27	2.00	NMIJ	1500
	KRISS											KRISS	
	LNE	0.21	2.09	0.25	2.06	0.35	2.00					LNE	
	NIM	-0.24	0.78	-0.20	0.69	-0.10	0.52			-0.45	2.06	NIM	
	CENAM	-0.11	1.17	-0.07	1.11	0.03	1.01			-0.32	2.24	CENAM	
	INMETRO	0.03	0.65	0.07	0.54	0.17	0.28			-0.18	2.01	INMETRO	
	UME	-0.29	1.17	-0.25	1.11	-0.15	1.01			-0.50	2.24	UME	
	VNIIM	-0.59	0.97	-0.55	0.90	-0.45	0.77			-0.80	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 1250.0 Hz and 1500.0 Hz.

f in Hz	j → / i ↓	NIM D_{ij} in °	NIM $U_{D_{ij}}$ in °	CENAM D_{ij} in °	CENAM $U_{D_{ij}}$ in °	INMETRO D_{ij} in °	INMETRO $U_{D_{ij}}$ in °	UME D_{ij} in °	UME $U_{D_{ij}}$ in °	VNIIM D_{ij} in °	VNIIM $U_{D_{ij}}$ in °	← j / ↓ i	f in Hz
	PTB mean	0.21	0.71	0.06	1.12	-0.08	0.55	0.19	1.12	0.74	0.91	PTB mean	
	CMI	-0.31	0.71	-0.46	1.12	-0.60	0.55	-0.33	1.12	0.22	0.91	CMI	
	NMISA	0.24	0.71	0.09	1.12	-0.05	0.55	0.22	1.12	0.77	0.91	NMISA	
	DPLA	0.10	0.58	-0.05	1.04	-0.19	0.38	0.08	1.04	0.63	0.82	DPLA	
	CEM	0.24	1.12	0.09	1.41	-0.05	1.03	0.22	1.41	0.77	1.26	CEM	
	GUM	0.28	0.78	0.13	1.17	-0.01	0.65	0.26	1.17	0.81	0.97	GUM	
	METAS	0.23	0.69	0.08	1.11	-0.06	0.54	0.21	1.11	0.76	0.90	METAS	
1250	NMIJ	0.26	0.51	0.11	1.01	-0.03	0.27	0.24	1.01	0.79	0.77	NMIJ	1500
	KRISS											KRISS	
	LNE	0.53	2.06	0.38	2.24	0.24	2.01	0.51	2.24	1.06	2.14	LNE	
	NIM			-0.15	1.12	-0.29	0.55	-0.02	1.12	0.53	0.91	NIM	
	CENAM	0.13	1.12			-0.14	1.03	0.13	1.41	0.68	1.26	CENAM	
	INMETRO	0.27	0.55	0.14	1.03			0.27	1.03	0.82	0.80	INMETRO	
	UME	-0.05	1.12	-0.18	1.41	-0.32	1.03			0.55	1.26	UME	
	VNIIM	-0.35	0.91	-0.48	1.26	-0.62	0.80	-0.30	1.26			VNIIM	

Table 9.54: Bilateral degrees of equivalence for the BB at 1600.0 Hz and 2000.0 Hz.

f in Hz	j → / i ↓	PTB mean D_{ij} in °	PTB mean $U_{D_{ij}}$ in °	CMI D_{ij} in °	CMI $U_{D_{ij}}$ in °	NMISA D_{ij} in °	NMISA $U_{D_{ij}}$ in °	DPLA D_{ij} in °	DPLA $U_{D_{ij}}$ in °	CEM D_{ij} in °	CEM $U_{D_{ij}}$ in °	← j / ↓ i	f in Hz
	PTB mean			0.63	0.71	-0.07	0.71	0.09	0.58	-0.20	1.12	PTB mean	
	CMI	-0.51	0.71			-0.70	0.71	-0.54	0.58	-0.83	1.12	CMI	
	NMISA	0.06	0.71	0.57	0.71			0.16	0.58	-0.13	1.12	NMISA	
	DPLA	-0.09	0.58	0.42	0.58	-0.15	0.58			-0.29	1.04	DPLA	
	CEM	0.16	1.12	0.67	1.12	0.10	1.12	0.25	1.04			CEM	
	GUM	0.11	0.78	0.62	0.78	0.05	0.78	0.20	0.67	-0.05	1.17	GUM	
	METAS	0.07	0.69	0.58	0.69	0.01	0.69	0.16	0.57	-0.09	1.11	METAS	
1600	NMIJ	0.06	0.52	0.57	0.52	0.00	0.52	0.15	0.33	-0.10	1.01	NMIJ	2000
	KRISS											KRISS	
	LNE	0.39	2.06	0.90	2.06	0.33	2.06	0.48	2.02	0.23	2.24	LNE	
	NIM	-0.18	0.71	0.33	0.71	-0.24	0.71	-0.09	0.58	-0.34	1.12	NIM	
	CENAM	-0.04	1.12	0.47	1.12	-0.10	1.12	0.05	1.04	-0.20	1.41	CENAM	
	INMETRO	0.13	0.55	0.64	0.55	0.07	0.55	0.22	0.38	-0.03	1.03	INMETRO	
	UME	-0.07	1.12	0.44	1.12	-0.13	1.12	0.02	1.04	-0.23	1.41	UME	
	VNIIM	-0.79	0.91	-0.28	0.91	-0.85	0.91	-0.70	0.82	-0.95	1.26	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 1600.0 Hz and 2000.0 Hz.

f in Hz	j → / i ↓	GUM D_{ij} in °	GUM $U_{D_{ij}}$ in °	METAS D_{ij} in °	METAS $U_{D_{ij}}$ in °	NMIJ D_{ij} in °	NMIJ $U_{D_{ij}}$ in °	KRISS D_{ij} in °	KRISS $U_{D_{ij}}$ in °	LNE D_{ij} in °	LNE $U_{D_{ij}}$ in °	← j / ↓ i	f in Hz
	PTB mean	-0.17	0.78	-0.09	0.69	-0.13	0.52			-0.48	5.02	PTB mean	
	CMI	-0.80	0.78	-0.72	0.69	-0.76	0.52			-1.11	5.02	CMI	
	NMISA	-0.10	0.78	-0.02	0.69	-0.06	0.52			-0.41	5.02	NMISA	
	DPLA	-0.26	0.67	-0.18	0.57	-0.22	0.33			-0.57	5.01	DPLA	
	CEM	0.03	1.17	0.11	1.11	0.07	1.01			-0.28	5.10	CEM	
	GUM			0.08	0.77	0.04	0.62			-0.31	5.04	GUM	
	METAS	-0.04	0.77			-0.04	0.50			-0.39	5.02	METAS	
1600	NMIJ	-0.05	0.62	-0.01	0.50					-0.35	5.00	NMIJ	2000
	KRISS											KRISS	
	LNE	0.28	2.09	0.32	2.06	0.33	2.00					LNE	
	NIM	-0.29	0.78	-0.25	0.69	-0.24	0.52			-0.57	2.06	NIM	
	CENAM	-0.15	1.17	-0.11	1.11	-0.10	1.01			-0.43	2.24	CENAM	
	INMETRO	0.02	0.65	0.06	0.54	0.07	0.28			-0.26	2.01	INMETRO	
	UME	-0.18	1.17	-0.14	1.11	-0.13	1.01			-0.46	2.24	UME	
	VNIIM	-0.90	0.97	-0.86	0.90	-0.85	0.77			-1.18	2.14	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 1600.0 Hz and 2000.0 Hz.

f in Hz	j → / i ↓	NIM D_{ij} in °	NIM $U_{D_{ij}}$ in °	CENAM D_{ij} in °	CENAM $U_{D_{ij}}$ in °	INMETRO D_{ij} in °	INMETRO $U_{D_{ij}}$ in °	UME D_{ij} in °	UME $U_{D_{ij}}$ in °	VNIIM D_{ij} in °	VNIIM $U_{D_{ij}}$ in °	← j / ↓ i	f in Hz
	PTB mean	0.17	0.71	0.05	1.12	-0.17	0.55	0.31	1.12	0.86	0.91	PTB mean	
	CMI	-0.46	0.71	-0.58	1.12	-0.80	0.55	-0.32	1.12	0.23	0.91	CMI	
	NMISA	0.24	0.71	0.12	1.12	-0.10	0.55	0.38	1.12	0.93	0.91	NMISA	
	DPLA	0.08	0.58	-0.04	1.04	-0.26	0.38	0.22	1.04	0.77	0.82	DPLA	
	CEM	0.37	1.12	0.25	1.41	0.03	1.03	0.51	1.41	1.06	1.26	CEM	
	GUM	0.34	0.78	0.22	1.17	0.00	0.65	0.48	1.17	1.03	0.97	GUM	
	METAS	0.26	0.69	0.14	1.11	-0.08	0.54	0.40	1.11	0.95	0.90	METAS	
1600	NMIJ	0.30	0.52	0.18	1.01	-0.04	0.28	0.44	1.01	0.99	0.77	NMIJ	2000
	KRISS											KRISS	
	LNE	0.65	5.02	0.53	5.10	0.31	5.01	0.79	5.10	1.34	5.06	LNE	
	NIM			-0.12	1.12	-0.34	0.55	0.14	1.12	0.69	0.91	NIM	
	CENAM	0.14	1.12			-0.22	1.03	0.26	1.41	0.81	1.26	CENAM	
	INMETRO	0.31	0.55	0.17	1.03			0.48	1.03	1.03	0.80	INMETRO	
	UME	0.11	1.12	-0.03	1.41	-0.20	1.03			0.55	1.26	UME	
	VNIIM	-0.61	0.91	-0.75	1.26	-0.92	0.80	-0.72	1.26			VNIIM	

Table 9.55: Bilateral degrees of equivalence for the BB at 2500.0 Hz and 3000.0 Hz.

f in Hz	j → / i ↓	PTB mean (in °)		CMI (in °)		NMISA (in °)		DPLA (in °)		CEM (in °)		← j / ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
	PTB mean			0.94	0.71	-0.06	0.71	0.15	0.58	-0.23	1.12	PTB mean	
	CMI	-0.74	0.71			-1.00	0.71	-0.79	0.58	-1.17	1.12	CMI	
	NMISA	0.09	0.71	0.83	0.71			0.21	0.58	-0.17	1.12	NMISA	
	DPLA	-0.10	0.58	0.64	0.58	-0.19	0.58			-0.38	1.04	DPLA	
	CEM	0.24	1.12	0.98	1.12	0.15	1.12	0.34	1.04			CEM	
	GUM	0.21	0.78	0.95	0.78	0.12	0.78	0.31	0.67	-0.03	1.17	GUM	
	METAS	0.13	0.69	0.87	0.69	0.04	0.69	0.23	0.57	-0.11	1.11	METAS	
2500	NMIJ	0.17	0.52	0.91	0.52	0.08	0.52	0.27	0.33	-0.07	1.01	NMIJ	3000
	KRISS											KRISS	
	LNE	0.62	5.02	1.36	5.02	0.53	5.02	0.72	5.01	0.38	5.10	LNE	
	NIM	-0.27	0.71	0.47	0.71	-0.36	0.71	-0.17	0.58	-0.51	1.12	NIM	
	CENAM	-0.03	1.12	0.71	1.12	-0.12	1.12	0.07	1.04	-0.27	1.41	CENAM	
	INMETRO	0.21	0.55	0.95	0.55	0.12	0.55	0.31	0.38	-0.03	1.03	INMETRO	
	UME	-0.38	1.12	0.36	1.12	-0.47	1.12	-0.28	1.04	-0.62	1.41	UME	
	VNIIM	-0.95	1.12	-0.21	1.12	-1.04	1.12	-0.85	1.04	-1.19	1.41	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 2500.0 Hz and 3000.0 Hz.

f in Hz	j → / i ↓	GUM (in °)		METAS (in °)		NMIJ (in °)		KRISS (in °)		LNE (in °)		← j / ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
	PTB mean	-0.21	0.78	-0.11	0.69	-0.20	0.52			-0.71	5.02	PTB mean	
	CMI	-1.15	0.78	-1.05	0.69	-1.14	0.52			-1.65	5.02	CMI	
	NMISA	-0.15	0.78	-0.05	0.69	-0.14	0.52			-0.65	5.02	NMISA	
	DPLA	-0.36	0.67	-0.26	0.57	-0.35	0.33			-0.86	5.01	DPLA	
	CEM	0.02	1.17	0.12	1.11	0.03	1.01			-0.48	5.10	CEM	
	GUM			0.10	0.77	0.01	0.62			-0.50	5.04	GUM	
	METAS	-0.08	0.77			-0.09	0.50			-0.60	5.02	METAS	
2500	NMIJ	-0.04	0.62	0.04	0.50					-0.51	5.00	NMIJ	3000
	KRISS											KRISS	
	LNE	0.41	5.04	0.49	5.02	0.45	5.00					LNE	
	NIM	-0.48	0.78	-0.40	0.69	-0.44	0.52			-0.89	5.02	NIM	
	CENAM	-0.24	1.17	-0.16	1.11	-0.20	1.01			-0.65	5.10	CENAM	
	INMETRO	0.00	0.65	0.08	0.54	0.04	0.28			-0.41	5.01	INMETRO	
	UME	-0.59	1.17	-0.51	1.11	-0.55	1.01			-1.00	5.10	UME	
	VNIIM	-1.16	1.17	-1.08	1.11	-1.12	1.01			-1.57	5.10	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 2500.0 Hz and 3000.0 Hz.

f in Hz	j → / i ↓	NIM (in °)		CENAM (in °)		INMETRO (in °)		UME (in °)		VNIIM (in °)		← j / ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
	PTB mean	0.33	0.71	0.05	1.12	-0.24	0.55	0.23	1.12	1.06	1.12	PTB mean	
	CMI	-0.61	0.71	-0.89	1.12	-1.18	0.55	-0.71	1.12	0.12	1.12	CMI	
	NMISA	0.39	0.71	0.11	1.12	-0.18	0.55	0.29	1.12	1.12	1.12	NMISA	
	DPLA	0.18	0.58	-0.10	1.04	-0.39	0.38	0.08	1.04	0.91	1.04	DPLA	
	CEM	0.56	1.12	0.28	1.41	-0.01	1.03	0.46	1.41	1.29	1.41	CEM	
	GUM	0.54	0.78	0.26	1.17	-0.03	0.65	0.44	1.17	1.27	1.17	GUM	
	METAS	0.44	0.69	0.16	1.11	-0.13	0.54	0.34	1.11	1.17	1.11	METAS	
2500	NMIJ	0.53	0.52	0.25	1.01	-0.04	0.28	0.43	1.01	1.26	1.01	NMIJ	3000
	KRISS											KRISS	
	LNE	1.04	5.02	0.76	5.10	0.47	5.01	0.94	5.10	1.77	5.10	LNE	
	NIM			-0.28	1.12	-0.57	0.55	-0.10	1.12	0.73	1.12	NIM	
	CENAM	0.24	1.12			-0.29	1.03	0.18	1.41	1.01	1.41	CENAM	
	INMETRO	0.48	0.55	0.24	1.03			0.47	1.03	1.30	1.03	INMETRO	
	UME	-0.11	1.12	-0.35	1.41	-0.59	1.03			0.83	1.41	UME	
	VNIIM	-0.68	1.12	-0.92	1.41	-1.16	1.03	-0.57	1.41			VNIIM	

Table 9.56: Bilateral degrees of equivalence for the BB at 3150.0 Hz and 3500.0 Hz.

f	j →	PTB mean		CMI		NMISA		DPLA		CEM		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean			1.07	0.71	-0.10	0.71	0.15	0.58	-0.27	1.12	PTB mean	
	CMI	-1.00	0.71			-1.17	0.71	-0.92	0.58	-1.34	1.12	CMI	
	NMISA	0.06	0.71	1.06	0.71			0.25	0.58	-0.17	1.12	NMISA	
	DPLA	-0.15	0.58	0.85	0.58	-0.21	0.58			-0.42	1.04	DPLA	
	CEM	0.24	1.12	1.24	1.12	0.18	1.12	0.39	1.04			CEM	
	GUM	0.24	0.78	1.24	0.78	0.18	0.78	0.39	0.67	0.00	1.17	GUM	
	METAS	0.12	0.69	1.12	0.69	0.06	0.69	0.27	0.57	-0.12	1.11	METAS	
3150	NMIJ	0.20	0.52	1.20	0.52	0.14	0.52	0.35	0.34	-0.04	1.01	NMIJ	3500
	KRISS											KRISS	
	LNE	0.74	5.02	1.74	5.02	0.68	5.02	0.89	5.01	0.50	5.10	LNE	
	NIM	-0.36	0.71	0.64	0.71	-0.42	0.71	-0.21	0.58	-0.60	1.12	NIM	
	CENAM	-0.03	1.12	0.97	1.12	-0.09	1.12	0.12	1.04	-0.27	1.41	CENAM	
	INMETRO	0.26	0.60	1.26	0.60	0.20	0.60	0.41	0.45	0.02	1.06	INMETRO	
	UME	-0.51	1.12	0.49	1.12	-0.57	1.12	-0.36	1.04	-0.75	1.41	UME	
	VNIIM	-1.11	1.12	-0.11	1.12	-1.17	1.12	-0.96	1.04	-1.35	1.41	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 3150.0 Hz and 3500.0 Hz.

f	j →	GUM		METAS		NMIJ		KRISS		LNE		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean	-0.26	0.78	-0.17	0.69	-0.22	0.53			-0.82	5.02	PTB mean	
	CMI	-1.33	0.78	-1.24	0.69	-1.29	0.53			-1.89	5.02	CMI	
	NMISA	-0.16	0.78	-0.07	0.69	-0.12	0.53			-0.72	5.02	NMISA	
	DPLA	-0.41	0.67	-0.32	0.57	-0.37	0.35			-0.97	5.01	DPLA	
	CEM	0.01	1.17	0.10	1.11	0.05	1.02			-0.55	5.10	CEM	
	GUM			0.09	0.77	0.04	0.63			-0.56	5.04	GUM	
	METAS	-0.12	0.77			-0.05	0.51			-0.65	5.02	METAS	
3150	NMIJ	-0.04	0.62	0.08	0.51					-0.60	5.00	NMIJ	3500
	KRISS											KRISS	
	LNE	0.50	5.04	0.62	5.02	0.54	5.00					LNE	
	NIM	-0.60	0.78	-0.48	0.69	-0.56	0.52			-1.10	5.02	NIM	
	CENAM	-0.27	1.17	-0.15	1.11	-0.23	1.01			-0.77	5.10	CENAM	
	INMETRO	0.02	0.69	0.14	0.59	0.06	0.38			-0.48	5.01	INMETRO	
	UME	-0.75	1.17	-0.63	1.11	-0.71	1.01			-1.25	5.10	UME	
	VNIIM	-1.35	1.17	-1.23	1.11	-1.31	1.01			-1.85	5.10	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 3150.0 Hz and 3500.0 Hz.

f	j →	NIM		CENAM		INMETRO		UME		VNIIM		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean	0.35	0.71	0.01	1.12	-0.25	0.60	0.53	1.12	1.16	1.12	PTB mean	
	CMI	-0.72	0.71	-1.06	1.12	-1.32	0.60	-0.54	1.12	0.09	1.12	CMI	
	NMISA	0.45	0.71	0.11	1.12	-0.15	0.60	0.63	1.12	1.26	1.12	NMISA	
	DPLA	0.20	0.58	-0.14	1.04	-0.40	0.45	0.38	1.04	1.01	1.04	DPLA	
	CEM	0.62	1.12	0.28	1.41	0.02	1.06	0.80	1.41	1.43	1.41	CEM	
	GUM	0.61	0.78	0.27	1.17	0.01	0.69	0.79	1.17	1.42	1.17	GUM	
	METAS	0.52	0.69	0.18	1.11	-0.08	0.59	0.70	1.11	1.33	1.11	METAS	
3150	NMIJ	0.57	0.53	0.23	1.02	-0.03	0.38	0.75	1.02	1.38	1.02	NMIJ	3500
	KRISS											KRISS	
	LNE	1.17	5.02	0.83	5.10	0.57	5.01	1.35	5.10	1.98	5.10	LNE	
	NIM			-0.34	1.12	-0.60	0.60	0.18	1.12	0.81	1.12	NIM	
	CENAM	0.33	1.12			-0.26	1.06	0.52	1.41	1.15	1.41	CENAM	
	INMETRO	0.62	0.60	0.29	1.06			0.78	1.06	1.41	1.06	INMETRO	
	UME	-0.15	1.12	-0.48	1.41	-0.77	1.06			0.63	1.41	UME	
	VNIIM	-0.75	1.12	-1.08	1.41	-1.37	1.06	-0.60	1.41			VNIIM	

Table 9.57: Bilateral degrees of equivalence for the BB at 4000.0 Hz and 4500.0 Hz.

f in Hz	j → i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j ↓ i	f in Hz
		D_{ij}	$u_{D_{ij}}$	D_{ij}	$u_{D_{ij}}$	D_{ij}	$u_{D_{ij}}$	D_{ij}	$u_{D_{ij}}$	D_{ij}	$u_{D_{ij}}$		
		in °		in °		in °		in °		in °			
	PTB mean			1.41	0.71	-0.05	0.71	0.21	0.58	-0.29	1.12	PTB mean	
	CMI	-1.26	0.71			-1.46	0.71	-1.20	0.58	-1.70	1.12	CMI	
	NMISA	0.07	0.71	1.33	0.71			0.26	0.58	-0.24	1.12	NMISA	
	DPLA	-0.17	0.58	1.09	0.58	-0.24	0.58			-0.50	1.04	DPLA	
	CEM	0.28	1.12	1.54	1.12	0.21	1.12	0.45	1.04			CEM	
	GUM	0.30	0.78	1.56	0.78	0.23	0.78	0.47	0.67	0.02	1.17	GUM	
	METAS	0.17	0.69	1.43	0.69	0.10	0.69	0.34	0.57	-0.11	1.11	METAS	
4000	NMIJ	0.21	0.54	1.47	0.54	0.14	0.54	0.38	0.36	-0.07	1.02	NMIJ	4500
	KRISS											KRISS	
	LNE	0.90	5.02	2.16	5.02	0.83	5.02	1.07	5.01	0.62	5.10	LNE	
	NIM	-0.47	0.71	0.79	0.71	-0.54	0.71	-0.30	0.58	-0.75	1.12	NIM	
	CENAM	-0.06	1.12	1.20	1.12	-0.13	1.12	0.11	1.04	-0.34	1.41	CENAM	
	INMETRO	0.32	0.71	1.58	0.71	0.25	0.71	0.49	0.58	0.04	1.12	INMETRO	
	UME	-0.64	1.12	0.62	1.12	-0.71	1.12	-0.47	1.04	-0.92	1.41	UME	
	VNIIM	-1.19	1.12	0.07	1.12	-1.26	1.12	-1.02	1.04	-1.47	1.41	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 4000.0 Hz and 4500.0 Hz.

f in Hz	j → i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j ↓ i	f in Hz
		D_{ij}	$u_{D_{ij}}$	D_{ij}	$u_{D_{ij}}$	D_{ij}	$u_{D_{ij}}$	D_{ij}	$u_{D_{ij}}$	D_{ij}	$u_{D_{ij}}$		
		in °		in °		in °		in °		in °			
	PTB mean	-0.35	0.78	-0.18	0.69	-0.20	0.51			-1.02	5.02	PTB mean	
	CMI	-1.76	0.78	-1.59	0.69	-1.61	0.51			-2.43	5.02	CMI	
	NMISA	-0.30	0.78	-0.13	0.69	-0.15	0.51			-0.97	5.02	NMISA	
	DPLA	-0.56	0.67	-0.39	0.57	-0.41	0.32			-1.23	5.01	DPLA	
	CEM	-0.06	1.17	0.11	1.11	0.09	1.01			-0.73	5.10	CEM	
	GUM			0.17	0.77	0.15	0.61			-0.67	5.04	GUM	
	METAS	-0.13	0.77			-0.02	0.49			-0.84	5.02	METAS	
4000	NMIJ	-0.09	0.63	0.04	0.52					-0.82	5.00	NMIJ	4500
	KRISS											KRISS	
	LNE	0.60	5.04	0.73	5.02	0.69	5.00					LNE	
	NIM	-0.77	0.78	-0.64	0.69	-0.68	0.54			-1.37	5.02	NIM	
	CENAM	-0.36	1.17	-0.23	1.11	-0.27	1.02			-0.96	5.10	CENAM	
	INMETRO	0.02	0.78	0.15	0.69	0.11	0.54			-0.58	5.02	INMETRO	
	UME	-0.94	1.17	-0.81	1.11	-0.85	1.02			-1.54	5.10	UME	
	VNIIM	-1.49	1.17	-1.36	1.11	-1.40	1.02			-2.09	5.10	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 4000.0 Hz and 4500.0 Hz.

f in Hz	j → i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j ↓ i	f in Hz
		D_{ij}	$u_{D_{ij}}$	D_{ij}	$u_{D_{ij}}$	D_{ij}	$u_{D_{ij}}$	D_{ij}	$u_{D_{ij}}$	D_{ij}	$u_{D_{ij}}$		
		in °		in °		in °		in °		in °			
	PTB mean	0.52	0.71	0.09	1.12	-0.32	0.71	0.50	1.12	1.48	1.12	PTB mean	
	CMI	-0.89	0.71	-1.32	1.12	-1.73	0.71	-0.91	1.12	0.07	1.12	CMI	
	NMISA	0.57	0.71	0.14	1.12	-0.27	0.71	0.55	1.12	1.53	1.12	NMISA	
	DPLA	0.31	0.58	-0.12	1.04	-0.53	0.58	0.29	1.04	1.27	1.04	DPLA	
	CEM	0.81	1.12	0.38	1.41	-0.03	1.12	0.79	1.41	1.77	1.41	CEM	
	GUM	0.87	0.78	0.44	1.17	0.03	0.78	0.85	1.17	1.83	1.17	GUM	
	METAS	0.70	0.69	0.27	1.11	-0.14	0.69	0.68	1.11	1.66	1.11	METAS	
4000	NMIJ	0.72	0.51	0.29	1.01	-0.12	0.51	0.70	1.01	1.68	1.01	NMIJ	4500
	KRISS											KRISS	
	LNE	1.54	5.02	1.11	5.10	0.70	5.02	1.52	5.10	2.50	5.10	LNE	
	NIM			-0.43	1.12	-0.84	0.71	-0.02	1.12	0.96	1.12	NIM	
	CENAM	0.41	1.12			-0.41	1.12	0.41	1.41	1.39	1.41	CENAM	
	INMETRO	0.79	0.71	0.38	1.12			0.82	1.12	1.80	1.12	INMETRO	
	UME	-0.17	1.12	-0.58	1.41	-0.96	1.12			0.98	1.41	UME	
	VNIIM	-0.72	1.12	-1.13	1.41	-1.51	1.12	-0.55	1.41			VNIIM	

Table 9.58: Bilateral degrees of equivalence for the BB at 5000.0 Hz and 5500.0 Hz.

f	j →	PTB mean		CMI		NMISA		DPLA		CEM		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean			1.67	0.71	-0.06	0.94	0.26	0.71	-0.33	1.12	PTB mean	
	CMI	-1.53	0.71			-1.73	0.94	-1.41	0.71	-2.00	1.12	CMI	
	NMISA	0.07	0.94	1.60	0.94			0.32	0.94	-0.27	1.28	NMISA	
	DPLA	-0.22	0.58	1.31	0.58	-0.29	0.85			-0.59	1.12	DPLA	
	CEM	0.33	1.12	1.86	1.12	0.26	1.28	0.55	1.04			CEM	
	GUM	0.41	0.94	1.94	0.94	0.34	1.13	0.63	0.85	0.08	1.28	GUM	
	METAS	0.26	0.69	1.79	0.69	0.19	0.93	0.48	0.57	-0.07	1.11	METAS	
5000	NMIJ	0.17	0.51	1.70	0.51	0.10	0.81	0.39	0.32	-0.16	1.01	NMIJ	5500
	KRISS											KRISS	
	LNE	1.16	5.02	2.69	5.02	1.09	5.06	1.38	5.01	0.83	5.10	LNE	
	NIM	-0.59	0.71	0.94	0.71	-0.66	0.94	-0.37	0.58	-0.92	1.12	NIM	
	CENAM	-0.04	1.12	1.49	1.12	-0.11	1.28	0.18	1.04	-0.37	1.41	CENAM	
	INMETRO	0.40	0.71	1.93	0.71	0.33	0.94	0.62	0.58	0.07	1.12	INMETRO	
	UME	-0.68	1.12	0.85	1.12	-0.75	1.28	-0.46	1.04	-1.01	1.41	UME	
	VNIIM	-1.33	1.12	0.20	1.12	-1.40	1.28	-1.11	1.04	-1.66	1.41	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 5000.0 Hz and 5500.0 Hz.

f	j →	GUM		METAS		NMIJ		KRISS		LNE		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean	-0.46	1.12	-0.23	0.99	-0.25	0.51			-1.20	5.02	PTB mean	
	CMI	-2.13	1.12	-1.90	0.99	-1.92	0.51			-2.87	5.02	CMI	
	NMISA	-0.40	1.28	-0.17	1.17	-0.19	0.81			-1.14	5.06	NMISA	
	DPLA	-0.72	1.12	-0.49	0.99	-0.51	0.51			-1.46	5.02	DPLA	
	CEM	-0.13	1.41	0.10	1.32	0.08	1.01			-0.87	5.10	CEM	
	GUM			0.23	1.32	0.21	1.01			-0.74	5.10	GUM	
	METAS	-0.15	0.93			-0.02	0.87			-0.97	5.07	METAS	
5000	NMIJ	-0.24	0.81	-0.09	0.49					-0.95	5.00	NMIJ	5500
	KRISS											KRISS	
	LNE	0.75	5.06	0.90	5.02	0.99	5.00					LNE	
	NIM	-1.00	0.94	-0.85	0.69	-0.76	0.51			-1.75	5.02	NIM	
	CENAM	-0.45	1.28	-0.30	1.11	-0.21	1.01			-1.20	5.10	CENAM	
	INMETRO	-0.01	0.94	0.14	0.69	0.23	0.51			-0.76	5.02	INMETRO	
	UME	-1.09	1.28	-0.94	1.11	-0.85	1.01			-1.84	5.10	UME	
	VNIIM	-1.74	1.28	-1.59	1.11	-1.50	1.01			-2.49	5.10	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 5000.0 Hz and 5500.0 Hz.

f	j →	NIM		CENAM		INMETRO		UME		VNIIM		← j	f
in Hz	i ↓	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	D_{ij} in °	$U_{D_{ij}}$ in °	↓ i	in Hz
	PTB mean	0.64	1.12	0.10	1.12	-0.36	0.94	0.60	1.58	1.73	1.58	PTB mean	
	CMI	-1.03	1.12	-1.57	1.12	-2.03	0.94	-1.07	1.58	0.06	1.58	CMI	
	NMISA	0.70	1.28	0.16	1.28	-0.30	1.13	0.66	1.70	1.79	1.70	NMISA	
	DPLA	0.38	1.12	-0.16	1.12	-0.62	0.94	0.34	1.58	1.47	1.58	DPLA	
	CEM	0.97	1.41	0.43	1.41	-0.03	1.28	0.93	1.80	2.06	1.80	CEM	
	GUM	1.10	1.41	0.56	1.41	0.10	1.28	1.06	1.80	2.19	1.80	GUM	
	METAS	0.87	1.32	0.33	1.32	-0.13	1.17	0.83	1.73	1.96	1.73	METAS	
5000	NMIJ	0.89	1.01	0.35	1.01	-0.11	0.81	0.85	1.50	1.98	1.50	NMIJ	5500
	KRISS											KRISS	
	LNE	1.84	5.10	1.30	5.10	0.84	5.06	1.80	5.22	2.93	5.22	LNE	
	NIM			-0.54	1.41	-1.00	1.28	-0.04	1.80	1.09	1.80	NIM	
	CENAM	0.55	1.12			-0.46	1.28	0.50	1.80	1.63	1.80	CENAM	
	INMETRO	0.99	0.71	0.44	1.12			0.96	1.70	2.09	1.70	INMETRO	
	UME	-0.09	1.12	-0.64	1.41	-1.08	1.12			1.13	2.12	UME	
	VNIIM	-0.74	1.12	-1.29	1.41	-1.73	1.12	-0.65	1.41			VNIIM	

Table 9.59: Bilateral degrees of equivalence for the BB at 6000.0 Hz and 6300.0 Hz.

f in Hz	j → i ↓	PTB mean		CMI		NMISA		DPLA		CEM		← j ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
		in °		in °		in °		in °		in °			
	PTB mean			1.84	0.71	-0.14	0.94	0.27	0.71	-0.42	1.12	PTB mean	
	CMI	-1.97	0.71			-1.98	0.94	-1.57	0.71	-2.26	1.12	CMI	
	NMISA	-0.04	0.94	1.93	0.94			0.41	0.94	-0.28	1.28	NMISA	
	DPLA	-0.41	0.71	1.56	0.71	-0.37	0.94			-0.69	1.12	DPLA	
	CEM	0.24	1.12	2.21	1.12	0.28	1.28	0.65	1.12			CEM	
	GUM	0.35	1.12	2.32	1.12	0.39	1.28	0.76	1.12	0.11	1.41	GUM	
	METAS	0.16	0.99	2.13	0.99	0.20	1.17	0.57	0.99	-0.08	1.32	METAS	
6000	NMIJ	0.17	0.51	2.14	0.51	0.21	0.81	0.58	0.51	-0.07	1.01	NMIJ	6300
	KRISS											KRISS	
	LNE	1.24	5.02	3.21	5.02	1.28	5.06	1.65	5.02	1.00	5.10	LNE	
	NIM	-0.80	1.12	1.17	1.12	-0.76	1.28	-0.39	1.12	-1.04	1.41	NIM	
	CENAM	-0.21	1.12	1.76	1.12	-0.17	1.28	0.20	1.12	-0.45	1.41	CENAM	
	INMETRO	0.25	0.94	2.22	0.94	0.29	1.13	0.66	0.94	0.01	1.28	INMETRO	
	UME	-0.83	1.58	1.14	1.58	-0.79	1.70	-0.42	1.58	-1.07	1.80	UME	
	VNIIM	-1.57	1.58	0.40	1.58	-1.53	1.70	-1.16	1.58	-1.81	1.80	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 6000.0 Hz and 6300.0 Hz.

f in Hz	j → i ↓	GUM		METAS		NMIJ		KRISS		LNE		← j ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
		in °		in °		in °		in °		in °			
	PTB mean	-0.63	1.12	-0.32	0.99	-0.37	0.51			-1.48	5.02	PTB mean	
	CMI	-2.47	1.12	-2.16	0.99	-2.21	0.51			-3.32	5.02	CMI	
	NMISA	-0.49	1.28	-0.18	1.17	-0.23	0.81			-1.34	5.06	NMISA	
	DPLA	-0.90	1.12	-0.59	0.99	-0.64	0.51			-1.75	5.02	DPLA	
	CEM	-0.21	1.41	0.10	1.32	0.05	1.01			-1.06	5.10	CEM	
	GUM			0.31	1.32	0.26	1.01			-0.85	5.10	GUM	
	METAS	-0.19	1.32			-0.05	0.87			-1.16	5.07	METAS	
6000	NMIJ	-0.18	1.01	0.01	0.87					-1.11	5.00	NMIJ	6300
	KRISS											KRISS	
	LNE	0.89	5.10	1.08	5.07	1.07	5.00					LNE	
	NIM	-1.15	1.41	-0.96	1.32	-0.97	1.01			-2.04	5.10	NIM	
	CENAM	-0.56	1.41	-0.37	1.32	-0.38	1.01			-1.45	5.10	CENAM	
	INMETRO	-0.10	1.28	0.09	1.17	0.08	0.81			-0.99	5.06	INMETRO	
	UME	-1.18	1.80	-0.99	1.73	-1.00	1.50			-2.07	5.22	UME	
	VNIIM	-1.92	1.80	-1.73	1.73	-1.74	1.50			-2.81	5.22	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 6000.0 Hz and 6300.0 Hz.

f in Hz	j → i ↓	NIM		CENAM		INMETRO		UME		VNIIM		← j ↓ i	f in Hz
		D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$	D_{ij}	$U_{D_{ij}}$		
		in °		in °		in °		in °		in °			
	PTB mean	0.70	1.12	-0.02	1.12	-0.52	0.94	0.60	1.58	1.46	1.58	PTB mean	
	CMI	-1.14	1.12	-1.86	1.12	-2.36	0.94	-1.24	1.58	-0.38	1.58	CMI	
	NMISA	0.84	1.28	0.12	1.28	-0.38	1.13	0.74	1.70	1.60	1.70	NMISA	
	DPLA	0.43	1.12	-0.29	1.12	-0.79	0.94	0.33	1.58	1.19	1.58	DPLA	
	CEM	1.12	1.41	0.40	1.41	-0.10	1.28	1.02	1.80	1.88	1.80	CEM	
	GUM	1.33	1.41	0.61	1.41	0.11	1.28	1.23	1.80	2.09	1.80	GUM	
	METAS	1.02	1.32	0.30	1.32	-0.20	1.17	0.92	1.73	1.78	1.73	METAS	
6000	NMIJ	1.07	1.01	0.35	1.01	-0.15	0.81	0.97	1.50	1.83	1.50	NMIJ	6300
	KRISS											KRISS	
	LNE	2.18	5.10	1.46	5.10	0.96	5.06	2.08	5.22	2.94	5.22	LNE	
	NIM			-0.72	1.41	-1.22	1.28	-0.10	1.80	0.76	1.80	NIM	
	CENAM	0.59	1.41			-0.50	1.28	0.62	1.80	1.48	1.80	CENAM	
	INMETRO	1.05	1.28	0.46	1.28			1.12	1.70	1.98	1.70	INMETRO	
	UME	-0.03	1.80	-0.62	1.80	-1.08	1.70			0.86	2.12	UME	
	VNIIM	-0.77	1.80	-1.36	1.80	-1.82	1.70	-0.74	2.12			VNIIM	

Table 9.60: Bilateral degrees of equivalence for the BB at 6500.0 Hz and 7000.0 Hz.

f in Hz	j → i ↓	PTB mean D_{ij}	PTB mean $U_{D_{ij}}$	CMI D_{ij}	CMI $U_{D_{ij}}$	NMISA D_{ij}	NMISA $U_{D_{ij}}$	DPLA D_{ij}	DPLA $U_{D_{ij}}$	CEM D_{ij}	CEM $U_{D_{ij}}$	← j ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean			2.20	0.71	-0.12	0.94	0.36	0.71	-0.45	1.12	PTB mean	
	CMI	-2.22	0.71			-2.32	0.94	-1.84	0.71	-2.65	1.12	CMI	
	NMISA	-0.04	0.94	2.18	0.94			0.48	0.94	-0.33	1.28	NMISA	
	DPLA	-0.46	0.71	1.76	0.71	-0.42	0.94			-0.81	1.12	DPLA	
	CEM	0.33	1.12	2.55	1.12	0.37	1.28	0.79	1.12			CEM	
	GUM	0.33	1.12	2.55	1.12	0.37	1.28	0.79	1.12	0.00	1.41	GUM	
	METAS	0.15	0.99	2.37	0.99	0.19	1.17	0.61	0.99	-0.18	1.32	METAS	
6500	NMIJ	0.16	0.51	2.38	0.51	0.20	0.81	0.62	0.51	-0.17	1.01	NMIJ	7000
	KRISS											KRISS	
	LNE	1.37	5.02	3.59	5.02	1.41	5.06	1.83	5.02	1.04	5.10	LNE	
	NIM	-0.92	1.12	1.30	1.12	-0.88	1.28	-0.46	1.12	-1.25	1.41	NIM	
	CENAM	-0.16	1.12	2.06	1.12	-0.12	1.28	0.30	1.12	-0.49	1.41	CENAM	
	INMETRO	0.42	0.94	2.64	0.94	0.46	1.13	0.88	0.94	0.09	1.28	INMETRO	
	UME	-0.81	1.58	1.41	1.58	-0.77	1.70	-0.35	1.58	-1.14	1.80	UME	
	VNIIM	-1.71	1.58	0.51	1.58	-1.67	1.70	-1.25	1.58	-2.04	1.80	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 6500.0 Hz and 7000.0 Hz.

f in Hz	j → i ↓	GUM D_{ij}	GUM $U_{D_{ij}}$	METAS D_{ij}	METAS $U_{D_{ij}}$	NMIJ D_{ij}	NMIJ $U_{D_{ij}}$	KRISS D_{ij}	KRISS $U_{D_{ij}}$	LNE D_{ij}	LNE $U_{D_{ij}}$	← j ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean	-0.57	1.12	-0.35	0.99	-0.37	0.52			-1.50	5.02	PTB mean	
	CMI	-2.77	1.12	-2.55	0.99	-2.57	0.52			-3.70	5.02	CMI	
	NMISA	-0.45	1.28	-0.23	1.17	-0.25	0.81			-1.38	5.06	NMISA	
	DPLA	-0.93	1.12	-0.71	0.99	-0.73	0.52			-1.86	5.02	DPLA	
	CEM	-0.12	1.41	0.10	1.32	0.08	1.01			-1.05	5.10	CEM	
	GUM			0.22	1.32	0.20	1.01			-0.93	5.10	GUM	
	METAS	-0.18	1.32			-0.02	0.87			-1.15	5.07	METAS	
6500	NMIJ	-0.17	1.01	0.01	0.87					-1.13	5.00	NMIJ	7000
	KRISS											KRISS	
	LNE	1.04	5.10	1.22	5.07	1.21	5.00					LNE	
	NIM	-1.25	1.41	-1.07	1.32	-1.08	1.01			-2.29	5.10	NIM	
	CENAM	-0.49	1.41	-0.31	1.32	-0.32	1.01			-1.53	5.10	CENAM	
	INMETRO	0.09	1.28	0.27	1.17	0.26	0.81			-0.95	5.06	INMETRO	
	UME	-1.14	1.80	-0.96	1.73	-0.97	1.50			-2.18	5.22	UME	
	VNIIM	-2.04	1.80	-1.86	1.73	-1.87	1.50			-3.08	5.22	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 6500.0 Hz and 7000.0 Hz.

f in Hz	j → i ↓	NIM D_{ij}	NIM $U_{D_{ij}}$	CENAM D_{ij}	CENAM $U_{D_{ij}}$	INMETRO D_{ij}	INMETRO $U_{D_{ij}}$	UME D_{ij}	UME $U_{D_{ij}}$	VNIIM D_{ij}	VNIIM $U_{D_{ij}}$	← j ↓ i	f in Hz
		in °		in °		in °		in °		in °			
	PTB mean	0.78	1.12	0.05	1.12	-0.58	0.94	1.00	1.58	1.66	1.58	PTB mean	
	CMI	-1.42	1.12	-2.15	1.12	-2.78	0.94	-1.20	1.58	-0.54	1.58	CMI	
	NMISA	0.90	1.28	0.17	1.28	-0.46	1.13	1.12	1.70	1.78	1.70	NMISA	
	DPLA	0.42	1.12	-0.31	1.12	-0.94	0.94	0.64	1.58	1.30	1.58	DPLA	
	CEM	1.23	1.41	0.50	1.41	-0.13	1.28	1.45	1.80	2.11	1.80	CEM	
	GUM	1.35	1.41	0.62	1.41	-0.01	1.28	1.57	1.80	2.23	1.80	GUM	
	METAS	1.13	1.32	0.40	1.32	-0.23	1.17	1.35	1.73	2.01	1.73	METAS	
6500	NMIJ	1.15	1.01	0.42	1.01	-0.21	0.81	1.37	1.51	2.03	1.51	NMIJ	7000
	KRISS											KRISS	
	LNE	2.28	5.10	1.55	5.10	0.92	5.06	2.50	5.22	3.16	5.22	LNE	
	NIM			-0.73	1.41	-1.36	1.28	0.22	1.80	0.88	1.80	NIM	
	CENAM	0.76	1.41			-0.63	1.28	0.95	1.80	1.61	1.80	CENAM	
	INMETRO	1.34	1.28	0.58	1.28			1.58	1.70	2.24	1.70	INMETRO	
	UME	0.11	1.80	-0.65	1.80	-1.23	1.70			0.66	2.12	UME	
	VNIIM	-0.79	1.80	-1.55	1.80	-2.13	1.70	-0.90	2.12			VNIIM	

Table 9.61: Bilateral degrees of equivalence for the BB at 7500.0 Hz and 8000.0 Hz.

f in Hz	j → i ↓	PTB mean D_{ij} in °	PTB mean $U_{D_{ij}}$ in °	CMI D_{ij} in °	CMI $U_{D_{ij}}$ in °	NMISA D_{ij} in °	NMISA $U_{D_{ij}}$ in °	DPLA D_{ij} in °	DPLA $U_{D_{ij}}$ in °	CEM D_{ij} in °	CEM $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean			2.56	0.71	0.08	0.94	0.43	1.12	-0.31	1.12	PTB mean	
	CMI	-2.28	0.71			-2.48	0.94	-2.13	1.12	-2.87	1.12	CMI	
	NMISA	0.07	0.94	2.35	0.94			0.35	1.28	-0.39	1.28	NMISA	
	DPLA	-0.42	1.12	1.86	1.12	-0.49	1.28			-0.74	1.41	DPLA	
	CEM	0.40	1.12	2.68	1.12	0.33	1.28	0.82	1.41			CEM	
	GUM	0.50	1.12	2.78	1.12	0.43	1.28	0.92	1.41	0.10	1.41	GUM	
	METAS	0.35	0.99	2.63	0.99	0.28	1.17	0.77	1.32	-0.05	1.32	METAS	
7500	NMIJ	0.35	0.52	2.63	0.52	0.28	0.81	0.77	1.01	-0.05	1.01	NMIJ	8000
	KRISS											KRISS	
	LNE	1.74	5.02	4.02	5.02	1.67	5.06	2.16	5.10	1.34	5.10	LNE	
	NIM	-0.80	1.12	1.48	1.12	-0.87	1.28	-0.38	1.41	-1.20	1.41	NIM	
	CENAM	-0.05	1.12	2.23	1.12	-0.12	1.28	0.37	1.41	-0.45	1.41	CENAM	
	INMETRO	0.56	1.12	2.84	1.12	0.49	1.28	0.98	1.41	0.16	1.41	INMETRO	
	UME	-0.92	1.58	1.36	1.58	-0.99	1.70	-0.50	1.80	-1.32	1.80	UME	
	VNIIM	-1.87	1.58	0.41	1.58	-1.94	1.70	-1.45	1.80	-2.27	1.80	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 7500.0 Hz and 8000.0 Hz.

f in Hz	j → i ↓	GUM D_{ij} in °	GUM $U_{D_{ij}}$ in °	METAS D_{ij} in °	METAS $U_{D_{ij}}$ in °	NMIJ D_{ij} in °	NMIJ $U_{D_{ij}}$ in °	KRISS D_{ij} in °	KRISS $U_{D_{ij}}$ in °	LNE D_{ij} in °	LNE $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean	-0.57	1.12	-0.63	1.17	-0.48	0.51			-1.87	5.02	PTB mean	
	CMI	-3.13	1.12	-3.19	1.17	-3.04	0.51			-4.43	5.02	CMI	
	NMISA	-0.65	1.28	-0.71	1.33	-0.56	0.81			-1.95	5.06	NMISA	
	DPLA	-1.00	1.41	-1.06	1.46	-0.91	1.01			-2.30	5.10	DPLA	
	CEM	-0.26	1.41	-0.32	1.46	-0.17	1.01			-1.56	5.10	CEM	
	GUM			-0.06	1.46	0.09	1.01			-1.30	5.10	GUM	
	METAS	-0.15	1.32			0.15	1.07			-1.24	5.11	METAS	
7500	NMIJ	-0.15	1.01	-0.00	0.87					-1.39	5.00	NMIJ	8000
	KRISS											KRISS	
	LNE	1.24	5.10	1.39	5.07	1.39	5.00					LNE	
	NIM	-1.30	1.41	-1.15	1.32	-1.15	1.01			-2.54	5.10	NIM	
	CENAM	-0.55	1.41	-0.40	1.32	-0.40	1.01			-1.79	5.10	CENAM	
	INMETRO	0.06	1.41	0.21	1.32	0.21	1.01			-1.18	5.10	INMETRO	
	UME	-1.42	1.80	-1.27	1.73	-1.27	1.51			-2.66	5.22	UME	
	VNIIM	-2.37	1.80	-2.22	1.73	-2.22	1.51			-3.61	5.22	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 7500.0 Hz and 8000.0 Hz.

f in Hz	j → i ↓	NIM D_{ij} in °	NIM $U_{D_{ij}}$ in °	CENAM D_{ij} in °	CENAM $U_{D_{ij}}$ in °	INMETRO D_{ij} in °	INMETRO $U_{D_{ij}}$ in °	UME D_{ij} in °	UME $U_{D_{ij}}$ in °	VNIIM D_{ij} in °	VNIIM $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean	0.76	1.12	0.04	1.12	-0.73	1.12	1.27	1.58	2.31	1.58	PTB mean	
	CMI	-1.80	1.12	-2.52	1.12	-3.29	1.12	-1.29	1.58	-0.25	1.58	CMI	
	NMISA	0.68	1.28	-0.04	1.28	-0.81	1.28	1.19	1.70	2.23	1.70	NMISA	
	DPLA	0.33	1.41	-0.39	1.41	-1.16	1.41	0.84	1.80	1.88	1.80	DPLA	
	CEM	1.07	1.41	0.35	1.41	-0.42	1.41	1.58	1.80	2.62	1.80	CEM	
	GUM	1.33	1.41	0.61	1.41	-0.16	1.41	1.84	1.80	2.88	1.80	GUM	
	METAS	1.39	1.46	0.67	1.46	-0.10	1.46	1.90	1.84	2.94	1.84	METAS	
7500	NMIJ	1.24	1.01	0.52	1.01	-0.25	1.01	1.75	1.50	2.79	1.50	NMIJ	8000
	KRISS											KRISS	
	LNE	2.63	5.10	1.91	5.10	1.14	5.10	3.14	5.22	4.18	5.22	LNE	
	NIM			-0.72	1.41	-1.49	1.41	0.51	1.80	1.55	1.80	NIM	
	CENAM	0.75	1.41			-0.77	1.41	1.23	1.80	2.27	1.80	CENAM	
	INMETRO	1.36	1.41	0.61	1.41			2.00	1.80	3.04	1.80	INMETRO	
	UME	-0.12	1.80	-0.87	1.80	-1.48	1.80			1.04	2.12	UME	
	VNIIM	-1.07	1.80	-1.82	1.80	-2.43	1.80	-0.95	2.12			VNIIM	

Table 9.62: Bilateral degrees of equivalence for the BB at 8500.0 Hz and 9000.0 Hz.

f in Hz	j → i ↓	PTB mean D_{ij} in °	PTB mean $U_{D_{ij}}$ in °	CMI D_{ij} in °	CMI $U_{D_{ij}}$ in °	NMISA D_{ij} in °	NMISA $U_{D_{ij}}$ in °	DPLA D_{ij} in °	DPLA $U_{D_{ij}}$ in °	CEM D_{ij} in °	CEM $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean			2.89	0.71	-0.84	0.94	0.45	1.12	-0.53	1.12	PTB mean	
	CMI	-2.64	0.71			-3.73	0.94	-2.44	1.12	-3.42	1.12	CMI	
	NMISA	-0.08	0.94	2.56	0.94			1.29	1.28	0.31	1.28	NMISA	
	DPLA	-0.46	1.12	2.18	1.12	-0.38	1.28			-0.98	1.41	DPLA	
	CEM	0.46	1.12	3.10	1.12	0.54	1.28	0.92	1.41			CEM	
	GUM	0.48	1.12	3.12	1.12	0.56	1.28	0.94	1.41	0.02	1.41	GUM	
	METAS	0.16	1.17	2.80	1.17	0.24	1.33	0.62	1.46	-0.30	1.46	METAS	
8500	NMIJ	0.40	0.51	3.04	0.51	0.48	0.81	0.86	1.01	-0.06	1.01	NMIJ	9000
	KRISS											KRISS	
	LNE	2.01	5.02	4.65	5.02	2.09	5.06	2.47	5.10	1.55	5.10	LNE	
	NIM	-0.79	1.12	1.85	1.12	-0.71	1.28	-0.33	1.41	-1.25	1.41	NIM	
	CENAM	-0.03	1.12	2.61	1.12	0.05	1.28	0.43	1.41	-0.49	1.41	CENAM	
	INMETRO	0.91	1.12	3.55	1.12	0.99	1.28	1.37	1.41	0.45	1.41	INMETRO	
	UME	-1.37	1.58	1.27	1.58	-1.29	1.70	-0.91	1.80	-1.83	1.80	UME	
	VNIIM	-2.12	1.58	0.52	1.58	-2.04	1.70	-1.66	1.80	-2.58	1.80	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 8500.0 Hz and 9000.0 Hz.

f in Hz	j → i ↓	GUM D_{ij} in °	GUM $U_{D_{ij}}$ in °	METAS D_{ij} in °	METAS $U_{D_{ij}}$ in °	NMIJ D_{ij} in °	NMIJ $U_{D_{ij}}$ in °	KRISS D_{ij} in °	KRISS $U_{D_{ij}}$ in °	LNE D_{ij} in °	LNE $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean	-0.51	1.12	-0.40	1.17	-0.44	0.51			-2.10	5.02	PTB mean	
	CMI	-3.40	1.12	-3.29	1.17	-3.33	0.51			-4.99	5.02	CMI	
	NMISA	0.33	1.28	0.44	1.33	0.40	0.81			-1.26	5.06	NMISA	
	DPLA	-0.96	1.41	-0.85	1.46	-0.89	1.01			-2.55	5.10	DPLA	
	CEM	0.02	1.41	0.13	1.46	0.09	1.01			-1.57	5.10	CEM	
	GUM			0.11	1.46	0.07	1.01			-1.59	5.10	GUM	
	METAS	-0.32	1.46			-0.04	1.07			-1.70	5.11	METAS	
8500	NMIJ	-0.08	1.01	0.24	1.07					-1.66	5.00	NMIJ	9000
	KRISS											KRISS	
	LNE	1.53	5.10	1.85	5.11	1.61	5.00					LNE	
	NIM	-1.27	1.41	-0.95	1.46	-1.19	1.01			-2.80	5.10	NIM	
	CENAM	-0.51	1.41	-0.19	1.46	-0.43	1.01			-2.04	5.10	CENAM	
	INMETRO	0.43	1.41	0.75	1.46	0.51	1.01			-1.10	5.10	INMETRO	
	UME	-1.85	1.80	-1.53	1.84	-1.77	1.50			-3.38	5.22	UME	
	VNIIM	-2.60	1.80	-2.28	1.84	-2.52	1.50			-4.13	5.22	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 8500.0 Hz and 9000.0 Hz.

f in Hz	j → i ↓	NIM D_{ij} in °	NIM $U_{D_{ij}}$ in °	CENAM D_{ij} in °	CENAM $U_{D_{ij}}$ in °	INMETRO D_{ij} in °	INMETRO $U_{D_{ij}}$ in °	UME D_{ij} in °	UME $U_{D_{ij}}$ in °	VNIIM D_{ij} in °	VNIIM $U_{D_{ij}}$ in °	← j ↓ i	f in Hz
	PTB mean	0.83	1.12	0.06	1.12	-0.40	1.12	1.28	1.58	4.09	1.58	PTB mean	
	CMI	-2.06	1.12	-2.83	1.12	-3.29	1.12	-1.61	1.58	1.20	1.58	CMI	
	NMISA	1.67	1.28	0.90	1.28	0.44	1.28	2.12	1.70	4.93	1.70	NMISA	
	DPLA	0.38	1.41	-0.39	1.41	-0.85	1.41	0.83	1.80	3.64	1.80	DPLA	
	CEM	1.36	1.41	0.59	1.41	0.13	1.41	1.81	1.80	4.62	1.80	CEM	
	GUM	1.34	1.41	0.57	1.41	0.11	1.41	1.79	1.80	4.60	1.80	GUM	
	METAS	1.23	1.46	0.46	1.46	0.00	1.46	1.68	1.84	4.49	1.84	METAS	
8500	NMIJ	1.27	1.01	0.50	1.01	0.04	1.01	1.72	1.50	4.53	1.50	NMIJ	9000
	KRISS											KRISS	
	LNE	2.93	5.10	2.16	5.10	1.70	5.10	3.38	5.22	6.19	5.22	LNE	
	NIM			-0.77	1.41	-1.23	1.41	0.45	1.80	3.26	1.80	NIM	
	CENAM	0.76	1.41			-0.46	1.41	1.22	1.80	4.03	1.80	CENAM	
	INMETRO	1.70	1.41	0.94	1.41			1.68	1.80	4.49	1.80	INMETRO	
	UME	-0.58	1.80	-1.34	1.80	-2.28	1.80			2.81	2.12	UME	
	VNIIM	-1.33	1.80	-2.09	1.80	-3.03	1.80	-0.75	2.12			VNIIM	

Table 9.63: Bilateral degrees of equivalence for the BB at 9500.0 Hz and 10000.0 Hz.

f in Hz	j → / i ↓	PTB mean D_{ij} in °	$u_{D_{ij}}$	CMI D_{ij} in °	$u_{D_{ij}}$	NMISA D_{ij} in °	$u_{D_{ij}}$	DPLA D_{ij} in °	$u_{D_{ij}}$	CEM D_{ij} in °	$u_{D_{ij}}$	← j / ↓ i	f in Hz
	PTB mean			3.15	0.71	-0.19	0.94	0.36	1.12	-1.23	2.06	PTB mean	
	CMI	-2.98	0.71			-3.34	0.94	-2.79	1.12	-4.38	2.06	CMI	
	NMISA	0.87	0.94	3.85	0.94			0.55	1.28	-1.04	2.15	NMISA	
	DPLA	-0.44	1.12	2.54	1.12	-1.31	1.28			-1.59	2.24	DPLA	
	CEM	0.51	1.12	3.49	1.12	-0.36	1.28	0.95	1.41			CEM	
	GUM	0.69	1.12	3.67	1.12	-0.18	1.28	1.13	1.41	0.18	1.41	GUM	
	METAS	0.58	1.19	3.56	1.19	-0.29	1.34	1.02	1.47	0.07	1.47	METAS	
9500	NMIJ	0.46	0.51	3.44	0.51	-0.41	0.81	0.90	1.01	-0.05	1.01	NMIJ	10000
	KRISS											KRISS	
	LNE	2.23	5.02	5.21	5.02	1.36	5.06	2.67	5.10	1.72	5.10	LNE	
	NIM	-0.82	1.12	2.16	1.12	-1.69	1.28	-0.38	1.41	-1.33	1.41	NIM	
	CENAM	0.01	1.12	2.99	1.12	-0.86	1.28	0.45	1.41	-0.50	1.41	CENAM	
	INMETRO	0.66	1.12	3.64	1.12	-0.21	1.28	1.10	1.41	0.15	1.41	INMETRO	
	UME	-1.07	1.58	1.91	1.58	-1.94	1.70	-0.63	1.80	-1.58	1.80	UME	
	VNIIM	-2.73	1.58	0.25	1.58	-3.60	1.70	-2.29	1.80	-3.24	1.80	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 9500.0 Hz and 10000.0 Hz.

f in Hz	j → / i ↓	GUM D_{ij} in °	$u_{D_{ij}}$	METAS D_{ij} in °	$u_{D_{ij}}$	NMIJ D_{ij} in °	$u_{D_{ij}}$	KRISS D_{ij} in °	$u_{D_{ij}}$	LNE D_{ij} in °	$u_{D_{ij}}$	← j / ↓ i	f in Hz
	PTB mean	-0.71	1.12	-0.43	1.87	-0.64	0.51			-2.34	5.02	PTB mean	
	CMI	-3.86	1.12	-3.58	1.87	-3.79	0.51			-5.49	5.02	CMI	
	NMISA	-0.52	1.28	-0.24	1.97	-0.45	0.81			-2.15	5.06	NMISA	
	DPLA	-1.07	1.41	-0.79	2.06	-1.00	1.01			-2.70	5.10	DPLA	
	CEM	0.52	2.24	0.80	2.69	0.59	2.00			-1.11	5.39	CEM	
	GUM			0.28	2.06	0.07	1.01			-1.63	5.10	GUM	
	METAS	-0.11	1.47			-0.21	1.80			-1.91	5.31	METAS	
9500	NMIJ	-0.23	1.01	-0.12	1.09					-1.70	5.00	NMIJ	10000
	KRISS											KRISS	
	LNE	1.54	5.10	1.65	5.12	1.77	5.00					LNE	
	NIM	-1.51	1.41	-1.40	1.47	-1.28	1.01			-3.05	5.10	NIM	
	CENAM	-0.68	1.41	-0.57	1.47	-0.45	1.01			-2.22	5.10	CENAM	
	INMETRO	-0.03	1.41	0.08	1.47	0.20	1.01			-1.57	5.10	INMETRO	
	UME	-1.76	1.80	-1.65	1.85	-1.53	1.50			-3.30	5.22	UME	
	VNIIM	-3.42	1.80	-3.31	1.85	-3.19	1.50			-4.96	5.22	VNIIM	

(continued) Bilateral degrees of equivalence for the BB at 9500.0 Hz and 10000.0 Hz.

f in Hz	j → / i ↓	NIM D_{ij} in °	$u_{D_{ij}}$	CENAM D_{ij} in °	$u_{D_{ij}}$	INMETRO D_{ij} in °	$u_{D_{ij}}$	UME D_{ij} in °	$u_{D_{ij}}$	VNIIM D_{ij} in °	$u_{D_{ij}}$	← j / ↓ i	f in Hz
	PTB mean	1.09	1.12	-0.03	1.12	-0.77	1.12	1.59	1.58	3.40	1.58	PTB mean	
	CMI	-2.06	1.12	-3.18	1.12	-3.92	1.12	-1.56	1.58	0.25	1.58	CMI	
	NMISA	1.28	1.28	0.16	1.28	-0.58	1.28	1.78	1.70	3.59	1.70	NMISA	
	DPLA	0.73	1.41	-0.39	1.41	-1.13	1.41	1.23	1.80	3.04	1.80	DPLA	
	CEM	2.32	2.24	1.20	2.24	0.46	2.24	2.82	2.50	4.63	2.50	CEM	
	GUM	1.80	1.41	0.68	1.41	-0.06	1.41	2.30	1.80	4.11	1.80	GUM	
	METAS	1.52	2.06	0.40	2.06	-0.34	2.06	2.02	2.34	3.83	2.34	METAS	
9500	NMIJ	1.73	1.01	0.61	1.01	-0.13	1.01	2.23	1.50	4.04	1.50	NMIJ	10000
	KRISS											KRISS	
	LNE	3.43	5.10	2.31	5.10	1.57	5.10	3.93	5.22	5.74	5.22	LNE	
	NIM			-1.12	1.41	-1.86	1.41	0.50	1.80	2.31	1.80	NIM	
	CENAM	0.83	1.41			-0.74	1.41	1.62	1.80	3.43	1.80	CENAM	
	INMETRO	1.48	1.41	0.65	1.41			2.36	1.80	4.17	1.80	INMETRO	
	UME	-0.25	1.80	-1.08	1.80	-1.73	1.80			1.81	2.12	UME	
	VNIIM	-1.91	1.80	-2.74	1.80	-3.39	1.80	-1.66	2.12			VNIIM	

10 — Conclusion

The CCAUV.V-K2 key comparison reported here was planned to be a repetition and extension of the former CCAUV.V-K1 from the year 2001. It was supposed to provide the basis for international comparability within the framework of the CIPM-MRA in the field of vibration for magnitude and phase of the complex sensitivity of accelerometers. The frequency range was adapted to the scope currently implemented in many NMIs and required by industry on a global scale.

According to the different modes of calibration an emphasis was placed on the use of single-ended as well as back-to-back types of transducers. Unfortunately, we had to realise during the comparison measurements and the analysis that the measurements suffered from non-negligible complications, as there was:

- an unexpected instability of the back-to-back transducer, which made a magnitude evaluation unfeasible, and
- a formerly unnoticed material dependency of the single-ended calibration results, which had to be taken into account for the KC-RV.

These issues lead to some serious consequences for both the analysis of the KC-results as well as their applicability for supporting both currently approved CMCs and subsequent CMC submissions.

CMC entries are supposed to represent the best measurement uncertainty a laboratory is able to provide on a calibration for a customer under optimal conditions with the most appropriate available device under test. The planning of the KC was done in order to comply with the "best conditions, best artefacts" assumption. However, based on current knowledge only the back-to-back transducer would have provided best conditions for most frequencies in the scope of this KC, but unfortunately it was not stable. The single-ended model does not provide best conditions for a comparison in the way it was used according to the technical protocol, as we know now, because we had to add a substantial systematic uncertainty component in order to take account of the dependency on the shaker armature material. A different approach to mount this kind of sensor is now being considered to solve the issue for Key Comparisons in the future.

As a consequence this KC does not provide optimal data for the support of the CIPM-MRA. In particular subsequent CMC-claims with uncertainties smaller than the reported unilateral DoE will have to be considered individually based on technical evidence. Such claims are feasible under certain conditions but, unfortunately, cannot be supported by the results of CCAUV.V-K2.

Additional technical requirements and mounting precautions in future protocols of KCs would have to consider proper ways for minimizing the now known sources of problems, which limit the capability of comparability between NMIs. Further investigations are currently being performed and will probably lead to an improvement for subsequent comparisons.

Bibliography

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Appendix A: — Technical Protocol

Technical Protocol of the CIPM Key Comparison

CCAUV.V-K2

2009-07-09

Task and Purpose of the Comparison

According to the rules set up by the CIPM MRA the consultative committees of the CIPM have the responsibility to establish “degrees of equivalence” (DoE) between the different measurement standards operated by the national NMIs. This is done by conducting key comparisons (KC) on different levels of the international metrological infrastructure. The previous top level KC in the field of Vibration metrology, CCAUV.V-K1 was finished in the year 2001 and it's results have since been then the foundation of all subsequently established DoE in the field.

However, over the last years, developments in technology and improvements at the NMIs expanded the general range of the calibration capabilities currently available. Therefore during the meeting of CCAUV in 2008 the decision was taken to make preparations for a further KC with an appropriately extended measurement range.

The results of this KC will, after approval for equivalence, form the new basis for DoE derived in subsequent RMO key comparisons, and therefore be the foundation for the registration of “calibration and measurement capabilities” (CMC) in the framework of the CIPM MRA.

The specific task of the KC is to measure the complex charge sensitivity of two different accelerometers at specified frequencies with primary means *I.e.* according to ISO 16063-11 “Methods for the calibration of vibration and shock transducers -- Part 11: Primary vibration calibration by laser interferometry”.

The reported sensitivities and associated uncertainties are then supposed to be used for the calculation of the DoE between the participating NMI and the key comparison reference value.

Pilot Laboratory

Pilot laboratory for this Key Comparison is

Physikalisch-Technische Bundesanstalt (PTB)
Working Group Acceleration
Bundesallee 100
38116 Braunschweig
Germany

This is the delivery address for the set of artefacts and the written and signed reports. Contact Persons are

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Devices under Test and Measurement Conditions

For the calibration task of this KC a set of two piezoelectric accelerometers will be circulated among the participating laboratories. The individual transducers being a “single ended” (SE) type, namely a Brüel & Kjær 8305-001 (SN: 2571390), and a “back to back” (BB) type, namely a Brüel & Kjær 8305 S (SN: 2602106).

The accelerometers are to be calibrated for magnitude and phase of their complex charge sensitivity according to those procedures and conditions implemented by the NMI in conformance with ISO 16063-11 which provide magnitude and phase information of the artefact. The sensitivities reported shall be for the accelerometers alone, excluding any effects from the charge amplifier.

The frequency range of the measurements was agreed to be from 10 Hz to 10 kHz. Specifically the laboratories are supposed to measure at the following frequencies (all values in Hz).

10, 12.5, 16, 20, 25, 31.5, 40, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1500, 1600, 2000, 2500, 3000, 3150, 3500, 4000, 4500, 5000, 5500, 6000, 6300, 6500, 7000, 7500, 8000, 8500, 9000, 9500, 10000.

Note: *this set does deviate from the standard frequencies of ISO 266*.

The participating laboratories should be able to provide magnitude results over the whole frequency range with their systems and to provide phase results for the majority of the specified frequencies.

The charge amplifier (CA) used for the calibration is not provided within the set of the artefacts, it must therefore be provided by the individual participant.

The measurement condition should be kept according to the laboratory's standard conditions for calibration of customer accelerometers for claiming their best measurement capability or CMC where applicable. This presumes that these conditions comply with those defined by the applicable ISO documentary standards [1,2,3], simultaneously.

Specific conditions for the measurements of this KC are:

- acceleration amplitudes: preferably 50 m/s² to 100 m/s²
  a range of 2 m/s² to 200 m/s² is admissible.
- ambient temperature and accelerometer temperature during the calibration: (23 ± 2)ºC (actual values to be stated within tolerances of ± 0.3ºC). The accelerometer temperature should be measured and reported.
- relative humidity: max. 75 %
- mounting torque of the accelerometer: (2.0 ± 0.1) N·m

Circulation Type, Schedule and Transportation

The transducers are circulated in a star type fashion with a measurement period of two weeks provided for each participant. In between two subsequent measurements at any participants laboratory the transducers are measured at the pilot lab in order to monitor the long term stability.

The schedule is planned as follows:

Participant	Transportation to Participant (calendar week)	Measurement (calendar week)	Transportation to Pilot (calendar week)	Monitoring measurements (calendar week)
CMI	37/2009	38-39/2009	40/2009	41-45/2009
NMISA	43/2009	44-45/2009	46/2009	47-51/2009
DPLA	49/2009	50-51/2009	52-53/2009	03.07.10
CEM	04/2010	05-06/2010	07/2010	08-12/2010
GUM	10/2010	11-12/2010	13/2010	14-18/2010
UME	16/2010	17-18/2010	19/2010	20-24/2010
AIST/NMIJ	22/2010	23-24/2010	25/2010	26-30/2010
METAS	28/2010	29-30/2010	31/2010	32-36/2010
KRISS	34/2010	35-36/2010	37/2010	38-42/2010
LNE	40/2010	41-42/2010	43/2010	44-48/2010
NIM	46/2010	47-48/2010	49/2010	50-02/2011
CENAM	01/2011	02-03/2011	04/2011	05-09/2011
INMETRO	10/2011	11-12/2011	12/2011	13-17/2011
VNIIM	18-19/2011	20-21/2011	22-23/2011	24-28/2011

The cost of transportation to and from a participating laboratory shall be covered by the participating laboratory.
The accelerometers have to be send by an international logistic service providing a tracking system. The transportation has to include an insurance covering a value of 9 000,- € in case the set of accelerometers gets damaged or lost during transportation.
As an alternative the artefact may be hand carried by a member of the participating laboratory.

Measurement and Analysis Instructions

The participating laboratories have to observe the following instructions:

- The charge amplifier used for the measurement of the accelerometer's response has to be calibrated with equipment traceable to national measurement standards.
- The motion of the BB accelerometer should be measured with the laser directly on the (polished) top surface of the transducer ***without any additional reflector or dummy mass***.
- The motion of the SE accelerometer should be measured on the moving part of the vibration exciter, close to the accelerometer's mounting surface, since the mounting (reference) surface is usually not directly accessible.
- The mounting surface of the accelerometer and the moving part of the exciter must be slightly lubricated before mounting.
- The cable between accelerometer and charge amplifier should be taken from the set of DUT delivered to the laboratory.
- In order to reduce the influence of non-rectilinear motion, the measurements should

be performed for at least three different laser positions which are symmetrically distributed over the respective measurement surface.

- It is advised that the measurement results should be compiled from complete measurement series carried out at different days under nominally the same conditions, except that the accelerometer is remounted and the cable reattached. The standard deviation of the subsequent measurements should be included in the report.
- For acceleration signals $a(t)$ of the form
  $$a(t)=\hat{a}\cdot\cos(\omega t+\varphi_a) \qquad (1)$$
  and the respective charge output signal of the transducer $q(t)$ of the form
  $$q(t)=\hat{q}\cdot\cos(\omega t+\varphi_q) \qquad (2)$$
  the phase is defined according to ISO 16063-1 as
  $$\Delta\varphi = \varphi_q-\varphi_a\,. \qquad (3)$$
- For the measurement of the phase of the sensitivity the delay or phase characteristics of the interferometer channel(s) has to be taken into account, since the photo-diode-amplifier-system typically has a non-negligible influence on the result.

Communication of the Results to the Pilot Laboratory

Each participating laboratory will submit one printed and signed calibration report for each accelerometer to the pilot laboratory including the following:

- a description of the calibration systems used for the comparison and the mounting techniques for the accelerometer
- a description of the calibration methods used
- documented record of the ambient conditions during measurements
- the calibration results, including the relative expanded measurement uncertainty, and the applied coverage factor for each value
- a detailed uncertainty budget for the system covering all components of measurement uncertainty (calculated according to GUM, [4, 5]). Including among others information on the type of uncertainty (A or B), assumed distribution function and repeatability component. (These information are necessary for the evaluation and linking of subsequent RMO KC)

In addition each participating laboratory will receive two electronic spreadsheets prepared by the pilot laboratory, where the calibration results have to be filled in following the structure given in the files. The use of the electronic spreadsheets for reporting is **mandatory**, the consistency between the results in electronic form and the printed and signed calibration report is the responsibility of the participating laboratory. The data submitted in the electronic spreadsheet shall be deemed the official results submitted for the comparison.

The results have to be submitted to the pilot laboratory within six weeks after the measurements.

The pilot laboratory will submit it's set of results to the executive secretary of CCAUV in advance to the first measurement of a participating laboratory.

Remarks on the Post Processing

- Since it was generally agreed that the chosen accelerometers were not the optimal choice as “best device under test” (DUT) for the frequencies below 40 Hz, an additional uncertainty component, attributed to the DUT, will be added to the measurement uncertainties for those frequencies prior to the evaluation of comparison results. This is supposed to cover the influence of the possible electrostrictive or tribo-electric effect of cable motion. This processing will be performed by the pilot laboratory during data analysis, **this component is not to be included in the participant's uncertainty budget**.
- Presuming consistency of the results, the key comparison reference value and the degrees of equivalence will be calculated according to the established methods as a weighted mean as agreed upon already for CCAUV.V-K1.
- In case of damage or loss of any of the artefacts the KC will be evaluated as far in the schedule as possible, all further action concerning continuation will be decided in coordination with the participants.

References

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Acknowledgement

The Artefacts were kindly committed by Brüel & Kjær to the pilot lab for the purpose of this comparison. They are especially selected from a larger production sample intended to provide the quality of “best measurement standards” in terms of the CIPM MRA.

Appendix B: — Monitoring Measurements

For the monitoring of the stability of the artefacts only the magnitude of sensitivity was considered. In the subsequent sections the results of these monitoring measurements are tabulated. Some graphical representations were already given in section 6. The applicable measurement uncertainty can be taken from the tabulated results of the pilot laboratory (PTB).

B.1 Magnitude of the SE

(see next pages)

Table B.1: Monitoring results for the SE accelerometer on the Bouche shaker (beryllium armature).

Week	0	6	12	20	26	33	38	44	51	62	71	77	87	97	107	124	126
Frequency in Hz	Sqa pC/(m/s^2)	Sqa pC/(m/s^2)	Sqa pC/(m/s^2)	Sqa pC/(m/s^2)	Sqa pC/(m/s^2)	Sqa pC/(m/s^2)	Sqa pC/(m/s^2)	Sqa pC/(m/s^2)	Sqa pC/(m/s^2)	Sqa pC/(m/s^2)	Sqa pC/(m/s^2)	Sqa pC/(m/s^2)	Sqa pC/(m/s^2)	Sqa pC/(m/s^2)	Sqa pC/(m/s^2)	Sqa pC/(m/s^2)	Sqa pC/(m/s^2)
10	0,12764	0,12768	0,12769	0,12760	0,12759	0,12764	0,12769	0,12759	0,12769	0,12735	0,12760	0,12749	0,12773	0,12761	0,12768	0,12771	0,12779
12,5	0,12767	0,12770	0,12752	0,12759	0,12763	0,12759	0,12768	0,12766	0,12765	0,12746	0,12758	0,12750	0,12773	0,12761	0,12769	0,12770	0,12778
16	0,12767	0,12769	0,12753	0,12760	0,12758	0,12766	0,12769	0,12765	0,12762	0,12754	0,12750	0,12750	0,12763	0,12754	0,12765	0,12770	0,12771
20	0,12767	0,12766	0,12751	0,12756	0,12750	0,12754	0,12766	0,12756	0,12755	0,12738	0,12758	0,12758	0,12770	0,12762	0,12774	0,12777	0,12781
25	0,12765	0,12767	0,12752	0,12755	0,12753	0,12759	0,12764	0,12756	0,12756	0,12733	0,12757	0,12757	0,12767	0,12760	0,12774	0,12777	0,12777
31,5	0,12766	0,12767	0,12751	0,12757	0,12757	0,12760	0,12765	0,12754	0,12757	0,12732	0,12755	0,12755	0,12768	0,12760	0,12775	0,12778	0,12779
40	0,12765	0,12765	0,12747	0,12755	0,12750	0,12758	0,12762	0,12752	0,12752	0,12738	0,12758	0,12758	0,12767	0,12761	0,12776	0,12776	0,12774
63	0,12760	0,12763	0,12749	0,12752	0,12749	0,12757	0,12761	0,12753	0,12750	0,12743	0,12749	0,12749	0,12761	0,12753	0,12769	0,12763	0,12764
80	0,12760	0,12763	0,12749	0,12752	0,12746	0,12759	0,12761	0,12752	0,12752	0,12742	0,12754	0,12754	0,12762	0,12756	0,12768	0,12762	0,12761
100	0,12757	0,12760	0,12748	0,12752	0,12759	0,12760	0,12759	0,12753	0,12753	0,12743	0,12755	0,12755	0,12761	0,12757	0,12767	0,12760	0,12767
125	0,12763	0,12762	0,12749	0,12752	0,12759	0,12759	0,12761	0,12756	0,12753	0,12745	0,12754	0,12757	0,12763	0,12758	0,12768	0,12762	0,12767
160	0,12765	0,12764	0,12757	0,12755	0,12765	0,12761	0,12762	0,12756	0,12756	0,12748	0,12757	0,12760	0,12766	0,12761	0,12768	0,12765	0,12769
200	0,12768	0,12767	0,12757	0,12761	0,12759	0,12762	0,12764	0,12756	0,12757	0,12750	0,12759	0,12762	0,12768	0,12763	0,12771	0,12772	0,12776
250	0,12771	0,12771	0,12757	0,12758	0,12766	0,12767	0,12768	0,12764	0,12764	0,12756	0,12760	0,12765	0,12772	0,12766	0,12778	0,12775	0,12772
315	0,12772	0,12771	0,12757	0,12757	0,12767	0,12766	0,12768	0,12765	0,12767	0,12746	0,12761	0,12756	0,12765	0,12761	0,12778	0,12774	0,12777
400	0,12773	0,12775	0,12759	0,12762	0,12769	0,12772	0,12773	0,12766	0,12768	0,12759	0,12768	0,12771	0,12776	0,12772	0,12783	0,12779	0,12778
500	0,12773	0,12775	0,12762	0,12760	0,12771	0,12771	0,12772	0,12767	0,12768	0,12765	0,12771	0,12776	0,12779	0,12775	0,12785	0,12785	0,12782
630	0,12777	0,12779	0,12764	0,12760	0,12774	0,12770	0,12770	0,12773	0,12773	0,12765	0,12772	0,12778	0,12785	0,12778	0,12791	0,12788	0,12785
800	0,12779	0,12781	0,12770	0,12762	0,12778	0,12775	0,12781	0,12774	0,12775	0,12770	0,12770	0,12776	0,12785	0,12777	0,12792	0,12794	0,12790
1000	0,12787	0,12790	0,12776	0,12776	0,12784	0,12781	0,12787	0,12781	0,12783	0,12776	0,12779	0,12785	0,12790	0,12785	0,12802	0,12804	0,12798
1250	0,12799	0,12799	0,12786	0,12790	0,12793	0,12785	0,12800	0,12796	0,12793	0,12785	0,12789	0,12797	0,12799	0,12795	0,12815	0,12818	0,12809
1500	0,12811	0,12808	0,12798	0,12803	0,12806	0,12804	0,12804	0,12799	0,12800	0,12789	0,12795	0,12804	0,12808	0,12802	0,12823	0,12847	0,12829
1600	0,12813	0,12811	0,12802	0,12805	0,12809	0,12812	0,12821	0,12826	0,12826	0,12802	0,12824	0,12828	0,12815	0,12822	0,12829	0,12873	0,12844
2000	0,12839	0,12839	0,12827	0,12831	0,12831	0,12833	0,12850	0,12827	0,12829	0,12827	0,12852	0,12855	0,12835	0,12847	0,12851	0,12840	0,12838
2500	0,12876	0,12867	0,12858	0,12859	0,12862	0,12861	0,12872	0,12867	0,12867	0,12861	0,12856	0,12862	0,12871	0,12863	0,12883	0,12866	0,12867
3000	0,12908	0,12905	0,12901	0,12901	0,12901	0,12905	0,12902	0,12901	0,12904	0,12896	0,12898	0,12904	0,12902	0,12902	0,12919	0,12911	0,12908
3150	0,12923	0,12917	0,12914	0,12916	0,12916	0,12919	0,12917	0,12914	0,12916	0,12911	0,12912	0,12919	0,12915	0,12915	0,12933	0,12922	0,12920
3500	0,12963	0,12950	0,12949	0,12957	0,12957	0,12955	0,12953	0,12956	0,12957	0,12946	0,12952	0,12957	0,12950	0,12953	0,12964	0,12955	0,12957
4000	0,13007	0,13003	0,13002	0,13009	0,13004	0,13009	0,13006	0,13002	0,13005	0,12998	0,13001	0,13009	0,12997	0,13002	0,13018	0,13011	0,13008
4500	0,13076	0,13067	0,13068	0,13069	0,13066	0,13071	0,13067	0,13067	0,13071	0,13065	0,13057	0,13068	0,13065	0,13063	0,13083	0,13071	0,13075
5000	0,13151	0,13152	0,13155	0,13147	0,13149	0,13148	0,13156	0,13144	0,13151	0,13133	0,13137	0,13140	0,13138	0,13139	0,13158	0,13149	0,13142
5500	0,13239	0,13229	0,13225	0,13227	0,13229	0,13228	0,13225	0,13221	0,13229	0,13215	0,13218	0,13226	0,13221	0,13222	0,13238	0,13229	0,13220
6000	0,13320	0,13312	0,13319	0,13313	0,13313	0,13314	0,13310	0,13307	0,13312	0,13300	0,13301	0,13302	0,13303	0,13302	0,13322	0,13304	0,13303
6300	0,13367	0,13364	0,13366	0,13367	0,13370	0,13365	0,13362	0,13357	0,13365	0,13349	0,13354	0,13358	0,13351	0,13354	0,13375	0,13363	0,13361
6500	0,13408	0,13402	0,13409	0,13404	0,13408	0,13406	0,13401	0,13399	0,13402	0,13387	0,13392	0,13397	0,13392	0,13394	0,13414	0,13400	0,13397
7000	0,13516	0,13509	0,13519	0,13506	0,13508	0,13505	0,13509	0,13499	0,13508	0,13493	0,13494	0,13496	0,13502	0,13497	0,13515	0,13505	0,13493
7500	0,13654	0,13639	0,13651	0,13640	0,13635	0,13637	0,13643	0,13633	0,13640	0,13622	0,13621	0,13630	0,13633	0,13628	0,13644	0,13634	0,13624
8000	0,13771	0,13758	0,13759	0,13754	0,13751	0,13761	0,13754	0,13749	0,13762	0,13736	0,13748	0,13735	0,13748	0,13744	0,13765	0,13757	0,13744
8500	0,13895	0,13889	0,13897	0,13892	0,13885	0,13874	0,13873	0,13876	0,13887	0,13866	0,13889	0,13875	0,13869	0,13877	0,13905	0,13894	0,13875
9000	0,14076	0,14055	0,14032	0,14055	0,14017	0,14021	0,13992	0,14017	0,14026	0,14001	0,14018	0,14000	0,13983	0,14001	0,14035	0,14019	0,14019
9500	0,14226	0,14186	0,14255	0,14177	0,14202	0,14202	0,14291	0,14222	0,14221	0,14171	0,14209	0,14204	0,14192	0,14202	0,14232	0,14186	0,14172
10000	0,14384	0,14370	0,14399	0,14348	0,14383	0,14370	0,14368	0,14353	0,14395	0,14353	0,14362	0,14346	0,14362	0,14357	0,14376	0,14373	0,14331

Table B.2: Monitoring results for the SE accelerometer on the SE09 shaker (ceramics armature).

Week	0	6	12	20	26	33	38	44	51	62	71	77	87	97	107	124	126
Frequency in Hz	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)
10	0,12764	0,12766	0,12760	0,12760	0,12759	0,12765	0,12773	0,12765	0,12760	0,12753	0,12752	0,12760	0,12768	0,12763	0,12752	0,12779	0,12779
12,5	0,12767	0,12776	0,12768	0,12759	0,12763	0,12771	0,12773	0,12772	0,12765	0,12760	0,12755	0,12758	0,12774	0,12766	0,12761	0,12778	0,12778
16	0,12767	0,12779	0,12776	0,12760	0,12758	0,12784	0,12767	0,12784	0,12772	0,12779	0,12758	0,12755	0,12765	0,12764	0,12764	0,12771	0,12771
20	0,12767	0,12777	0,12775	0,12756	0,12750	0,12774	0,12773	0,12776	0,12769	0,12749	0,12760	0,12761	0,12770	0,12767	0,12771	0,12781	0,12781
25	0,12765	0,12765	0,12761	0,12755	0,12753	0,12761	0,12761	0,12754	0,12751	0,12732	0,12754	0,12757	0,12766	0,12758	0,12757	0,12777	0,12777
31,5	0,12766	0,12762	0,12760	0,12757	0,12757	0,12763	0,12758	0,12756	0,12750	0,12731	0,12753	0,12757	0,12767	0,12758	0,12764	0,12779	0,12779
40	0,12765	0,12764	0,12761	0,12755	0,12750	0,12758	0,12758	0,12758	0,12752	0,12734	0,12756	0,12760	0,12765	0,12759	0,12766	0,12774	0,12774
63	0,12760	0,12762	0,12762	0,12752	0,12749	0,12760	0,12760	0,12754	0,12752	0,12741	0,12748	0,12755	0,12761	0,12756	0,12758	0,12769	0,12769
80	0,12760	0,12763	0,12765	0,12752	0,12746	0,12764	0,12760	0,12754	0,12756	0,12744	0,12749	0,12761	0,12760	0,12759	0,12760	0,12768	0,12768
100	0,12757	0,12765	0,12767	0,12754	0,12750	0,12766	0,12764	0,12756	0,12754	0,12750	0,12756	0,12760	0,12761	0,12758	0,12765	0,12774	0,12783
125	0,12763	0,12763	0,12760	0,12755	0,12752	0,12763	0,12764	0,12758	0,12757	0,12738	0,12755	0,12757	0,12766	0,12760	0,12763	0,12772	0,12768
160	0,12765	0,12764	0,12764	0,12756	0,12757	0,12764	0,12765	0,12760	0,12755	0,12744	0,12758	0,12762	0,12768	0,12762	0,12773	0,12773	0,12772
200	0,12768	0,12767	0,12767	0,12759	0,12758	0,12767	0,12768	0,12761	0,12758	0,12747	0,12758	0,12762	0,12769	0,12763	0,12773	0,12775	0,12774
250	0,12771	0,12776	0,12767	0,12760	0,12760	0,12766	0,12772	0,12762	0,12765	0,12751	0,12760	0,12766	0,12771	0,12767	0,12772	0,12777	0,12774
315	0,12772	0,12778	0,12771	0,12761	0,12758	0,12765	0,12771	0,12762	0,12765	0,12745	0,12761	0,12756	0,12765	0,12762	0,12776	0,12780	0,12776
400	0,12773	0,12780	0,12773	0,12763	0,12764	0,12771	0,12775	0,12764	0,12766	0,12755	0,12766	0,12771	0,12776	0,12771	0,12778	0,12782	0,12777
500	0,12773	0,12777	0,12773	0,12765	0,12764	0,12770	0,12774	0,12765	0,12767	0,12762	0,12770	0,12775	0,12778	0,12773	0,12784	0,12787	0,12779
630	0,12777	0,12782	0,12777	0,12768	0,12765	0,12768	0,12771	0,12770	0,12773	0,12760	0,12771	0,12777	0,12784	0,12778	0,12786	0,12790	0,12782
800	0,12779	0,12783	0,12779	0,12771	0,12770	0,12773	0,12783	0,12771	0,12774	0,12765	0,12770	0,12775	0,12784	0,12778	0,12787	0,12796	0,12786
1000	0,12784	0,12780	0,12786	0,12777	0,12777	0,12780	0,12788	0,12778	0,12781	0,12771	0,12779	0,12784	0,12790	0,12785	0,12793	0,12806	0,12790
1250	0,12793	0,12789	0,12794	0,12784	0,12783	0,12782	0,12799	0,12788	0,12790	0,12778	0,12789	0,12795	0,12797	0,12794	0,12803	0,12817	0,12795
1500	0,12805	0,12801	0,12802	0,12796	0,12793	0,12802	0,12805	0,12795	0,12798	0,12785	0,12797	0,12802	0,12806	0,12802	0,12817	0,12849	0,12811
1600	0,12810	0,12804	0,12823	0,12800	0,12815	0,12805	0,12820	0,12821	0,12823	0,12797	0,12819	0,12824	0,12813	0,12820	0,12822	0,12873	0,12813
2000	0,12830	0,12827	0,12833	0,12820	0,12822	0,12825	0,12848	0,12822	0,12825	0,12813	0,12845	0,12851	0,12831	0,12836	0,12843	0,12837	0,12833
2500	0,12862	0,12858	0,12850	0,12852	0,12857	0,12859	0,12861	0,12852	0,12858	0,12846	0,12850	0,12861	0,12866	0,12862	0,12875	0,12870	0,12866
3000	0,12897	0,12895	0,12887	0,12890	0,12892	0,12897	0,12899	0,12888	0,12897	0,12882	0,12885	0,12897	0,12900	0,12898	0,12911	0,12908	0,12903
3151	0,12908	0,12906	0,12898	0,12901	0,12906	0,12909	0,12908	0,12902	0,12911	0,12897	0,12896	0,12907	0,12912	0,12910	0,12922	0,12921	0,12913
3500	0,12944	0,12940	0,12933	0,12934	0,12940	0,12944	0,12949	0,12935	0,12946	0,12932	0,12931	0,12943	0,12948	0,12946	0,12960	0,12961	0,12947
4000	0,12993	0,12993	0,12984	0,12986	0,12991	0,12994	0,12994	0,12987	0,12995	0,12983	0,12985	0,12993	0,12996	0,12995	0,13010	0,13008	0,12999
4499	0,13050	0,13052	0,13043	0,13045	0,13054	0,13059	0,13051	0,13046	0,13055	0,13039	0,13038	0,13054	0,13059	0,13056	0,13068	0,13069	0,13055
5000	0,13113	0,13116	0,13104	0,13108	0,13113	0,13123	0,13117	0,13108	0,13118	0,13108	0,13108	0,13116	0,13129	0,13121	0,13139	0,13137	0,13126
5500	0,13185	0,13191	0,13177	0,13185	0,13189	0,13196	0,13207	0,13183	0,13196	0,13179	0,13179	0,13190	0,13207	0,13198	0,13208	0,13215	0,13202
6000	0,13264	0,13274	0,13266	0,13264	0,13269	0,13267	0,13271	0,13269	0,13278	0,13266	0,13263	0,13272	0,13289	0,13280	0,13288	0,13300	0,13278
6301	0,13316	0,13320	0,13312	0,13316	0,13324	0,13335	0,13335	0,13321	0,13334	0,13318	0,13307	0,13324	0,13339	0,13332	0,13344	0,13357	0,13334
6499	0,13344	0,13352	0,13349	0,13348	0,13357	0,13374	0,13362	0,13354	0,13367	0,13352	0,13342	0,13360	0,13375	0,13367	0,13381	0,13395	0,13370
6999	0,13439	0,13455	0,13442	0,13444	0,13447	0,13467	0,13460	0,13443	0,13459	0,13445	0,13438	0,13451	0,13476	0,13462	0,13476	0,13488	0,13463
7500	0,13563	0,13570	0,13569	0,13570	0,13569	0,13592	0,13584	0,13574	0,13585	0,13571	0,13566	0,13580	0,13604	0,13590	0,13602	0,13615	0,13587
8000	0,13673	0,13684	0,13677	0,13680	0,13680	0,13689	0,13694	0,13685	0,13700	0,13678	0,13675	0,13688	0,13715	0,13701	0,13715	0,13738	0,13701
8501	0,13788	0,13805	0,13794	0,13800	0,13794	0,13823	0,13803	0,13808	0,13822	0,13790	0,13787	0,13806	0,13838	0,13822	0,13841	0,13863	0,13827
8999	0,13932	0,13945	0,13937	0,13936	0,13908	0,13944	0,13970	0,13970	0,13951	0,13907	0,13902	0,13964	0,13961	0,13959	0,14007	0,14024	0,13948
9499	0,14063	0,14103	0,14086	0,14085	0,14122	0,14063	0,14084	0,14064	0,14098	0,14113	0,14103	0,14059	0,14136	0,14098	0,14093	0,14117	0,14116
10000	0,14221	0,14255	0,14243	0,14246	0,14258	0,14255	0,14264	0,14238	0,14274	0,14256	0,14238	0,14245	0,14301	0,14273	0,14270	0,14293	0,14271

B.2 Magnitude of the BB

(see next page)

Table B.3: Monitoring results for the BB accelerometer.

Week	0	7	13	20	27	33	39	45	51	57	68	77	87	88	97	98	107	127	128
Frequency in Hz	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)	Sqa pC/(m/s²)
10	0,12602	0,12609	0,12630	0,12635	0,12649	0,12668	0,12635	0,12674	0,12671	0,12652	0,12665	0,12669	0,12687	0,12672	0,12653	0,12673	0,12686	0,12688	0,12688
12,5	0,12605	0,12615	0,12631	0,12640	0,12638	0,12701	0,12642	0,12671	0,12656	0,12657	0,12662	0,12679	0,12685	0,12676	0,12667	0,12675	0,12685	0,12691	0,12691
16	0,12602	0,12617	0,12633	0,12640	0,12631	0,12686	0,12646	0,12675	0,12670	0,12662	0,12661	0,12673	0,12675	0,12668	0,12697	0,12679	0,12681	0,12704	0,12704
20	0,12611	0,12619	0,12630	0,12639	0,12641	0,12676	0,12645	0,12669	0,12674	0,12651	0,12668	0,12678	0,12680	0,12678	0,12678	0,12672	0,12690	0,12702	0,12702
25	0,12607	0,12619	0,12631	0,12634	0,12639	0,12677	0,12647	0,12666	0,12668	0,12651	0,12668	0,12673	0,12677	0,12676	0,12678	0,12668	0,12692	0,12696	0,12696
31,5	0,12607	0,12614	0,12627	0,12633	0,12636	0,12680	0,12648	0,12667	0,12674	0,12649	0,12665	0,12674	0,12677	0,12679	0,12672	0,12667	0,12684	0,12699	0,12699
40	0,12607	0,12615	0,12627	0,12633	0,12634	0,12679	0,12651	0,12665	0,12672	0,12649	0,12667	0,12675	0,12676	0,12678	0,12677	0,12669	0,12684	0,12698	0,12698
63	0,12606	0,12615	0,12627	0,12634	0,12631	0,12676	0,12648	0,12665	0,12660	0,12654	0,12658	0,12670	0,12668	0,12669	0,12680	0,12665	0,12678	0,12689	0,12689
80	0,12611	0,12618	0,12625	0,12634	0,12631	0,12676	0,12648	0,12666	0,12664	0,12655	0,12661	0,12670	0,12676	0,12671	0,12682	0,12674	0,12682	0,12690	0,12690
100	0,12607	0,12617	0,12624	0,12633	0,12630	0,12675	0,12652	0,12661	0,12663	0,12654	0,12663	0,12669	0,12673	0,12671	0,12681	0,12659	0,12681	0,12683	0,12686
125	0,12611	0,12619	0,12624	0,12632	0,12631	0,12676	0,12655	0,12662	0,12660	0,12652	0,12663	0,12669	0,12672	0,12669	0,12680	0,12667	0,12682	0,12684	0,12686
160	0,12613	0,12621	0,12626	0,12637	0,12634	0,12677	0,12659	0,12664	0,12663	0,12655	0,12665	0,12670	0,12675	0,12673	0,12684	0,12669	0,12683	0,12685	0,12689
200	0,12616	0,12618	0,12628	0,12635	0,12631	0,12681	0,12664	0,12666	0,12662	0,12654	0,12663	0,12670	0,12672	0,12673	0,12685	0,12671	0,12683	0,12686	0,12679
250	0,12621	0,12626	0,12630	0,12637	0,12637	0,12679	0,12671	0,12668	0,12666	0,12655	0,12671	0,12674	0,12672	0,12672	0,12679	0,12678	0,12685	0,12688	0,12690
315	0,12620	0,12628	0,12631	0,12637	0,12636	0,12679	0,12674	0,12670	0,12659	0,12645	0,12665	0,12667	0,12668	0,12664	0,12661	0,12661	0,12682	0,12690	0,12692
400	0,12622	0,12630	0,12635	0,12640	0,12641	0,12683	0,12680	0,12671	0,12670	0,12654	0,12674	0,12679	0,12675	0,12675	0,12679	0,12679	0,12687	0,12691	0,12693
500	0,12623	0,12631	0,12634	0,12641	0,12639	0,12681	0,12682	0,12673	0,12669	0,12653	0,12673	0,12677	0,12676	0,12675	0,12679	0,12679	0,12688	0,12691	0,12694
630	0,12625	0,12634	0,12637	0,12641	0,12639	0,12684	0,12684	0,12675	0,12671	0,12654	0,12677	0,12679	0,12676	0,12676	0,12682	0,12681	0,12695	0,12694	0,12697
800	0,12623	0,12636	0,12636	0,12645	0,12644	0,12685	0,12689	0,12677	0,12670	0,12656	0,12677	0,12683	0,12675	0,12678	0,12681	0,12680	0,12696	0,12695	0,12700
1000	0,12633	0,12639	0,12643	0,12649	0,12648	0,12690	0,12694	0,12682	0,12672	0,12662	0,12681	0,12690	0,12686	0,12683	0,12687	0,12687	0,12707	0,12697	0,12704
1250	0,12637	0,12647	0,12646	0,12655	0,12653	0,12695	0,12695	0,12692	0,12683	0,12669	0,12684	0,12691	0,12695	0,12690	0,12692	0,12691	0,12717	0,12703	0,12712
1500	0,12649	0,12656	0,12651	0,12660	0,12667	0,12703	0,12700	0,12694	0,12690	0,12680	0,12683	0,12685	0,12701	0,12696	0,12695	0,12695	0,12722	0,12704	0,12719
1600	0,12654	0,12658	0,12675	0,12665	0,12663	0,12705	0,12707	0,12701	0,12706	0,12719	0,12706	0,12696	0,12713	0,12708	0,12710	0,12709	0,12726	0,12719	0,12723
2000	0,12661	0,12675	0,12679	0,12682	0,12677	0,12720	0,12725	0,12710	0,12692	0,12704	0,12725	0,12694	0,12728	0,12722	0,12711	0,12713	0,12743	0,12725	0,12741
2500	0,12694	0,12699	0,12679	0,12701	0,12680	0,12746	0,12747	0,12740	0,12729	0,12722	0,12737	0,12739	0,12750	0,12738	0,12738	0,12738	0,12765	0,12754	0,12757
3000	0,12718	0,12726	0,12715	0,12733	0,12739	0,12775	0,12771	0,12765	0,12756	0,12750	0,12768	0,12770	0,12773	0,12766	0,12766	0,12766	0,12793	0,12781	0,12791
3150	0,12729	0,12735	0,12724	0,12742	0,12750	0,12786	0,12782	0,12776	0,12768	0,12761	0,12779	0,12777	0,12782	0,12776	0,12776	0,12776	0,12802	0,12790	0,12797
3500	0,12757	0,12760	0,12753	0,12772	0,12776	0,12813	0,12808	0,12806	0,12795	0,12791	0,12809	0,12805	0,12809	0,12807	0,12807	0,12807	0,12828	0,12817	0,12823
4000	0,12791	0,12798	0,12792	0,12810	0,12815	0,12853	0,12845	0,12840	0,12835	0,12826	0,12845	0,12847	0,12846	0,12845	0,12845	0,12845	0,12869	0,12856	0,12864
4500	0,12839	0,12842	0,12839	0,12856	0,12865	0,12901	0,12893	0,12886	0,12880	0,12872	0,12883	0,12891	0,12890	0,12889	0,12889	0,12889	0,12914	0,12896	0,12904
5000	0,12893	0,12899	0,12887	0,12908	0,12912	0,12955	0,12955	0,12942	0,12927	0,12925	0,12941	0,12939	0,12945	0,12937	0,12937	0,12937	0,12974	0,12948	0,12955
5500	0,12948	0,12949	0,12943	0,12963	0,12976	0,13011	0,13006	0,12997	0,12991	0,12978	0,13000	0,12998	0,13003	0,12995	0,12995	0,12995	0,13029	0,13004	0,13015
6000	0,13002	0,13009	0,13006	0,13025	0,13029	0,13070	0,13069	0,13056	0,13048	0,13036	0,13054	0,13057	0,13057	0,13054	0,13054	0,13054	0,13090	0,13060	0,13067
6300	0,13041	0,13047	0,13047	0,13058	0,13070	0,13114	0,13109	0,13093	0,13094	0,13078	0,13091	0,13101	0,13099	0,13094	0,13094	0,13094	0,13127	0,13096	0,13105
6500	0,13067	0,13068	0,13067	0,13085	0,13095	0,13135	0,13137	0,13118	0,13113	0,13103	0,13112	0,13127	0,13124	0,13120	0,13120	0,13120	0,13154	0,13124	0,13125
7000	0,13147	0,13151	0,13155	0,13166	0,13176	0,13218	0,13215	0,13199	0,13193	0,13177	0,13181	0,13204	0,13202	0,13202	0,13202	0,13202	0,13219	0,13195	0,13199
7500	0,13239	0,13237	0,13241	0,13260	0,13262	0,13305	0,13302	0,13287	0,13281	0,13276	0,13263	0,13284	0,13294	0,13289	0,13289	0,13289	0,13311	0,13276	0,13276
8000	0,13318	0,13330	0,13366	0,13353	0,13346	0,13475	0,13387	0,13404	0,13371	0,13309	0,13345	0,13408	0,13385	0,13422	0,13422	0,13422	0,13385	0,13464	0,13346
8500	0,13408	0,13426	0,13434	0,13446	0,13428	0,13502	0,13494	0,13495	0,13483	0,13456	0,13434	0,13472	0,13493	0,13500	0,13500	0,13500	0,13489	0,13501	0,13498
9000	0,13508	0,13533	0,13525	0,13552	0,13585	0,13617	0,13608	0,13604	0,13584	0,13567	0,13566	0,13611	0,13593	0,13612	0,13612	0,13612	0,13602	0,13634	0,13581
9500	0,13622	0,13678	0,13601	0,13657	0,13772	0,13727	0,13667	0,13760	0,13720	0,13675	0,13760	0,13736	0,13765	0,13722	0,13722	0,13722	0,13704	0,13784	0,13801
10000	0,13813	0,13810	0,13809	0,13806	0,13793	0,13847	0,13961	0,13955	0,13830	0,13949	0,13981	0,13945	0,13938	0,13827	0,13827	0,13827	0,13829	0,13878	0,13919

Appendix C: — Measurement Uncertainty Budgets Reported by the Participants

C.1 PTB

Magnitude of sensitivity by fringe counting

DUT	B&K 8305 or 8305-001	+ B&K 2650				
acceleration:	100 m/s²					
Voltage	typic. 1V				std. uncert. combined frequency ranges	
Disturbing Component	**comment**	**typical width**	**distribution**	**factor**	**10 Hz to 40 Hz**	**to 800Hz**
nominal Frequency	Generator accuracy	5,00E-05	rectangular	1,73	2,89E-05	2,89E-05
Accelerometer Voltage	DVM calibration (200mV to 900 mV)	5,00E-05	rectangular	1,73	2,89E-05	2,89E-05
Acceleration Ampl. by FC	optical misalignment, Heydeman correction, Wavelngth	1,00E-04	rectangular	1,73	5,77E-05	5,77E-05
harmonic distortion on Voltage measurement	estimated < 6e-5 max at 63 Hz		single point	2	3,00E-05	3,00E-05
Humm	50 Hz, ~0,7mV RMS	1,23E-05	single point	2,00	6,13E-06	3,83E-07
Noise	1,7mV RMS	0,00007225	single point	2	3,61E-05	2,26E-06
Transverse motion	1 % transv. Sensitivity @ 4% transv. Excitation		complex		1,14E-04	1,14E-04
Base Strain sensitivity	S = 0,005m/s² / µ€ € < 0,1 µm/m	depending on acc. Level	rectangular	1,73	2,89E-05	5,77E-06
Mounting torque	S = 6e-4/Nm; dM = 0,2 Nm	0,00012	rectangular	1,73	6,93E-05	6,93E-05
temperature sensitivity	S=2,5e-4 /K dT = 0,3 K	0,000075	rectangular	1,73	4,33E-05	4,33E-05
magnetic sensitivity	S=1/a *(m/s²)/T B < 0,03mT	depending on acc. Level	rectangular	1,73	1,73E-06	3,46E-07
airborne sound	S=0,008 m/s² at 154 dB max sound level 88 dB	8,00E-08	rectangular	1,73	4,62E-08	4,62E-08
quantization	suppressed by known phase-disturbance	1,00E-05	U-type	1,41	7,07E-06	7,07E-06
phase disturbance	Depending on ratio of stoch. Veloc. to stat. Veloc.	Stoch. Veloc. RMS 30µm/s	Steiner	1	1,78E-08	1,78E-08
trigger hysteresis	set hysteresis value 20 mV system. Dev. Corrected	est. remaining dev. < 1e-6		1	1,00E-06	1,00E-06
Low pass of photo detector voltage	f_c (-3db) 3 MHz	1,00E-07	rectangular	1,73	5,77E-08	5,77E-08
foto electric noise	RMS 2,5mV		Steiner	1	1,30E-05	2,00E-05
harmonical distortion	rectangular distrib. of relat. Phase. Only 1st harmonic essential, ampl. ratio 0,0012	1,33E-04	U-type	1,41	9,43E-05	9,43E-05
humm (50 Hz)	humm acc. 0,08m/s²	1,77E-05	rectangular	1,73	1,02E-05	1,60E-04
asynchronous measurement	voltage/acceleration/voltage	1,00E-04	rectangular	1,73	5,77E-05	5,77E-05
residual influences		1,00E-04	normal	1,41	7,07E-05	7,07E-05
exp. std. deviation		1,70E-04	normal	1,41	1,20E-04	1,20E-04
Charge Amplifier calibration		4,24E-04	normal	2	2,12E-04	2,12E-04
rel. std. uncertainty	**in %**				**0,0324**	**0,0358**
rel. comb. exp. Uncertainty (k=2)	**in %**				**0,0647**	**0,0716**
stated rel. comb. exp. Uncertainty	**in %**				**0,1000**	**0,1000**

Magnitude of sensitivity by sine-approximation

DUT acceleration: Voltage Sample rate	B&K 8305 or 8305-001 100 m/s^2 typic. 1V 10 MS/s	+ B&K 2650 @ 12 Bit				
					std. uncert. combined frequency ranges	
Disturbing Component	**comment**	**95% value**	**distribution**	**factor**		
					500 Hz to 5 kHz	**to 10 kHz**
frequency of SAM	deviation of sample clock from generator clock	1,00E-04	rectangular	1,73	5,77E-05	5,77E-05
Accelerometer Voltage	sampling of HP3458A	5,00E-04	rectangular	1,73	2,89E-04	2,89E-04
Velocity amplitude	wave length, optical adjustment, deviation between the two beams	1,16E-05	normal	2,00	5,80E-06	5,80E-06
harmon. Distortion	mainly 1st harmonic		Steiner	1,00	7,84E-06	7,84E-06
Humm on Voltage	typical 1mV	5,00E-07	Steiner	1,00	5,00E-07	5,00E-07
Noise on Voltage	MC on influence to SAM duration 20ms, Un=1,0mV	6,60E-06	normal	1,00	3,30E-06	3,30E-06
Transverse Motion	S(transv) = 0,7% a(transv) < 4%		u-type	1,41	1,98E-04	1,98E-04
Base strain sensitivity	S = 0,005m/s^2 / µ€ € < 0,1 µm/m	5,00E-06	rectangular	1,73	2,89E-06	2,89E-06
mounting	S = 6e-4/Nm; dM = 0,2 Nm	1,20E-04	rectangular	1,73	6,93E-05	6,93E-05
Temperature	S=2,5e-4 /K dT = 0,3 K	7,50E-05	rectangular	1,73	4,33E-05	4,33E-05
Magnetic field	S=1/a *(m/s^2)/T B < 0,03mT	3,00E-07	rectangular	1,73	1,73E-07	1,73E-07
Airborne acoustics	S=0,008 m/s^2 at 154 dB max sound level 88 dB	8,00E-08	rectangular	1,73	4,62E-08	4,62E-08
Noise on Interferom.	noise level equiv. of 2 nm after demodulation, Monte Carlo		normal	1,00	1,10E-04	3,00E-04
a-synchronous Measurement	voltage/acceleration/voltage	1,00E-04	rectangular	1,73	5,77E-05	5,77E-05
charge ampl. calibration		4,24E-04	normal	2,00	2,12E-04	2,12E-04
resid. influences		1,00E-04	normal	1,41	7,07E-05	7,07E-05
exp. std. dev					2,30E-05	1,60E-04
rel. std. uncertainty	**in %**				**0,0446**	**0,0549**
rel. comb. exp. Uncertainty (k=2)	**in %**				**0,0891**	**0,1098**
stated rel. comb. exp. Uncertainty	**in %**				**0,1000**	**0,3000**

Phase of sensitivity by sine-approximation

DUT	B&K 8305 or 8305-001	+ B&K 2650				
acceleration:	100 m/s²					
Voltage	typic. 1V					
Sample rate	10 MS/s	@ 12 Bit				
					combined frequency ranges	
Disturbing Component	**comment**	**95% value**	**distribution**	**factor**	**10 Hz to 1 kHz**	**to 10 kHz**
Channel a-synchronisity	all frequencies	< 10 ns	normal	2	1,80E-03	1,80E-02
Humm (50 Hz)	Monte Carlo, multiples of 20ms are evaluated	equivalent displacement amp. 4 µm	normal	1	8,00E-03	1,00E-03
Noise on accelerometer Voltage output	Monte Carlo, SNR=500	< 2mV @ 1V	normal	1	4,00E-04	4,00E-04
Transverse/Rocking motion	1 % transv. Sensitivity @ 10% transv. Excitation	rel. Phase 0 … 2pi	U-type (by MC)	1	7,00E-04	7,00E-04
delay of Laser Vibrom. + Mixer + Filter	absolut correction 1,54µs applied	uncert. of correction 100 ns	rectang.	1,73	2,08E-02	2,08E-01
Calibration Charge Amplifier B&K 2650	including Stability, reproducibility, methode (black box)	<0,02°	normal	2	2,00E-02	2,00E-02
Noise on heterodyne interferometer channel	noise level equiv. of 2 nm after demodulation, Monte Carlo	< 2nm	normal	1	1,43E-04	1,43E-02
Motion disturbance	drift, relative motion evaluation as velocity and period by period	estimated < 0,02°	normal	2	1,00E-02	1,00E-02
exp. Std. deviation		typical < 0,02°	normal	2	5,00E-02	1,20E-01
std. uncertainty	**in 1°**				**0,059**	**0,242**
exp. Uncertainty (k=2)	**in 1°**				**0,118**	**0,484**
stated exp. Uncertainty	**in 1°**				**0,200**	**0,500**

C.2 CMI

no submission

C.3 NMISA

UNCERTAINTY BUDGET MATRIX (UBM)		
	Certificate No	AV\VS-2642
	Procedure No	NML-AV\VS-0001

Reference: Guide to the Expression of Uncertainty in Measurement, issued by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML - ISO 1995 (ISBN 92-67-10188-9)

Description:	Sensitivty calibration (modulus) as per ISO 16063-11 method 3	Make & model:	Brüel & Kjær 8305-001	Range:	10 Hz to 1 000 Hz	Metrologist
		Serial number:	2571390			Ian Veldman

Mathematical Model: $S = \hat{u}/\hat{a} = \hat{u}/(2\pi f)^2 d$

Symbol	Input Quantity (Source of Uncertainty)	Estimated Uncertainty		Probability Distribution	k	Divisor factor	Standard Uncertainty	Sensitivity Coefficient		Standard Uncertainty Contribution Ui (y)	Reliability	Degrees of Freedom	Remarks
u	▼ Standards and Reference Equipment (Uncorrelated) ▼	(Xi)	Unit	(N, R, T, U)	▼	▼	U(Xi)	Ci	Unit	%	%	v	
φ_Q	Interferometer output signal disturbance on phase amplitude	0.01	%	Rectangular √3	2.00	1.73	5.77E-03	1	%	0.006	100	infinite	e.g. offsets, voltage amplitude deviations, <> 90° Corrected with Heydemant procedure
φ_{VD}	Effect of voltage disturbance on phase amplitude measurement	0.01	%	Rectangular √3	2.00	1.73	5.77E-03	0.01	%	0.000	100	infinite	Additive uncorrelated noise is reduced by 1/√n. Where n=number of samples pes vibration cycle. Worse case
φ_{MD}	Effect of motion disturbance on phase amplitude measurement	0.015	%	Rectangular √3	2.00	1.73	8.66E-03	1	%	0.009	100	infinite	Relative motion between sensing spot, exiter and accelerometer. Worse case calculated for 16mm double ended
φ_{PD}	Effect of phase disturbance on phase amplitude measurement	0.01	%	Rectangular √3	2.00	1.73	5.77E-03	1	%	0.006	100	infinite	Corrected for using Heydemann correction procedure
φ_{RE}	Residual interferometric effects on phase amplitude measurement	0.01	%	Rectangular √3	2.00	1.73	5.77E-03	1	%	0.006	100	infinite	Not aware of any
f_{FG}	Vibration frequency measurement accuracy	0.05	%	Rectangular √3	2.00	1.73	2.89E-02	1	%	0.029	100	infinite	ISO 16063-11 requirement: ≤ 0,05 % of reading
λ_U	Uncertainty on laser wavelength measurement	2.50E-11	nm	Normal k = 2	2.00	2.00	1.25E-11	100	%	0.000	100	infinite	Uncertainty quoted on certificate
$\hat{u}_V$	Accelerometer output voltage measurement (ADC resolution/accuracy)	0.12	%	Rectangular √3	2.00	1.73	6.93E-02	1	%	0.069	100	infinite	Manufacturer's specification worse case on 1 V range
S_F	Filtering effect on sensitivity measurement	0.08	%	Rectangular √3	2.00	1.73	4.62E-02	1	%	0.046	100	infinite	$e=(f/f_{Hp})^2$
G_{CA}	Charge amplifier gain accuracy	0.30	%	Normal k = 2	2.00	2.00	1.50E-01	1	%	0.150	100	infinite	Conditiong amplifier uncertainty
	Resolution of Standard / Equipment (If applicable)										100		
	▼ Unit Under Test / Calibration (Uncorrelated) ▼					NOTE!	ONLY CHANGE BLUE CELLS	- All OTHER CELLS (WHITE) ARE PROTECTED					
$\hat{u}_D$	Effect of voltage disturbance on accelerometer output voltage measurement	0.005	%	Triangular √6		1.73	2.887E-03	1	%	0.003	100	infinite	$U_{THD} = ½(d/100)^2$; Maximum allowed by ISO 16063
$\hat{u}_T$	Effect of transverse motion on accelerometer output voltage measurement	0.1	%	Triangular √6		1.73	5.774E-02	1	%	0.058	100	infinite	Transeverse error for a transverse sensitivity of 1%
$\hat{u}_{RES}$	Residual effects on accelerometer output voltage measurement	0.2	%	Normal k = 3		2.00	1.000E-01	1	%	0.100	100	infinite	Tribo-electric effect
$\hat{u}_\sigma$	Standard deviation on accelerometer output voltage measurement	0.3	%	Normal k = 3		2.00	1.500E-01	1	%	0.150	100	infinite	ESDM for sensitivity calulation using 5 cycles minimum
	Resolution of UUT / Equipment (If applicable)										100		
	Data - Type "B" Evaluation Range of the results (Rectangular)										100		
	#REF!			Normal k = 1								4	No of Readings 5
About UBM	TOTAL COMBINED UNCERTAINTY									%			

Best Measurement Capability (Excluding UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.174	V_{eff}	infinite	Checked and Approved By:
	Expanded Uncertainty	95,45 % K = 2	**0.349**	k =	**2.00**	
Uncertainty of Measurement (Including UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.257	V_{eff}	infinite	
	Expanded Uncertainty	*95,45 %* *K = 2*	**0.5**	k =	**2.00**	

UBM V5.03 - NMISA - Vibration Laboratory (Designed by BvO)

VS-2642 UoM modulus.xls 10 Hz to 1 kHz

UNCERTAINTY BUDGET MATRIX (UBM)			
		Certificate No	AV\VS-2642
		Procedure No	NML-AV\VS-0001

Reference: Guide to the Expression of Uncertainty in Measurement, issued by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML - ISO 1995 (ISBN 92-67-10188-9)

Description:	Sensitivty calibration (modulus) as per ISO 16063-11 method 3	Make & model:	Brüel & Kjær 8305-001	Range:	1,25 kHz to 4,5 kHz	Metrologist
		Serial number:	2571390			Ian Veldman
Mathematical Model:	$S = \hat{u}/\hat{a} = \hat{u}/(2\pi f)^2 d$					

Symbol	Input Quantity (Source of Uncertainty)	Estimated Uncertainty		Probability Distribution	k	Divisor factor	Standard Uncertainty	Sensitivity Coefficient		Standard Uncertainty Contribution Ui (y)	Reliability	Degrees of Freedom	Remarks
u	▼ Standards and Reference Equipment (Uncorrelated) ▼	(Xi)	Unit	(N, R, T, U)	▼	▼	U(Xi)	Ci	Unit	%	%	v	
φ_Q	Interferometer output signal disturbance on phase amplitude	0.1	%	Rectangular √3	2.00	1.73	5.77E-02	1	%	0.058	100	infinite	e.g. offsets, voltage amplitude deviations, <> 90° Corrected with Heydemant procedure
φ_{VD}	Effect of voltage disturbance on phase amplitude measurement	0.05	%	Rectangular √3	2.00	1.73	2.89E-02	0.01	%	0.000	100	infinite	Additive uncorrelated noise is reduced by 1/√n. Where n=number of samples pes vibration cycle. Worse case
φ_{MD}	Effect of motion disturbance on phase amplitude measurement	0.5	%	Rectangular √3	2.00	1.73	2.89E-01	1	%	0.289	100	infinite	Relative motion between sensing spot, exiter and accelerometer. Worse case calculated for 16mm double ended
φ_{PD}	Effect of phase disturbance on phase amplitude measurement	0.05	%	Rectangular √3	2.00	1.73	2.89E-02	1	%	0.029	100	infinite	Corrected for using Heydemann correction procedure
φ_{RE}	Residual interferometric effects on phase amplitude measurement	0.01	%	Rectangular √3	2.00	1.73	5.77E-03	1	%	0.006	100	infinite	Not aware of any
f_{FG}	Vibration frequency measurement accuracy	0.1	%	Rectangular √3	2.00	1.73	5.77E-02	1	%	0.058	100	infinite	ISO 16063-11 requirement: ≤ 0,05 % of reading
λ_U	Uncertainty on laser wavelength measurement	2.50E-11	nm	Normal k = 2	2.00	2.00	1.25E-11	100	%	0.000	100	infinite	Uncertainty quoted on certificate
$\hat{u}_V$	Accelerometer output voltage measurement (ADC resolution/accuracy)	0.1	%	Rectangular √3	2.00	1.73	5.77E-02	1	%	0.058	100	infinite	Manufacturer's specification worse case on 1 V range
S_F	Filtering effect on sensitivity measurement	0.3	%	Rectangular √3	2.00	1.73	1.73E-01	1	%	0.173	100	infinite	$e=(f/f_{Hp})^2$
G_{CA}	Charge amplifier gain accuracy	0.30	%	Normal k = 2	2.00	2.00	1.50E-01	1	%	0.150	100	infinite	Conditiong amplifier uncertainty
	Resolution of Standard / Equipment (If applicable)										100		
	▼ Unit Under Test / Calibration (Uncorrelated) ▼					NOTE! ONLY CHANGE BLUE CELLS - All OTHER CELLS (WHITE) ARE PROTECTED							
$\hat{u}_D$	Effect of voltage disturbance on accelerometer output voltage measurement	0.05	%	Triangular √6		1.73	2.887E-02	1	%	0.029	100	infinite	$U_{THD} = ½(d/100)^2$; Maximum allowed by ISO 16063
$\hat{u}_T$	Effect of transverse motion on accelerometer output voltage measurement	0.06	%	Triangular √6		1.73	3.464E-02	1	%	0.035	100	infinite	Transeverse error for a transverse sensitivity of 1%
$\hat{u}_{RES}$	Residual effects on accelerometer output voltage measurement	0.1	%	Normal k = 3		2.00	5.000E-02	1	%	0.050	100	infinite	Tribo-electric effect
$\hat{u}_\sigma$	Standard deviation on accelerometer output voltage measurement	0.1	%	Normal k = 3		2.00	5.000E-02	1	%	0.050	100	infinite	ESDM for sensitivity calulation using 100 cycles minimu
	Resolution of UUT / Equipment (If applicable)										100		
	Data - Type "B" Evaluation Range of the results (Rectangular)										100		
	#REF!			Normal k = 1								4	No of Readings 5
About UBM	TOTAL COMBINED UNCERTAINTY									%			

Best Measurement Capability (Excluding UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.383	V_{eff}	infinite	Checked and Approved By:
	Expanded Uncertainty	95,45 % K = 2	**0.767**	k =	**2.00**	
Uncertainty of Measurement (Including UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.392	V_{eff}	infinite	
	Expanded Uncertainty	*95,45 % K = 2*	**0.8**	k =	**2.00**	

UNCERTAINTY BUDGET MATRIX (UBM)	Certificate No	AV\VS-2642
	Procedure No	NML-AV\VS-0001

Reference: Guide to the Expression of Uncertainty in Measurement, issued by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML - ISO 1995 (ISBN 92-67-10188-9)

Description:	Sensitivty calibration (modulus) as per ISO 16063-11 method 3	Make & model:	Brüel & Kjær 8305-001	Range: 5 kHz to 12 kHz	Metrologist
		Serial number:	2571390		Ian Veldman

Mathematical Model: $S = \hat{u}/\hat{a} = \hat{u}/(2\pi f)^2 d$

Symbol	Input Quantity (Source of Uncertainty)	Estimated Uncertainty		Probability Distribution	k	Divisor factor	Standard Uncertainty	Sensitivity Coefficient		Standard Uncertainty Contribution Ui (y)	Reliability	Degrees of Freedom	Remarks
u	▼ Standards and Reference Equipment (Uncorrelated) ▼	(Xi)	Unit	(N, R, T, U)	▼	▼	U(Xi)	Ci	Unit	%	%	v	
φ_{Q}	Interferometer output signal disturbance on phase amplitude	0.1	%	Rectangular √3	2.00	1.73	5.77E-02	1	%	0.058	100	infinite	e.g. offsets, voltage amplitude deviations, <> 90° Corrected with Heydemant procedure
φ_{VD}	Effect of voltage disturbance on phase amplitude measurement	0.12	%	Rectangular √3	2.00	1.73	6.93E-02	0.01	%	0.001	100	infinite	Additive uncorrelated noise is reduced by 1/√n. Where n=number of samples pes vibration cycle. Worse case
φ_{MD}	Effect of motion disturbance on phase amplitude measurement	0.8	%	Rectangular √3	2.00	1.73	4.62E-01	1	%	0.462	100	infinite	Relative motion between sensing spot, exiter and accelerometer. Worse case calculated for 16mm double ended
φ_{PD}	Effect of phase disturbance on phase amplitude measurement	0.1	%	Rectangular √3	2.00	1.73	5.77E-02	1	%	0.058	100	infinite	Corrected for using Heydemann correction procedure
φ_{RE}	Residual interferometric effects on phase amplitude measurement	0.05	%	Rectangular √3	2.00	1.73	2.89E-02	1	%	0.029	100	infinite	Not aware of any
f_{FG}	Vibration frequency measurement accuracy	0.2	%	Rectangular √3	2.00	1.73	1.15E-01	1	%	0.115	100	infinite	ISO 16063-11 requirement: ≤ 0,05 % of reading
λ_{U}	Uncertainty on laser wavelength measurement	2.50E-11	nm	Normal k = 2	2.00	2.00	1.25E-11	100	%	0.000	100	infinite	Uncertainty quoted on certificate
$\hat{u}_{V}$	Accelerometer output voltage measurement (ADC resolution/accuracy)	0.1	%	Rectangular √3	2.00	1.73	5.77E-02	1	%	0.058	100	infinite	Manufacturer's specification worse case on 1 V range
S_{F}	Filtering effect on sensitivity measurement	0.3	%	Rectangular √3	2.00	1.73	1.73E-01	1	%	0.173	100	infinite	$e=(f/f_{Hp})^2$
G_{CA}	Charge amplifier gain accuracy	0.30	%	Normal k = 2	2.00	2.00	1.50E-01	1	%	0.150	100	infinite	Conditiong amplifier uncertainty
	Resolution of Standard / Equipment (If applicable)										100		
	▼ Unit Under Test / Calibration (Uncorrelated) ▼				NOTE! ONLY CHANGE BLUE CELLS - All OTHER CELLS (WHITE) ARE PROTECTED								
$\hat{u}_{D}$	Effect of voltage disturbance on accelerometer output voltage measurement	0.05	%	Triangular √6		1.73	2.887E-02	1	%	0.029	100	infinite	$U_{THD} = ½(d/100)^2$; Maximum allowed by ISO 16063
$\hat{u}_{T}$	Effect of transverse motion on accelerometer output voltage measurement	0.1	%	Triangular √6		1.73	5.774E-02	1	%	0.058	100	infinite	Transeverse error for a transverse sensitivity of 1%
$\hat{u}_{RES}$	Residual effects on accelerometer output voltage measurement	0.3	%	Normal k = 3		2.00	1.500E-01	1	%	0.150	100	infinite	Tribo-electric effect
$\hat{u}_{\sigma}$	Standard deviation on accelerometer output voltage measurement	0.3	%	Normal k = 3		2.00	1.500E-01	1	%	0.150	100	infinite	ESDM for sensitivity calulation using 1000 cycles minim
	Resolution of UUT / Equipment (If applicable)										100		
	Data - Type "B" Evaluation Range of the results (Rectangular)										100		
	#REF!			Normal k = 1								4	No of Readings 5
About UBM	TOTAL COMBINED UNCERTAINTY									%			

Best Measurement Capability (Excluding UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.539	V_{eff}	infinite	Checked and Approved By:
	Expanded Uncertainty	**95,45 %** **K = 2**	**1.078**	**k =**	**2.00**	
Uncertainty of Measurement (Including UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.582	V_{eff}	infinite	
	Expanded Uncertainty	***95,45 %*** ***K = 2***	**1.2**	**k =**	**2.00**	

UNCERTAINTY BUDGET MATRIX (UBM)

Certificate No	AV\VS-2641
Procedure No	NML-AV\VS-0001

Reference: Guide to the Expression of Uncertainty in Measurement, issued by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML - ISO 1995 (ISBN 92-67-10188-9)

Description:	Sensitivty calibration (modulus) as per ISO 16063-11 method 3	Make & model:	Brüel & Kjær 8305s	Range:	10 Hz to 1 000 Hz
		Serial number:	2602106	Metrologist	Ian Veldman

Mathematical Model: $S = \hat{u}/\hat{a} = \hat{u}/(2\pi f)^2 d$

Symbol	Input Quantity (Source of Uncertainty)	Estimated Uncertainty		Probability Distribution	k	Divisor factor	Standard Uncertainty	Sensitivity Coefficient		Standard Uncertainty Contribution Ui (y)	Reliability	Degrees of Freedom	Remarks
u	▼ Standards and Reference Equipment (Uncorrelated) ▼	(Xi)	Unit	(N, R, T, U)	▼	▼	U(Xi)	Ci	Unit	%	%	v	
φ_Q	Interferometer output signal disturbance on phase amplitude	0.01	%	Rectangular √3	2.00	1.73	5.77E-03	1	%	0.006	100	infinite	e.g. offsets, voltage amplitude deviations, <> 90° Corrected with Heydemant procedure
φ_{VD}	Effect of voltage disturbance on phase amplitude measurement	0.01	%	Rectangular √3	2.00	1.73	5.77E-03	0.01	%	0.000	100	infinite	Additive uncorrelated noise is reduced by 1/√n. Where n=number of samples pes vibration cycle. Worse case
φ_{MD}	Effect of motion disturbance on phase amplitude measurement	0.015	%	Rectangular √3	2.00	1.73	8.66E-03	1	%	0.009	100	infinite	Relative motion between sensing spot, exiter and accelerometer. Worse case calculated for 16mm double ended
φ_{PD}	Effect of phase disturbance on phase amplitude measurement	0.01	%	Rectangular √3	2.00	1.73	5.77E-03	1	%	0.006	100	infinite	Corrected for using Heydemann correction procedure
φ_{RE}	Residual interferometric effects on phase amplitude measurement	0.01	%	Rectangular √3	2.00	1.73	5.77E-03	1	%	0.006	100	infinite	Not aware of any
f_{FG}	Vibration frequency measurement accuracy	0.05	%	Rectangular √3	2.00	1.73	2.89E-02	1	%	0.029	100	infinite	ISO 16063-11 requirement: ≤ 0,05 % of reading
λ_U	Uncertainty on laser wavelength measurement	2.50E-11	nm	Normal k = 2	2.00	2.00	1.25E-11	100	%	0.000	100	infinite	Uncertainty quoted on certificate
$\hat{u}_V$	Accelerometer output voltage measurement (ADC resolution/accuracy)	0.12	%	Rectangular √3	2.00	1.73	6.93E-02	1	%	0.069	100	infinite	Manufacturer's specification worse case on 1 V range
S_F	Filtering effect on sensitivity measurement	0.08	%	Rectangular √3	2.00	1.73	4.62E-02	1	%	0.046	100	infinite	$e=(f/f_{Hp})^2$
G_{CA}	Charge amplifier gain accuracy	0.30	%	Normal k = 2	2.00	2.00	1.50E-01	1	%	0.150	100	infinite	Conditiong amplifier uncertainty
	Resolution of Standard / Equipment (If applicable)										100		
	▼ Unit Under Test / Calibration (Uncorrelated) ▼				NOTE! ONLY CHANGE BLUE CELLS - All OTHER CELLS (WHITE) ARE PROTECTED								
$\hat{u}_D$	Effect of voltage disturbance on accelerometer output voltage measurement	0.005	%	Triangular √6		1.73	2.887E-03	1	%	0.003	100	infinite	$U_{THD} = ½(d/100)^2$; Maximum allowed by ISO 16063
$\hat{u}_T$	Effect of transverse motion on accelerometer output voltage measurement	0.1	%	Triangular √6		1.73	5.774E-02	1	%	0.058	100	infinite	Transeverse error for a transverse sensitivity of 1%
$\hat{u}_{RES}$	Residual effects on accelerometer output voltage measurement	0.2	%	Normal k = 3		2.00	1.000E-01	1	%	0.100	100	infinite	Tribo-electric effect
$\hat{u}_\sigma$	Standard deviation on accelerometer output voltage measurement	0.3	%	Normal k = 3		2.00	1.500E-01	1	%	0.150	100	infinite	ESDM for sensitivity calulation using 5 cycles minimum
	Resolution of UUT / Equipment (If applicable)										100		
	Data - Type "B" Evaluation Range of the results (Rectangular)										100		
	#REF!			Normal *k* = 1								4	No of Readings 5
About UBM	TOTAL COMBINED UNCERTAINTY									%			

Best Measurement Capability (Excluding UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.174	V_{eff}	infinite	Checked and Approved By:
	Expanded Uncertainty	**95,45 % K = 2**	**0.349**	***k* =**	**2.00**	
Uncertainty of Measurement (Including UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.257	V_{eff}	infinite	
	Expanded Uncertainty	***95,45 % K = 2***	**0.5**	***k* =**	**2.00**	

UNCERTAINTY BUDGET MATRIX (UBM)

Certificate No	AV\VS-2641	Procedure No	NML-AV\VS-0001

Reference: Guide to the Expression of Uncertainty in Measurement, issued by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML - ISO 1995 (ISBN 92-67-10188-9)

Description:	Sensitivty calibration (modulus) as per ISO 16063-11 method 3	Make & model:	Brüel & Kjær 8305s	Range:	1,25 kHz to 4,5 kHz
		Serial number:	2602106	Metrologist	Ian Veldman

Mathematical Model: $S = \hat{u}/\hat{a} = \hat{u}/(2\pi f)^2 d$

Symbol	Input Quantity (Source of Uncertainty)	Estimated Uncertainty		Probability Distribution	k	Divisor factor	Standard Uncertainty	Sensitivity Coefficient		Standard Uncertainty Contribution Ui(y)	Reliability	Degrees of Freedom	Remarks
u	▼ Standards and Reference Equipment (Uncorrelated) ▼	(Xi)	Unit	(N, R, T, U)	▼	▼	U(Xi)	Ci	Unit	%	%	v	
φ_{Q}	Interferometer output signal disturbance on phase amplitude	0.1	%	Rectangular √3	2.00	1.73	5.77E-02	1	%	0.058	100	infinite	e.g. offsets, voltage amplitude deviations, <> 90° Corrected with Heydemant procedure
φ_{VD}	Effect of voltage disturbance on phase amplitude measurement	0.05	%	Rectangular √3	2.00	1.73	2.89E-02	0.01	%	0.000	100	infinite	Additive uncorrelated noise is reduced by 1/√n. Where n=number of samples pes vibration cycle. Worse case
φ_{MD}	Effect of motion disturbance on phase amplitude measurement	0.5	%	Rectangular √3	2.00	1.73	2.89E-01	1	%	0.289	100	infinite	Relative motion between sensing spot, exiter and accelerometer.
φ_{PD}	Effect of phase disturbance on phase amplitude measurement	0.05	%	Rectangular √3	2.00	1.73	2.89E-02	1	%	0.029	100	infinite	Corrected for using Heydemann correction procedure
φ_{RE}	Residual interferometric effects on phase amplitude measurement	0.01	%	Rectangular √3	2.00	1.73	5.77E-03	1	%	0.006	100	infinite	Not aware of any
f_{FG}	Vibration frequency measurement accuracy	0.1	%	Rectangular √3	2.00	1.73	5.77E-02	1	%	0.058	100	infinite	ISO 16063-11 requirement: ≤ 0,05 % of reading
λ_{U}	Uncertainty on laser wavelength measurement	2.50E-11	nm	Normal k = 2	2.00	2.00	1.25E-11	100	%	0.000	100	infinite	Uncertainty quoted on certificate
$\hat{u}_{V}$	Accelerometer output voltage measurement (ADC resolution/accuracy)	0.1	%	Rectangular √3	2.00	1.73	5.77E-02	1	%	0.058	100	infinite	Manufacturer's specification worse case on 1 V range
S_{F}	Filtering effect on sensitivity measurement	0.3	%	Rectangular √3	2.00	1.73	1.73E-01	1	%	0.173	100	infinite	$e=(f/f_{Hp})^2$
G_{CA}	Charge amplifier gain accuracy	0.30	%	Normal k = 2	2.00	2.00	1.50E-01	1	%	0.150	100	infinite	Conditiong amplifier uncertainty
	Resolution of Standard / Equipment (If applicable)										100		
	▼ Unit Under Test / Calibration (Uncorrelated) ▼												
$\hat{u}_{D}$	Effect of voltage disturbance on accelerometer output voltage measurement	0.05	%	Triangular √6		1.73	2.887E-02	1	%	0.029	100	infinite	$U_{THD} = ½(d/100)^2$; Maximum allowed by ISO 16063
$\hat{u}_{T}$	Effect of transverse motion on accelerometer output voltage measurement	0.06	%	Triangular √6		1.73	3.464E-02	1	%	0.035	100	infinite	Transeverse error for a transverse sensitivity of 1%
$\hat{u}_{RES}$	Residual effects on accelerometer output voltage measurement	0.1	%	Normal k = 3		2.00	5.000E-02	1	%	0.050	100	infinite	Tribo-electric effect
$\hat{u}_{\sigma}$	Standard deviation on accelerometer output voltage measurement	0.1	%	Normal k = 3		2.00	5.000E-02	1	%	0.050	100	infinite	ESDM for sensitivity calulation using 100 cycles minimu
	Resolution of UUT / Equipment (If applicable)										100		
	Data - Type "B" Evaluation Range of the results (Rectangular)										100		
	#REF!			Normal k = 1								4	No of Readings 5
About UBM	TOTAL COMBINED UNCERTAINTY									%			

NOTE! *ONLY CHANGE BLUE CELLS - All OTHER CELLS (WHITE) ARE PROTECTED*

Best Measurement Capability (Excluding UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.383	V_{eff}	infinite	Checked and Approved By:
	Expanded Uncertainty	95,45 % K = 2	0.767	k =	2.00	
Uncertainty of Measurement (Including UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.392	V_{eff}	infinite	
	Expanded Uncertainty	95,45 % K = 2	0.8	k =	2.00	

UNCERTAINTY BUDGET MATRIX (UBM)		Certificate No	AV\VS-2641
		Procedure No	NML-AV\VS-0001

Reference: Guide to the Expression of Uncertainty in Measurement, issued by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML - ISO 1995 (ISBN 92-67-10188-9)

Description:	Sensitivty calibration (modulus) as per ISO 16063-11 method 3	Make & model:	Brüel & Kjær 8305s	Range:	5 kHz to 12 kHz	Metrologist
		Serial number:	2602106			Ian Veldman

Mathematical Model: $S = \hat{u}/\hat{a} = \hat{u}/(2\pi f)^2 d$

Symbol	Input Quantity (Source of Uncertainty)	Estimated Uncertainty		Probability Distribution	k	Divisor factor	Standard Uncertainty	Sensitivity Coefficient		Standard Uncertainty Contribution Ui (y)	Reliability	Degrees of Freedom	Remarks
u	▼ Standards and Reference Equipment (Uncorrelated) ▼	(Xi)	Unit	(N, R, T, U)	▼	▼	U(Xi)	Ci	Unit	%	%	v	
φ_Q	Interferometer output signal disturbance on phase amplitude	0.1	%	Rectangular √3	2.00	1.73	5.77E-02	1	%	0.058	100	infinite	e.g. offsets, voltage amplitude deviations, <> 90° Corrected with Heydemant procedure
φ_{VD}	Effect of voltage disturbance on phase amplitude measurement	0.12	%	Rectangular √3	2.00	1.73	6.93E-02	0.01	%	0.001	100	infinite	Additive uncorrelated noise is reduced by 1/√n. Where n=number of samples pes vibration cycle. Worse case
φ_{MD}	Effect of motion disturbance on phase amplitude measurement	0.8	%	Rectangular √3	2.00	1.73	4.62E-01	1	%	0.462	100	infinite	Relative motion between sensing spot, exiter and accelerometer. Worse case calculated for 16mm double ended
φ_{PD}	Effect of phase disturbance on phase amplitude measurement	0.1	%	Rectangular √3	2.00	1.73	5.77E-02	1	%	0.058	100	infinite	Corrected for using Heydemann correction procedure
φ_{RE}	Residual interferometric effects on phase amplitude measurement	0.05	%	Rectangular √3	2.00	1.73	2.89E-02	1	%	0.029	100	infinite	Not aware of any
f_{FG}	Vibration frequency measurement accuracy	0.2	%	Rectangular √3	2.00	1.73	1.15E-01	1	%	0.115	100	infinite	ISO 16063-11 requirement: ≤ 0,05 % of reading
λ_U	Uncertainty on laser wavelength measurement	2.50E-11	nm	Normal k = 2	2.00	2.00	1.25E-11	100	%	0.000	100	infinite	Uncertainty quoted on certificate
$\hat{u}_V$	Accelerometer output voltage measurement (ADC resolution/accuracy)	0.1	%	Rectangular √3	2.00	1.73	5.77E-02	1	%	0.058	100	infinite	Manufacturer's specification worse case on 1 V range
S_F	Filtering effect on sensitivity measurement	0.3	%	Rectangular √3	2.00	1.73	1.73E-01	1	%	0.173	100	infinite	$e=(f/f_{Hp})^2$
G_{CA}	Charge amplifier gain accuracy	0.30	%	Normal k = 2	2.00	2.00	1.50E-01	1	%	0.150	100	infinite	Conditiong amplifier uncertainty
	Resolution of Standard / Equipment (If applicable)										100		
	▼ Unit Under Test / Calibration (Uncorrelated) ▼												**NOTE!** *ONLY CHANGE BLUE CELLS - All OTHER CELLS (WHITE) ARE PROTECTED*
$\hat{u}_D$	Effect of voltage disturbance on accelerometer output voltage measurement	0.05	%	Triangular √6		1.73	2.887E-02	1	%	0.029	100	infinite	$U_{THD} = ½(d/100)^2$; Maximum allowed by ISO 16063
$\hat{u}_T$	Effect of transverse motion on accelerometer output voltage measurement	0.1	%	Triangular √6		1.73	5.774E-02	1	%	0.058	100	infinite	Transeverse error for a transverse sensitivity of 1%
$\hat{u}_{RES}$	Residual effects on accelerometer output voltage measurement	0.3	%	Normal k = 3		2.00	1.500E-01	1	%	0.150	100	infinite	Tribo-electric effect
$\hat{u}_\sigma$	Standard deviation on accelerometer output voltage measurement	0.3	%	Normal k = 3		2.00	1.500E-01	1	%	0.150	100	infinite	ESDM for sensitivity calulation using 1000 cycles minim
	Resolution of UUT / Equipment (If applicable)										100		
	Data - Type "B" Evaluation Range of the results (Rectangular)										100		
	#REF!			Normal k = 1								4	No of Readings 5
About UBM	TOTAL COMBINED UNCERTAINTY									%			

Best Measurement Capability (Excluding UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.539	V_{eff}	infinite	Checked and Approved By:
	Expanded Uncertainty	**95,45 %** **K = 2**	**1.078**	k =	**2.00**	
Uncertainty of Measurement (Including UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.582	V_{eff}	infinite	
	Expanded Uncertainty	***95,45 %*** ***K = 2***	**1.2**	k =	**2.00**	

UBM V5.03 - NMISA - Vibration Laboratory (Designed by BvO) VS-2641 UoM modulus.xls 5 kHz to 10 kHz

UNCERTAINTY BUDGET MATRIX (UBM)

Certificate No	AV\VS-2642
Procedure No	NML-AV\VS-0001

Reference: Guide to the Expression of Uncertainty in Measurement, issued by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML - ISO 1995 (ISBN 92-67-10188-9)

Description:	Phase shift calibration as per ISO 16063-11 method 3	**Make & model:**	Brüel & Kjær 8305-001	**Range:**	10 Hz to 1 000 Hz	**Metrologist**
		Serial number:	2571390			Ian Veldman

Mathematical Model: $S_{Phase}=UUT_{Phase}-Ref_{Phase}-Ref_{Delay}-AtoD_{Phase}-DSP_{Delay}$

Symbol	Input Quantity (Source of Uncertainty)	Estimated Uncertainty		Probability Distribution	k	Divisor factor	Standard Uncertainty	Sensitivity Coefficient		Standard Uncertainty Contribution Ui (y)	Reliability	Degrees of Freedom	Remarks
u	▼ Standards and Reference Equipment (Uncorrelated) ▼	(Xi)	Unit	(N, R, T, U)	▼	▼	U(Xi)	Ci	Unit	Degrees	%	v	
$\varphi_{s,Q}$	Interferometer output signal disturbance on displacement phase measurement	0.1	Degree	Rectangular √3	2.00	1.73	5.77E-02	1	Degree	0.058	100	infinite	e.g. offsets, voltage amplitude deviations, <> 90° Corrected with Heydemant procedure
$\varphi_{s,VD}$	Effect of voltage disturbance on displacement phase measurement	0.05	Degree	Rectangular √3	2.00	1.73	2.89E-02	1	Degree	0.029	100	infinite	Additive uncorrelated noise is reduced by 1/√n. Where n=number of samples pes vibration cycle. Worse case
$\varphi_{s,MD}$	Effect of motion disturbance on displacement phase measurement	0.05	Degree	Rectangular √3	2.00	1.73	2.89E-02	1	Degree	0.029	100	infinite	Relative motion between sensing spot, exiter and accelerometer. Worse case calculated for 16mm double ended accelerometer.
$\varphi_{s,PD}$	Effect of phase disturbance on displacement phase measurement	0.1	Degree	Rectangular √3	2.00	1.73	5.77E-02	1	Degree	0.058	100	infinite	Corrected for using Heydemann correction procedure
$\varphi_{s,RE}$	Residual interferometric effects on displacement phase measurement	0.02	Degree	Rectangular √3	2.00	1.73	1.15E-02	1	Degree	0.012	100	infinite	Not aware of any
$\Delta\varphi_E$	Environmental effects on phase shift measurement	0.03	Degree	Rectangular √3	2.00	1.73	1.73E-02	1	Degree	0.017	100	infinite	ISO 16063-11 requirement: ≤ 0,05 % of reading
$\varphi_{u,V}$	Accelerometer output phase measurement (ADC resolution/accuracy)	0.2	Degree	Normal k = 2	2.00	2.00	1.00E-01	1	Degree	0.100	100	infinite	SAM phase calculation accuracy
$\varphi_{u,F}$	Filtering effect on accelerometer output phase measurement	0.1	Degree	Rectangular √3	2.00	1.73	5.77E-02	1	Degree	0.058	100	infinite	$e=(f/f_{Hp})^2$
$\varphi_{C,A}$	Charge amplifier phase accuracy	0.30	Degree	Normal k = 2	2.00	2.00	1.50E-01	1	Degree	0.150	100	infinite	
	Resolution of Standard / Equipment (If applicable)										100		
	▼ Unit Under Test / Calibration (Uncorrelated) ▼							**NOTE!** *ONLY CHANGE BLUE CELLS - All OTHER CELLS (WHITE) ARE PROTECTED*					
$\varphi_{u,D}$	Effect of voltage disturbance on accelerometer output phase measurement	0.1	Degree	Triangular √6		1.73	5.774E-02	1	Degree	0.058	100	infinite	U_{THD} = ½(d/100)^2; Maximum allowed by ISO 16063
$\varphi_{u,T}$	Effect of transverse motion on accelerometer output phase measurement	0.05	Degree	Triangular √6		1.73	2.887E-02	1	Degree	0.029	100	infinite	Transeverse error for a transverse sensitivity of 1%
φ_{ESDM}	Standard deviation on accelerometer phase shift measurement	0.05	Degree	Normal k = 3		2.00	2.500E-02	1	Degree	0.025	100	infinite	ESDM for sensitivity calulation using 5 cycles minimum
				Normal k = 2									
	Resolution of UUT / Equipment (If applicable)										100		
	Data - Type "B" Evaluation Range of the results (Rectangular)										100		
	Data - Type "A" Evaluation Exp Std Deviation "s"			Normal *k* = 1								4	No of Readings 5
About UBM	**TOTAL COMBINED UNCERTAINTY**									**Degrees**			

Best Measurement Capability (Excluding UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.211	V_{eff}	infinite	Checked and Approved By:
	Expanded Uncertainty	95,45 % K = 2	**0.423**	*k* =	2.00	
Uncertainty of Measurement (Including UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.222	V_{eff}	infinite	
	Expanded Uncertainty	*95,45 % K = 2*	**0.4**	*k* =	2.00	

UNCERTAINTY BUDGET MATRIX (UBM)

Certificate No	AV\VS-2642
Procedure No	NML-AV\VS-0001

Reference: Guide to the Expression of Uncertainty in Measurement, issued by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML - ISO 1995 (ISBN 92-67-10188-9)

Description:	Phase shift calibration as per ISO 16063-11 method 3	Make & model:	Brüel & Kjær 8305-001	Range:	1,25 kHz to 4,5 kHz
		Serial number:	2571390	Metrologist	Ian Veldman

Mathematical Model: $S_{Phase}=UUT_{Phase}-Ref_{Phase}-Ref_{Delay}-AtoD_{Phase}-DSP_{Delay}$

Symbol	Input Quantity (Source of Uncertainty)	Estimated Uncertainty		Probability Distribution	*k*	Divisor factor	Standard Uncertainty	Sensitivity Coefficient		Standard Uncertainty Contribution *Ui* (y)	Reliability	Degrees of Freedom	Remarks
u	▼ **Standards and Reference Equipment (Uncorrelated) ▼**	*(Xi)*	Unit	(N, R, T, U)	▼	▼	*U(Xi)*	*Ci*	Unit	Degrees	%	*v*	
$\varphi_{s,Q}$	Interferometer output signal disturbance on displacement phase measurement	0.15	Degree	Rectangular √3	2.00	1.73	8.66E-02	1	Degree	0.087	100	infinite	e.g. offsets, voltage amplitude deviations, <> 90° Corrected with Heydemant procedure
$\varphi_{s, VD}$	Effect of voltage disturbance on displacement phase measurement	0.1	Degree	Rectangular √3	2.00	1.73	5.77E-02	1	Degree	0.058	100	infinite	Additive uncorrelated noise is reduced by 1/√n. Where n=number of samples pes vibration cycle. Worse case
$\varphi_{s, MD}$	Effect of motion disturbance on displacement phase measurement	0.1	Degree	Rectangular √3	2.00	1.73	5.77E-02	1	Degree	0.058	100	infinite	Relative motion between sensing spot, exiter and accelerometer. Worse case calculated for 16mm double ended accelerometer.
$\varphi_{s, PD}$	Effect of phase disturbance on displacement phase measurement	0.2	Degree	Rectangular √3	2.00	1.73	1.15E-01	1	Degree	0.115	100	infinite	Corrected for using Heydemann correction procedure
$\varphi_{s, RE}$	Residual interferometric effects on displacement phase measurement	0.08	Degree	Rectangular √3	2.00	1.73	4.62E-02	1	Degree	0.046	100	infinite	Not aware of any
$\Delta\varphi_E$	Environmental effects on phase shift measurement	0.05	Degree	Rectangular √3	2.00	1.73	2.89E-02	1	Degree	0.029	100	infinite	ISO 16063-11 requirement: ≤ 0,05 % of reading
$\varphi_{u,V}$	Accelerometer output phase measurement (ADC resolution/accuracy)	0.25	Degree	Normal k = 2	2.00	2.00	1.25E-01	1	Degree	0.125	100	infinite	SAM phase calculation accuracy
$\varphi_{u,F}$	Filtering effect on accelerometer output phase measurement	0.1	Degree	Rectangular √3	2.00	1.73	5.77E-02	1	Degree	0.058	100	infinite	$e=(f/f_{Hp})^2$
$\varphi_{C,A}$	Charge amplifier phase accuracy	0.25	Degree	Normal k = 2	2.00	2.00	1.25E-01	1	Degree	0.125	100	infinite	
	Resolution of Standard / Equipment (If applicable)										100		
	▼ **Unit Under Test / Calibration (Uncorrelated) ▼**						**NOTE!** *ONLY CHANGE BLUE CELLS - All OTHER CELLS (WHITE) ARE PROTECTED*						
$\varphi_{u,D}$	Effect of voltage disturbance on accelerometer output phase measurement	0.15	Degree	Triangular √6		1.73	8.660E-02	1	Degree	0.087	100	infinite	U_{THD} = ½(d/100)²; Maximum allowed by ISO 16063
$\varphi_{u,T}$	Effect of transverse motion on accelerometer output phase measurement	0.05	Degree	Triangular √6		1.73	2.887E-02	1	Degree	0.029	100	infinite	Transeverse error for a transverse sensitivity of 1%
φ_{ESDM}	Standard deviation on accelerometer phase shift measurement	0.05	Degree	Normal k = 3		2.00	2.500E-02	1	Degree	0.025	100	infinite	ESDM for sensitivity calulation using 5 cycles minimum
				Normal k = 2									
	Resolution of UUT / Equipment (If applicable)										100		
	Data - Type "B" Evaluation Range of the results (Rectangular)										100		
	Data - Type "A" Evaluation Exp Std Deviation "s"			Normal *k* = 1								4	No of Readings 5
About UBM	**TOTAL COMBINED UNCERTAINTY**									**Degrees**			

Best Measurement Capability (<u>Excluding</u> UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.255	V_{eff}	infinite	Checked and Approved By:
	Expanded Uncertainty	**95,45 % K = 2**	**0.511**	***k*** **=**	**2.00**	
Uncertainty of Measurement (Including UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.272	V_{eff}	infinite	
	Expanded Uncertainty	***95,45 % K = 2***	**0.5**	***k*** **=**	**2.00**	

UNCERTAINTY BUDGET MATRIX (UBM)

Certificate No	AV\VS-2642
Procedure No	NML-AV\VS-0001

Reference: Guide to the Expression of Uncertainty in Measurement, issued by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML - ISO 1995 (ISBN 92-67-10188-9)

Description:	Phase shift calibration as per ISO 16063-11 method 3	Make & model:	Brüel & Kjær 8305-001	Range:	5 kHz to 12 kHz	Metrologist
		Serial number:	2571390			Ian Veldman

Mathematical Model: $S_{Phase}=UUT_{Phase}-Ref_{Phase}-Ref_{Delay}-AtoD_{Phase}-DSP_{Delay}$

Symbol	Input Quantity (Source of Uncertainty)	Estimated Uncertainty		Probability Distribution	k	Divisor factor	Standard Uncertainty	Sensitivity Coefficient		Standard Uncertainty Contribution Ui (y)	Reliability	Degrees of Freedom	Remarks
u	▼ Standards and Reference Equipment (Uncorrelated) ▼	(Xi)	Unit	(N, R, T, U)	▼	▼	U(Xi)	Ci	Unit	Degrees	%	v	
$\varphi_{s,Q}$	Interferometer output signal disturbance on displacement phase measurement	0.2	Degree	Rectangular √3	2.00	1.73	1.15E-01	1	Degree	0.115	100	infinite	e.g. offsets, voltage amplitude deviations, <> 90° Corrected with Heydemant procedure
$\varphi_{s,VD}$	Effect of voltage disturbance on displacement phase measurement	0.12	Degree	Rectangular √3	2.00	1.73	6.93E-02	1	Degree	0.069	100	infinite	Additive uncorrelated noise is reduced by 1/√n. Where n=number of samples pes vibration cycle. Worse case
$\varphi_{s,MD}$	Effect of motion disturbance on displacement phase measurement	0.12	Degree	Rectangular √3	2.00	1.73	6.93E-02	1	Degree	0.069	100	infinite	Relative motion between sensing spot, exiter and accelerometer. Worse case calculated for 16mm double ended accelerometer.
$\varphi_{s,PD}$	Effect of phase disturbance on displacement phase measurement	0.15	Degree	Rectangular √3	2.00	1.73	8.66E-02	1	Degree	0.087	100	infinite	Corrected for using Heydemann correction procedure
$\varphi_{s,RE}$	Residual interferometric effects on displacement phase measurement	0.1	Degree	Rectangular √3	2.00	1.73	5.77E-02	1	Degree	0.058	100	infinite	Not aware of any
$\Delta\varphi_E$	Environmental effects on phase shift measurement	0.1	Degree	Rectangular √3	2.00	1.73	5.77E-02	1	Degree	0.058	100	infinite	ISO 16063-11 requirement: ≤ 0,05 % of reading
$\varphi_{u,V}$	Accelerometer output phase measurement (ADC resolution/accuracy)	0.3	Degree	Normal k = 2	2.00	2.00	1.50E-01	1	Degree	0.150	100	infinite	SAM phase calculation accuracy
$\varphi_{u,F}$	Filtering effect on accelerometer output phase measurement	0.5	Degree	Rectangular √3	2.00	1.73	2.89E-01	1	Degree	0.289	100	infinite	$e=(f/f_{Hp})^2$
$\varphi_{C,A}$	Charge amplifier phase accuracy	0.18	Degree	Normal k = 2	2.00	2.00	9.00E-02	1	Degree	0.090	100	infinite	
	Resolution of Standard / Equipment (If applicable)										100		
	▼ Unit Under Test / Calibration (Uncorrelated) ▼												NOTE! ONLY CHANGE BLUE CELLS - All OTHER CELLS (WHITE) ARE PROTECTED
$\varphi_{u,D}$	Effect of voltage disturbance on accelerometer output phase measurement	0.25	Degree	Triangular √6		1.73	1.443E-01	1	Degree	0.144	100	infinite	U_{THD} = ½(d/100)²; Maximum allowed by ISO 16063
$\varphi_{u,T}$	Effect of transverse motion on accelerometer output phase measurement	0.1	Degree	Triangular √6		1.73	5.774E-02	1	Degree	0.058	100	infinite	Transeverse error for a transverse sensitivity of 1%
φ_{ESDM}	Standard deviation on accelerometer phase shift measurement	0.05	Degree	Normal k = 3		2.00	2.500E-02	1	Degree	0.025	100	infinite	ESDM for sensitivity calulation using 5 cycles minimum
				Normal k = 2									
	Resolution of UUT / Equipment (If applicable)										100		
	Data - Type "B" Evaluation Range of the results (Rectangular)										100		
	Data - Type "A" Evaluation Exp Std Deviation "s"			Normal k = 1								4	No of Readings 5
About UBM	TOTAL COMBINED UNCERTAINTY									Degrees			

Best Measurement Capability (<u>Excluding</u> UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.389	V_{eff}	infinite
	Expanded Uncertainty	95,45 % K = 2	0.778	k =	2.00
Uncertainty of Measurement (Including UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.419	V_{eff}	infinite
	Expanded Uncertainty	95,45 % K = 2	0.8	k =	2.00

Checked and Approved By:

UNCERTAINTY BUDGET MATRIX (UBM)

Certificate No	AV\VS-2641
Procedure No	NML-AV\VS-0001

Reference: Guide to the Expression of Uncertainty in Measurement, issued by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML - ISO 1995 (ISBN 92-67-10188-9)

Description:	Phase shift calibration as per ISO 16063-11 method 3	Make & model:	Brüel & Kjær 8305s	Range:	10 Hz to 1 000 Hz	Metrologist
		Serial number:	2602106			Ian Veldman

Mathematical Model: $S_{Phase}=UUT_{Phase}-Ref_{Phase}-Ref_{Delay}-AtoD_{Phase}-DSP_{Delay}$

Symbol	Input Quantity (Source of Uncertainty)	Estimated Uncertainty		Probability Distribution	k	Divisor factor	Standard Uncertainty	Sensitivity Coefficient		Standard Uncertainty Contribution Ui (y)	Reliability	Degrees of Freedom	Remarks
u	▼ Standards and Reference Equipment (Uncorrelated) ▼	(Xi)	Unit	(N, R, T, U)	▼	▼	U(Xi)	Ci	Unit	Degrees	%	v	
$\varphi_{s,Q}$	Interferometer output signal disturbance on displacement phase measurement	0.1	Degree	Rectangular √3	2.00	1.73	5.77E-02	1	Degree	0.058	100	infinite	e.g. offsets, voltage amplitude deviations, <> 90° Corrected with Heydemant procedure
$\varphi_{s,VD}$	Effect of voltage disturbance on displacement phase measurement	0.05	Degree	Rectangular √3	2.00	1.73	2.89E-02	1	Degree	0.029	100	infinite	Additive uncorrelated noise is reduced by 1/√n. Where n=number of samples pes vibration cycle. Worse case
$\varphi_{s,MD}$	Effect of motion disturbance on displacement phase measurement	0.05	Degree	Rectangular √3	2.00	1.73	2.89E-02	1	Degree	0.029	100	infinite	Relative motion between sensing spot, exiter and accelerometer. Worse case calculated for 16mm double ended accelerometer.
$\varphi_{s,PD}$	Effect of phase disturbance on displacement phase measurement	0.1	Degree	Rectangular √3	2.00	1.73	5.77E-02	1	Degree	0.058	100	infinite	Corrected for using Heydemann correction procedure
$\varphi_{s,RE}$	Residual interferometric effects on displacement phase measurement	0.02	Degree	Rectangular √3	2.00	1.73	1.15E-02	1	Degree	0.012	100	infinite	Not aware of any
$\Delta\varphi_E$	Environmental effects on phase shift measurement	0.03	Degree	Rectangular √3	2.00	1.73	1.73E-02	1	Degree	0.017	100	infinite	ISO 16063-11 requirement: ≤ 0,05 % of reading
$\varphi_{u,V}$	Accelerometer output phase measurement (ADC resolution/accuracy)	0.2	Degree	Normal k = 2	2.00	2.00	1.00E-01	1	Degree	0.100	100	infinite	SAM phase calculation accuracy
$\varphi_{u,F}$	Filtering effect on accelerometer output phase measurement	0.1	Degree	Rectangular √3	2.00	1.73	5.77E-02	1	Degree	0.058	100	infinite	$e=(f/f_{Hp})^2$
$\varphi_{C,A}$	Charge amplifier phase accuracy	0.30	Degree	Normal k = 2	2.00	2.00	1.50E-01	1	Degree	0.150	100	infinite	
	Resolution of Standard / Equipment (If applicable)										100		
	▼ Unit Under Test / Calibration (Uncorrelated) ▼						NOTE! ONLY CHANGE BLUE CELLS - All OTHER CELLS (WHITE) ARE PROTECTED						
$\varphi_{u,D}$	Effect of voltage disturbance on accelerometer output phase measurement	0.1	Degree	Triangular √6		1.73	5.774E-02	1	Degree	0.058	100	infinite	U_{THD} = ½(d/100)²; Maximum allowed by ISO 16063
$\varphi_{u,T}$	Effect of transverse motion on accelerometer output phase measurement	0.05	Degree	Triangular √6		1.73	2.887E-02	1	Degree	0.029	100	infinite	Transeverse error for a transverse sensitivity of 1%
φ_{ESDM}	Standard deviation on accelerometer phase shift measurement	0.05	Degree	Normal k = 3		2.00	2.500E-02	1	Degree	0.025	100	infinite	ESDM for sensitivity calulation using 5 cycles minimum
				Normal k = 2									
	Resolution of UUT / Equipment (If applicable)										100		
	Data - Type "B" Evaluation Range of the results (Rectangular)										100		
	Data - Type "A" Evaluation Exp Std Deviation "s"			Normal *k* = 1								4	No of Readings 5
About UBM	TOTAL COMBINED UNCERTAINTY									Degrees			

Best Measurement Capability (Excluding UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.211	V_{eff}	infinite	Checked and Approved By:
	Expanded Uncertainty	95,45 % K = 2	**0.423**	*k* =	**2.00**	
Uncertainty of Measurement (Including UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.222	V_{eff}	infinite	
	Expanded Uncertainty	*95,45 %* *K = 2*	**0.4**	*k* =	**2.00**	

UNCERTAINTY BUDGET MATRIX (UBM)

Certificate No	AV\VS-2641
Procedure No	NML-AV\VS-0001

Reference: Guide to the Expression of Uncertainty in Measurement, issued by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML - ISO 1995 (ISBN 92-67-10188-9)

Description:	Phase shift calibration as per ISO 16063-11 method 3	Make & model:	Brüel & Kjær 8305s	Range:	1,25 kHz to 4,5 kHz	Metrologist
		Serial number:	2602106			Ian Veldman

Mathematical Model: $S_{Phase}=UUT_{Phase}-Ref_{Phase}-Ref_{Delay}-AtoD_{Phase}-DSP_{Delay}$

Symbol	Input Quantity (Source of Uncertainty)	Estimated Uncertainty		Probability Distribution	k	Divisor factor	Standard Uncertainty	Sensitivity Coefficient		Standard Uncertainty Contribution Ui(y)	Reliability	Degrees of Freedom	Remarks
u	▼ Standards and Reference Equipment (Uncorrelated) ▼	(Xi)	Unit	(N, R, T, U)	▼	▼	U(Xi)	Ci	Unit	Degrees	%	v	
$\varphi_{s,Q}$	Interferometer output signal disturbance on displacement phase measurement	0.15	Degree	Rectangular √3	2.00	1.73	8.66E-02	1	Degree	0.087	100	infinite	e.g. offsets, voltage amplitude deviations, <> 90° Corrected with Heydemant procedure
$\varphi_{s,VD}$	Effect of voltage disturbance on displacement phase measurement	0.1	Degree	Rectangular √3	2.00	1.73	5.77E-02	1	Degree	0.058	100	infinite	Additive uncorrelated noise is reduced by 1/√n. Where n=number of samples pes vibration cycle. Worse case
$\varphi_{s,MD}$	Effect of motion disturbance on displacement phase measurement	0.1	Degree	Rectangular √3	2.00	1.73	5.77E-02	1	Degree	0.058	100	infinite	Relative motion between sensing spot, exiter and accelerometer. Worse case calculated for 16mm double ended accelerometer.
$\varphi_{s,PD}$	Effect of phase disturbance on displacement phase measurement	0.2	Degree	Rectangular √3	2.00	1.73	1.15E-01	1	Degree	0.115	100	infinite	Corrected for using Heydemann correction procedure
$\varphi_{s,RE}$	Residual interferometric effects on displacement phase measurement	0.08	Degree	Rectangular √3	2.00	1.73	4.62E-02	1	Degree	0.046	100	infinite	Not aware of any
$\Delta\varphi_E$	Environmental effects on phase shift measurement	0.05	Degree	Rectangular √3	2.00	1.73	2.89E-02	1	Degree	0.029	100	infinite	ISO 16063-11 requirement: ≤ 0,05 % of reading
$\varphi_{u,V}$	Accelerometer output phase measurement (ADC resolution/accuracy)	0.25	Degree	Normal k = 2	2.00	2.00	1.25E-01	1	Degree	0.125	100	infinite	SAM phase calculation accuracy
$\varphi_{u,F}$	Filtering effect on accelerometer output phase measurement	0.1	Degree	Rectangular √3	2.00	1.73	5.77E-02	1	Degree	0.058	100	infinite	$e=(f/f_{Hp})^2$
$\varphi_{C,A}$	Charge amplifier phase accuracy	0.25	Degree	Normal k = 2	2.00	2.00	1.25E-01	1	Degree	0.125	100	infinite	
	Resolution of Standard / Equipment (If applicable)										100		
	▼ Unit Under Test / Calibration (Uncorrelated) ▼						NOTE! ONLY CHANGE BLUE CELLS - All OTHER CELLS (WHITE) ARE PROTECTED						
$\varphi_{u,D}$	Effect of voltage disturbance on accelerometer output phase measurement	0.15	Degree	Triangular √6		1.73	8.660E-02	1	Degree	0.087	100	infinite	U_{THD} = ½(d/100)²; Maximum allowed by ISO 16063
$\varphi_{u,T}$	Effect of transverse motion on accelerometer output phase measurement	0.05	Degree	Triangular √6		1.73	2.887E-02	1	Degree	0.029	100	infinite	Transeverse error for a transverse sensitivity of 1%
φ_{ESDM}	Standard deviation on accelerometer phase shift measurement	0.05	Degree	Normal k = 3		2.00	2.500E-02	1	Degree	0.025	100	infinite	ESDM for sensitivity calulation using 5 cycles minimum
				Normal k = 2									
	Resolution of UUT / Equipment (If applicable)										100		
	Data - Type "B" Evaluation Range of the results (Rectangular)										100		
	Data - Type "A" Evaluation Exp Std Deviation "s"			Normal *k* = 1								4	No of Readings 5
About UBM	TOTAL COMBINED UNCERTAINTY									Degrees			

Best Measurement Capability (<u>Excluding</u> UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.255	V_{eff}	infinite	Checked and Approved By:
	Expanded Uncertainty	95,45 % K = 2	0.511	k =	2.00	
Uncertainty of Measurement (Including UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.272	V_{eff}	infinite	
	Expanded Uncertainty	*95,45 %* *K = 2*	0.5	k =	2.00	

UNCERTAINTY BUDGET MATRIX (UBM)		Certificate No	AV\VS-2641
		Procedure No	NML-AV\VS-0001

Reference: Guide to the Expression of Uncertainty in Measurement, issued by BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML - ISO 1995 (ISBN 92-67-10188-9)

Description:	Phase shift calibration as per ISO 16063-11 method 3	Make & model:	Brüel & Kjær 8305s	Range:	5 kHz to 12 kHz	Metrologist
		Serial number:	2602106			Ian Veldman

Mathematical Model: $S_{Phase}=UUT_{Phase}-Ref_{Phase}-Ref_{Delay}-AtoD_{Phase}-DSP_{Delay}$

Symbol	Input Quantity (Source of Uncertainty)	Estimated Uncertainty		Probability Distribution	k	Divisor factor	Standard Uncertainty	Sensitivity Coefficient		Standard Uncertainty Contribution Ui (y)	Reliability	Degrees of Freedom	Remarks
u	▼ Standards and Reference Equipment (Uncorrelated) ▼	(Xi)	Unit	(N, R, T, U)	▼	▼	U(Xi)	Ci	Unit	Degrees	%	v	
$\varphi_{s,Q}$	Interferometer output signal disturbance on displacement phase measurement	0.2	Degree	Rectangular √3	2.00	1.73	1.15E-01	1	Degree	0.115	100	infinite	e.g. offsets, voltage amplitude deviations, <> 90° Corrected with Heydemant procedure
$\varphi_{s,VD}$	Effect of voltage disturbance on displacement phase measurement	0.12	Degree	Rectangular √3	2.00	1.73	6.93E-02	1	Degree	0.069	100	infinite	Additive uncorrelated noise is reduced by 1/√n. Where n=number of samples pes vibration cycle. Worse case
$\varphi_{s,MD}$	Effect of motion disturbance on displacement phase measurement	0.12	Degree	Rectangular √3	2.00	1.73	6.93E-02	1	Degree	0.069	100	infinite	Relative motion between sensing spot, exiter and accelerometer. Worse case calculated for 16mm double ended accelerometer.
$\varphi_{s,PD}$	Effect of phase disturbance on displacement phase measurement	0.15	Degree	Rectangular √3	2.00	1.73	8.66E-02	1	Degree	0.087	100	infinite	Corrected for using Heydemann correction procedure
$\varphi_{s,RE}$	Residual interferometric effects on displacement phase measurement	0.1	Degree	Rectangular √3	2.00	1.73	5.77E-02	1	Degree	0.058	100	infinite	Not aware of any
$\Delta\varphi_E$	Environmental effects on phase shift measurement	0.1	Degree	Rectangular √3	2.00	1.73	5.77E-02	1	Degree	0.058	100	infinite	ISO 16063-11 requirement: ≤ 0,05 % of reading
$\varphi_{u,V}$	Accelerometer output phase measurement (ADC resolution/accuracy)	0.3	Degree	Normal k = 2	2.00	2.00	1.50E-01	1	Degree	0.150	100	infinite	SAM phase calculation accuracy
$\varphi_{u,F}$	Filtering effect on accelerometer output phase measurement	0.5	Degree	Rectangular √3	2.00	1.73	2.89E-01	1	Degree	0.289	100	infinite	$e=(f/f_{Hp})^2$
$\varphi_{C,A}$	Charge amplifier phase accuracy	0.18	Degree	Normal k = 2	2.00	2.00	9.00E-02	1	Degree	0.090	100	infinite	
	Resolution of Standard / Equipment (If applicable)										100		
	▼ Unit Under Test / Calibration (Uncorrelated) ▼												NOTE! ONLY CHANGE BLUE CELLS - All OTHER CELLS (WHITE) ARE PROTECTED
$\varphi_{u,D}$	Effect of voltage disturbance on accelerometer output phase measurement	0.25	Degree	Triangular √6		1.73	1.443E-01	1	Degree	0.144	100	infinite	U_{THD} = ½(d/100)^2; Maximum allowed by ISO 16063
$\varphi_{u,T}$	Effect of transverse motion on accelerometer output phase measurement	0.1	Degree	Triangular √6		1.73	5.774E-02	1	Degree	0.058	100	infinite	Transeverse error for a transverse sensitivity of 1%
φ_{ESDM}	Standard deviation on accelerometer phase shift measurement	0.05	Degree	Normal k = 3		2.00	2.500E-02	1	Degree	0.025	100	infinite	ESDM for sensitivity calulation using 5 cycles minimum
				Normal k = 2									
	Resolution of UUT / Equipment (If applicable)										100		
	Data - Type "B" Evaluation Range of the results (Rectangular)										100		
	Data - Type "A" Evaluation Exp Std Deviation "s"			Normal k = 1								4	No of Readings 5
About UBM	TOTAL COMBINED UNCERTAINTY									Degrees			

Best Measurement Capability (Excluding UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.389	V_{eff}	infinite	Checked and Approved By:
	Expanded Uncertainty	95,45 % K = 2	0.778	k =	2.00	
Uncertainty of Measurement (Including UUT contribution)	Combined Uncertainty (Normal)	▼ Level of Confidence ▼	0.419	V_{eff}	infinite	
	Expanded Uncertainty	95,45 % K = 2	0.8	k =	2.00	

C.4 DPLA

Budget of Uncertainties Quadrature system with WQ-2914---

Notes: 8305 on filter

All values except the last line are 1 sigma values
Budget of uncertainty for a piezoelectric accelerometer at 50-100 m/s(^2) at the higher frequencies.
Temperature influence on accelerometer not included.

i	Quantity	Description	Unc. Contribution	Relative expanded uncertainty or bounds of estimated error components [%]	Probability distribution model	Factor xi	Relative contribution urel,i (y) f 160 %	> 10 Hz to 20 Hz %	> 20 Hz to 40 Hz %	> 40 Hz to 500 Hz %	> 500 Hz to 1,25 kHz %	> 1,25 kHz to 2 kHz %	> 2 kHz to 4 kHz %	> 4 kHz to 5 kHz %	> 5 kHz to 7 kHz %	> 7 kHz to 10 kHz %
1	$u(\hat{u}_V)$	Output voltage Measurement	u1 (S)	0,124	Normal (k = 2)	0,500	0,062	0,062	0,062	0,062	0,062	0,062	0,062	0,062	0,062	0,062
2	$u(\hat{u}_F)$	Voltage filtering effect on accelerometer output amplitude measurement (frequency b	u2 (S)	0,010	Rectangular	0,577	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006
3	$u(\hat{u}_D)$	Effect of voltage disturbance on accelerometer output voltage measurement (e.g. hu	u3 (S)	0,010	Rectangular	0,577	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006
4	$u(\hat{u}_T)$	Effect of transverse, rocking and bending acceleration on accelerometer output volta	u4 (S)	0,100	Special	0,236	0,024	0,024	0,024	0,024	0,024	0,024	0,024	0,047	0,047	0,071
4a	$u(s_Q)$	Calibration factor for Reference charge amplifier	u4a (S)	0,176	Normal (k = 2)	0,500	0,088	0,089	0,088	0,088	0,088	0,088	0,088	0,088	0,088	0,088
5	$u(\hat{\varphi}_{M,Q})$	Effect of interferometer quadrature output signal disturbance on phase amplitude me	u5 (S)	0,050	Rectangular	0,577	0,029	0,029	0,029	0,029	0,029	0,029	0,058	0,058	0,058	0,058
6	$u(\hat{\varphi}_{M,F})$	Interferometer signal filtering effect on phase amplitude measurement (frequency bar	u6 (S)	Included in 5												
7	$u(\hat{\varphi}_{M,VD})$	Effect of voltage disturbance on phase amplitude measurement (e.g. random noise ir	u7 (S)	Included in 5												
8	$u(\hat{\varphi}_{M,MD})$	Effect of motion disturbance on phase amplitude measurement (e.g. drift; relative mo	u8 (S)	0,100	Rectangular	0,236	0,024	0,024	0,024	0,024	0,024	0,024	0,025	0,037	0,037	0,059
9	$u(\hat{\varphi}_{M,PD})$	Effect of phase disturbance on phase amplitude measurement (e.g. phase noise of th	u9 (S)	Included in 5												
10	$u(\hat{\varphi}_{M,RE})$	Residual interferometric effects on phase amplitude measurement (interferometer fur	u10 (S)	Included in 5												
11	$u(f_{FG})$	Vibration frequency measurement (frequency generator and indicator)	u11 (S)	0,0025	Rectangular	1,1547	0,0029	0,0029	0,0029	0,0029	0,0029	0,0029	0,0029	0,0029	0,0029	0,0029
12	$u(S_{RE})$	Residual effects on sensitivity measurement (e.g. random effect in repeat measurem	u12 (S)	0,089	Rectangular	0,577	0,047	0,052	0,052	0,052	0,052	0,052	0,074	0,074	0,074	0,124
	urel(S2)	**Uncertainty for accelerometer sensitivity S2**		**Standard uncertainty (k = 1)**			**0,147**	**0,150**	**0,149**	**0,149**	**0,149**	**0,149**	**0,171**	**0,188**	**0,188**	**0,248**
		Uncertainty for accelerometer sensitivity S2		**95% conf.level uncertainty (k = 2)**			**0,294**	**0,300**	**0,299**	**0,299**	**0,299**	**0,299**	**0,341**	**0,375**	**0,375**	**0,495**

Budget of Uncertainties   Quadrature system with WQ-2914---

Notes: 8305-001 directly on Be shaker table

All values except the last line are 1 sigma values
Budget of uncertainty for a piezoelectric accelerometer at 50-100 m/s(^2) at the higher frequencies.
Temperature influence on accelerometer not included.

i	Quantity	Description	Unc. Contribution	Relative expanded uncertainty or bounds of estimated error components [%]	Probability distribution model	Factor xi	f: 160 (Relative contribution urel,i (y)) %	> 10 Hz to 20 Hz %	> 20 Hz to 40 Hz %	> 40 Hz to 500 Hz %	> 500 Hz to 1,25 kHz %	> 1,25 kHz to 2 kHz %	> 2 kHz to 4 kHz %	> 4 kHz to 5 kHz %	> 5 kHz to 7 kHz %	> 7 kHz to 10 kHz %
1	$u(\hat{u}_V)$	Output voltage Measurement	u1 (S)	0,124	Normal (k = 2)	0,500	0,062	0,062	0,062	0,062	0,062	0,062	0,062	0,062	0,062	0,062
2	$u(\hat{u}_F)$	Voltage filtering effect on accelerometer output amplitude measurement (frequency b	u2 (S)	0,010	Rectangular	0,577	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006
3	$u(\hat{u}_D)$	Effect of voltage disturbance on accelerometer output voltage measurement (e.g. hu	u3 (S)	0,010	Rectangular	0,577	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006
4	$u(\hat{u}_T)$	Effect of transverse, rocking and bending acceleration on accelerometer output volta	u4 (S)	0,100	Special	0,236	0,024	0,024	0,024	0,024	0,024	0,024	0,024	0,141	0,141	0,354
4a	$u(s_Q)$	Calibration factor for Reference charge amplifier	u4a (S)	0,176	Normal (k = 2)	0,500	0,088	0,089	0,088	0,088	0,088	0,088	0,088	0,088	0,088	0,088
5	$u(\hat{\varphi}_{M,Q})$	Effect of interferometer quadrature output signal disturbance on phase amplitude me	u5 (S)	0,050	Rectangular	0,577	0,029	0,029	0,029	0,029	0,029	0,029	0,058	0,058	0,058	0,058
6	$u(\hat{\varphi}_{M,F})$	Interferometer signal filtering effect on phase amplitude measurement (frequency ba	u6 (S)	Included in 5												
7	$u(\hat{\varphi}_{M,VD})$	Effect of voltage disturbance on phase amplitude measurement (e.g. random noise i	u7 (S)	Included in 5												
8	$u(\hat{\varphi}_{M,MD})$	Effect of motion disturbance on phase amplitude measurement (e.g. drift; relative mo	u8 (S)	0,100	Rectangular	0,236	0,024	0,024	0,024	0,024	0,024	0,024	0,025	0,076	0,076	0,130
9	$u(\hat{\varphi}_{M,PD})$	Effect of phase disturbance on phase amplitude measurement (e.g. phase noise of tl	u9 (S)	Included in 5												
10	$u(\hat{\varphi}_{M,RE})$	Residual interferometric effects on phase amplitude measurement (interferometer fu	u10 (S)	Included in 5												
11	$u(f_{FG})$	Vibration frequency measurement (frequency generator and indicator)	u11 (S)	0,0025	Rectangular	1,1547	0,0029	0,0029	0,0029	0,0029	0,0029	0,0029	0,0029	0,0029	0,0029	0,0029
12	$u(S_{RE})$	Residual effects on sensitivity measurement (e.g. random effect in repeat measurem	u12 (S)	0,128	Rectangular	0,577	0,047	0,074	0,074	0,098	0,098	0,098	0,074	0,098	0,098	0,124
	urel(S2)	**Uncertainty for accelerometer sensitivity S2**		**Standard uncertainty (k = 1)**			**0,147**	**0,160**	**0,160**	**0,174**	**0,174**	**0,174**	**0,171**	**0,288**	**0,288**	**0,524**
		Uncertainty for accelerometer sensitivity S2		**95% conf.level uncertainty (k = 2)**			**0,294**	**0,321**	**0,320**	**0,349**	**0,349**	**0,349**	**0,341**	**0,575**	**0,575**	**1,048**
																1,365 at 9 kHz

Budget of Uncertainties — Quadrature system with air-bearing shaker
Phase

Notes: 8305 on filter on Be table.

All values are 1 sigma values
Budget of uncertainty for a piezoelectric accelerometer at 50-100 m/s(^2) at the higher frequencies.
Temperature influence on accelerometer not included.

i	Quantity	Description (Numbering following ISO 16063-11 Table A.4)	Unc. Contribution	Relative expanded uncertainty or bounds of estimated error components [degrees]	Probability distribution model	Factor xi	Frequency 160 — Relative contribution urel,i (y) [degrees]	10 Hz to 20 Hz [degrees]	> 20 Hz to 40 Hz [degrees]	> 40 Hz to 500 Hz [degrees]	> 500 Hz to 1,25 kHz [degrees]	> 1,25 kHz to 2 kHz [degrees]	> 2 kHz to 4 kHz [degrees]	> 4 kHz to 5 kHz [degrees]	> 5 kHz to 7 kHz [degrees]	> 7 kHz to 10 kHz [degrees]
	φ_u	φ_s														
1	u($\varphi_{u,V}$)	Accelerometer output phase measurement (waveform recorder; e.g. ADCresolution)	u1 (S)	0,2	Rectangular	0,577	0,115	0,115	0,115	0,115	0,115	0,115	0,115	0,115	0,144	0,404
2	u($\varphi_{u,F}$)	Voltage filtering effect on accelerometer output phase measurement (frequency band limitation)	u2 (S)	Included in 1	Rectangular	0,577										
3	u($\varphi_{u,D}$)	Effect of voltage disturbance on accelerometer output voltage phase measurement (e.g. hum and noise)	u3 (S)	0,01	Rectangular	0,577	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006
4	u($\varphi_{u,T}$)	Effect of transverse, rocking and bending acceleration on accelerometer output voltage phase measurement (transverse sensitiv	u4 (S)	0,06	Special	0,236	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,028	0,028	0,042
4a	u($\varphi_{u,Q}$)	Calibration factor for Reference charge amplifier phase response	u4a (S)	0,08	Rectangular	0,577	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,014	0,040
5	u($\varphi_{s,Q}$)	Effect of interferometer quadrature output signal disturbance on displacement phase amplitude measurement (e.g. offsets, volta	u5 (S)	0,01	Rectangular	0,577	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006
6	u($\varphi_{s,F}$)	Interferometer signal filtering effect on displacement phase amplitude measurement (frequency band limitation)	u6 (S)	Included in 5												
7	u($\varphi_{s,VD}$)	Effect of voltage disturbance on displacement phase amplitude measurement (e.g. random noise in the photoelectric measuring	u7 (S)	Included in 5												
8	u($\varphi_{s,MD}$)	Effect of motion disturbance on displacement phase amplitude measurement (e.g. drift; relative motion between the accelerome	u8 (S)	0	Rectangular	0,577	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
9	u($\varphi_{s,PD}$)	Effect of phase disturbance on displacement phase amplitude measurement (e.g. phase noise of the interferometer signals)	u9 (S)	Included in 5												
10	u($\varphi_{s,RE}$)	Residual interferometric effects on displacement phase amplitude measurement (interferometer function)	u10 (S)	0,01	Rectangular	0,577	0,006	0,006	0,006	0,006	0,006	0,006	0,023	0,023	0,052	0,115
11	u($\Delta\varphi_{RE}$)	Residual effects on phase shift measurement (e.g. random effect in repeat measurements; experimental standard deviation of a	u12 (S)	0,05	Rectangular	0,577	0,029	0,029	0,029	0,029	0,029	0,029	0,029	0,029	0,115	0,115
	u($\Delta\varphi$)	Uncertainty for accelerometer phase $\Delta\varphi$		Standard uncertainty (k = 1)			**0,121**	**0,121**	**0,121**	**0,121**	**0,121**	**0,121**	**0,123**	**0,125**	**0,195**	**0,440**
		Expanded uncertainty for accelerometer phase $\Delta\varphi$		95% conf.level uncertainty (k = 2)			**0,242**	**0,242**	**0,242**	**0,242**	**0,242**	**0,242**	**0,246**	**0,251**	**0,390**	**0,880**

Budget of Uncertainties — Quadrature system with air-bearing shaker
Phase
Notes: 8305-001 on Be table.

All values are 1 sigma values
Budget of uncertainty for a piezoelectric accelerometer at 50-100 m/s(^2) at the higher frequencies.
Temperature influence on accelerometer not included.

i	Quantity (Numbering following ISO 16063-11 Table A.4)	Description	Unc. Contribution	Relative expanded uncertainty or bounds of estimated error components [degrees]	Probability distribution model	Factor xi	Frequency 160 [degrees]	10 Hz to 20 Hz [degrees]	> 20 Hz to 40 Hz [degrees]	> 40 Hz to 500 Hz [degrees]	> 500 Hz to 1,25 kHz [degrees]	> 1,25 kHz to 2 kHz [degrees]	> 2 kHz to 4 kHz [degrees]	> 4 kHz to 5 kHz [degrees]	> 5 kHz to 7 kHz [degrees]	> 7 kHz to 10 kHz [degrees]
	φ_u	φ_s					Relative contribution urel,i (y)									
1	$u(\varphi_{u,V})$	Accelerometer output phase measurement (waveform recorder; e.g. ADCresolution)	u1 (S)	0,2	Rectangular	0,577	0,115	0,115	0,115	0,115	0,115	0,115	0,115	0,115	0,144	0,404
2	$u(\varphi_{u,F})$	Voltage filtering effect on accelerometer output phase measurement (frequency band limitation)	u2 (S)	Included in 1	Rectangular	0,577										
3	$u(\varphi_{u,D})$	Effect of voltage disturbance on accelerometer output voltage phase measurement (e.g. hum and noise)	u3 (S)	0,01	Rectangular	0,577	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006
4	$u(\varphi_{u,T})$	Effect of transverse, rocking and bending acceleration on accelerometer output voltage phase measurement (transverse sensitiv	u4 (S)	0,06	Special	0,236	0,014	0,014	0,014	0,014	0,014	0,014	0,014	0,028	0,028	0,042
4a	$u(\varphi_{u,Q})$	Calibration factor for Reference charge amplifier phase response	u4a (S)	0,08	Rectangular	0,577	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,012	0,014	0,040
5	$u(\varphi_{s,Q})$	Effect of interferometer quadrature output signal disturbance on displacement phase amplitude measurement (e.g. offsets, volta	u5 (S)	0,01	Rectangular	0,577	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006	0,006
6	$u(\varphi_{s,F})$	Interferometer signal filtering effect on displacement phase amplitude measurement (frequency band limitation)	u6 (S)	Included in 5												
7	$u(\varphi_{s,VD})$	Effect of voltage disturbance on displacement phase amplitude measurement (e.g. random noise in the photoelectric measuring	u7 (S)	Included in 5												
8	$u(\varphi_{s,MD})$	Effect of motion disturbance on displacement phase amplitude measurement (e.g. drift; relative motion between the accelerome	u8 (S)	0,05	Rectangular	0,577	0,029	0,029	0,029	0,029	0,029	0,029	0,058	0,058	0,115	0,115
9	$u(\varphi_{s,PD})$	Effect of phase disturbance on displacement phase amplitude measurement (e.g. phase noise of the interferometer signals)	u9 (S)	Included in 5												
10	$u(\varphi_{s,RE})$	Residual interferometric effects on displacement phase amplitude measurement (interferometer function)	u10 (S)	0,01	Rectangular	0,577	0,006	0,006	0,006	0,006	0,006	0,006	0,023	0,023	0,052	0,115
11	$u(\Delta\varphi_{RE})$	Residual effects on phase shift measurement (e.g. random effect in repeat measurements; experimental standard deviation of a	u12 (S)	0,05	Rectangular	0,577	0,029	0,029	0,029	0,029	0,029	0,029	0,029	0,029	0,115	0,115
	$u(\Delta\varphi)$	Uncertainty for accelerometer phase $\Delta\varphi$		Standard uncertainty (k = 1)			**0,124**	**0,124**	**0,124**	**0,124**	**0,124**	**0,124**	**0,136**	**0,138**	**0,226**	**0,455**
		Expanded uncertainty for accelerometer phase $\Delta\varphi$		95% conf.level uncertainty (k = 2)			**0,248**	**0,248**	**0,248**	**0,248**	**0,248**	**0,248**	**0,272**	**0,276**	**0,453**	**0,910**

C.5 CEM

Uncertainty budget

Magnitude

Description	Frequency range (Hz)	Relative expanded uncertainty (%)	Probability distribution	Factor	Uncertainty type	Uncertainty contribution
Laser	10 - 10 000	0,26	normal	2	B	0,13
Voltage	10 - 10 000	0,06	normal	2	B	0,03
Angular frequency of vibration	10 - 10 000	0,002	rectangular	1,732	B	0,001
Gain coefficient (amplifiers)	10 - 10 000	0,04	normal	2	B	0,02
Frequency response	10 - 5 000	0,10	normal	2	B	0,05
	>5 000 - 10 000	0,40				0,20
Transverse motion	10 - 5 000	0,02	rectangular	1,732	B	0,01
	>5 000 - 10 000	0,10				0,06
Hum	10 - 10 000	0,02	rectangular	1,732	B	0,01
Noise	10 - 10 000	0,00	rectangular	1,732	B	0,001
Sensor mounting	10 - 5 000	0,10	rectangular	1,732	B	0,06
	>5 000 - 10 000	0,20				0,12
Relative Motion	5 - 10 000	0,01	rectangular	1,732	B	0,01
Temperature response	10 - 10 000	0,003	rectangular	1,732	B	0,002
Magnetic field influence	10 - 10 000	0,002	rectangular	1,732	B	0,001
Repetibility	10 - 5 000	0,10	normal	1	A	0,10
	>5 000 - 10 000	0,30				0,30
Temperature influence on sensor	10 - 10 000	0,05	rectangular	1,732	B	0,03
		Expanded uncertainty (10 Hz - 5 kHz)				0,4
		Expanded uncertainty (>5 kHz -10 kHz)				0,8

Phase

Description	Frequency range (Hz)	Relative expanded uncertainty (1º)	Probability distribution	Factor	Uncertainty type	Uncertainty contribution
Laser	10 - 10 000	0,10	normal	2	B	0,05
Voltage	10 - 10 000	0,015	normal	2	B	0,008
Gain coefficient (amplifiers)	10 - 10 000	0,20	normal	2	B	0,10
Frequency response	10 - 1 000	0,20	normal	2	B	0,10
	>1 000 - 10 000	0,40				0,20
Transverse motion	10 - 1 000	0,20	rectangular	1,732	B	0,12
	>1 000 - 10 000	0,60				0,35
Hum	10 - 10 000	0,02	rectangular	1,732	B	0,012
Noise	10 - 10 000	0,02	rectangular	1,732	B	0,012
Sensor mounting	10 - 1 000	0,20	rectangular	1,732	B	0,12
	>1 000 - 10 000	0,30				0,17
Temperature response	10 - 10 000	0,01	rectangular	1,732	B	0,006
Magnetic field influence	10 - 10 000	0,10	rectangular	1,732	B	0,058
Repetibility	10 - 1 000	0,10	normal	1	A	0,10
	>1 000 - 10 000	0,25				0,25
		Expanded uncertainty (10 Hz - 1 kHz)				0,5
		Expanded uncertainty (>1 kHz -10 kHz)				1,0

Remarks: Other possible contributions are considered negligible. The uncertainties for 10 kHz for the back to back sensor are higher because of their repeatability contributions are much higher as a consequence of a resonance problem of the sensor.

C.6 GUM

C.6.1 SE-Sensor, magnitude

Central Office of Measures (GUM), Poland 2010-05-05
Calibration report 1 of CIPM Key Comparison CCAUV.V-K2 Page 3/4

10. **Uncertainty budget**

10.1. **Uncertainty budget for magnitude**

i	Source of uncertainty	Distribution (type of uncertainty)	Uncertainty contribution					
			10 Hz to 16 Hz	20 Hz to < 5 kHz	5 kHz	> 5 kHz to 8 kHz	>8 kHz to < 10 kHz	10 kHz
1	Accelerometer output voltage measurement	normal (B)	0,00045	0,00045	0,00045	0,00045	0,00045	0,00045
2	Vibration velocity	normal (B)	0,00010	0,00010	0,00010	0,00010	0,00010	0,00015
3	Frequency of vibration signal	rectangular (B)	0,00001	0,00001	0,00001	0,00001	0,00001	0,00001
4	Amplifier transfer coefficient (gain)	normal (B)	0,00040	0,00040	0,00040	0,00040	0,00040	0,00040
5	Frequency response	normal (B)	0,00050	0,00050	0,00050	0,00400	0,00400	0,00400
6	Transverse motion	rectangular (B)	0,00010	0,00010	0,00010	0,00100	0,00100	0,00100
7	Harmonics	rectangular (B)	0,00001	0,00001	0,00001	0,00001	0,00001	0,00001
8	Hum	normal (B)	0,00010	0,00010	0,00010	0,00010	0,00010	0,00010
9	Noise	normal (B)	0,00001	0,00001	0,00001	0,00001	0,00001	0,00001
10	Geometrical dependence on measurement location	rectangular (B)	0,00150	0,00150	0,00200	0,00200	0,00200	0,00400
11	Transducer mounting	rectangular (B)	0,00140	0,00140	0,00140	0,00280	0,00280	0,00280
12	Cable mounting	rectangular (B)	0,00200	0,00100	0,00100	0,00100	0,00100	0,00100
13	Relative motion	rectangular (B)	0,00001	0,00001	0,00001	0,00001	0,00001	0,00001
14	Temperature change	rectangular (B)	0,00002	0,00002	0,00002	0,00002	0,00002	0,00002
15	Linearity	rectangular (B)	0,00001	0,00001	0,00001	0,00001	0,00001	0,00001
16	Instability of vibration signal with time	rectangular (B)	0,00001	0,00001	0,00001	0,00001	0,00001	0,00001
17	Residual interferometric effects on measurement	rectangular (B)	0,00050	0,00050	0,00050	0,00050	0,00050	0,00050
18	Standard deviation of arithmetic mean	normal (A)	0,00008	0,00025	0,00015	0,00059	0,00075	0,00075
Total relative measurement uncertainty			0,00302	0,00248	0,00281	0,00555	0,00557	0,00656
Expanded measurement uncertainty (k = 2), rounded			0,6 %	0,5 %	0,6 %	1,1 %	1,1 %	1,3 %

C.6.2 SE-Sensor, phase

10.2 **Uncertainty budget for phase**

i	Source of uncertainty	Distribution (type of uncertainty)	Uncertainty contribution in °					
			10 Hz	12,5 Hz to 16 Hz	20 Hz to < 5 kHz	5 kHz	>5 kHz to < 10 kHz	10 kHz
1	Accelerometer output voltage measurement	normal (B)	0,1	0,1	0,1	0,1	0,1	0,1
2	Vibration velocity	normal (B)	0,01	0,01	0,01	0,01	0,01	0,015
3	Frequency of vibration signal	rectangular (B)	0	0	0	0	0	0
4	Amplifier transfer coefficient (gain)	normal (B)	0,1	0,1	0,1	0,1	0,1	0,1
5	Frequency response	normal (B)	0,1	0,1	0,1	0,1	0,2	0,2
6	Transverse motion	rectangular (B)	0,1	0,1	0,1	0,1	0,2	0,2
7	Harmonics	rectangular (B)	0	0	0	0	0	0
8	Hum	normal (B)	0,01	0,01	0,01	0,01	0,01	0,01
9	Noise	normal (B)	0,01	0,01	0,01	0,01	0,01	0,01
10	Geometrical dependence on measurement location	rectangular B)	0,1	0,1	0,1	0,25	0,25	0,25
11	Transducer mounting	rectangular (B)	0,1	0,1	0,1	0,1	0,2	0,2
12	Cable mounting	rectangular (B)	0,2	0,2	0,1	0,1	0,1	0,1
13	Relative motion	rectangular (B)	0,1	0,05	0,05	0,05	0,05	0,05
14	Temperature change	rectangular (B)	0,01	0,01	0,01	0,01	0,01	0,01
15	Linearity	rectangular (B)	0,01	0,01	0,01	0,01	0,01	0,01
16	Instability of vibration signal with time	rectangular (B)	0,01	0,01	0,01	0,01	0,01	0,01
17	Residual interferometric effects on measurement	rectangular (B)	0,1	0,1	0,1	0,1	0,1	0,1
18	Standard deviation of arithmetic mean	normal (A)	0,01	0,01	0,02	0,01	0,02	0,03
Total relative measurement uncertainty			0,35 °	0,34 °	0,29 °	0,37 °	0,48 °	0,48 °
Expanded measurement uncertainty (k = 2), rounded			0,70 °	0,70 °	0,60 °	0,80 °	1,00 °	1,00 °

C.6.3 BB-Sensor, magnitude

Central Office of Measures (GUM), Poland 2010-05-05
Calibration report 2 of CIPM Key Comparison CCAUV.V-K2 Page 3/4

10. **Uncertainty budget**

10.1. **Uncertainty budget for magnitude**

i	Source of uncertainty	Distribution (type of uncertainty)	Uncertainty contribution					
			10 Hz to 16 Hz	20 Hz to < 5 kHz	5 kHz	> 5 kHz to 8 kHz	>8 kHz to < 10 kHz	10 kHz
1	Accelerometer output voltage measurement	normal (B)	0,00045	0,00045	0,00045	0,00045	0,00045	0,00045
2	Vibration velocity	normal (B)	0,00010	0,00010	0,00010	0,00010	0,00010	0,00015
3	Frequency of vibration signal	rectangular (B)	0,00001	0,00001	0,00001	0,00001	0,00001	0,00001
4	Amplifier transfer coefficient (gain)	normal (B)	0,00040	0,00040	0,00040	0,00040	0,00040	0,00040
5	Frequency response	normal (B)	0,00050	0,00050	0,00050	0,00400	0,00400	0,00400
6	Transverse motion	rectangular (B)	0,00010	0,00010	0,00010	0,00100	0,00100	0,00100
7	Harmonics	rectangular (B)	0,00001	0,00001	0,00001	0,00001	0,00001	0,00001
8	Hum	normal (B)	0,00010	0,00010	0,00010	0,00010	0,00010	0,00010
9	Noise	normal (B)	0,00001	0,00001	0,00001	0,00001	0,00001	0,00001
10	Geometrical dependence on measurement location	rectangular B)	0,00150	0,00150	0,00200	0,00200	0,00200	0,00400
11	Transducer mounting	rectangular (B)	0,00140	0,00140	0,00140	0,00280	0,00280	0,00280
12	Cable mounting	rectangular (B)	0,00200	0,00100	0,00100	0,00100	0,00100	0,00100
13	Relative motion	rectangular (B)	0,00001	0,00001	0,00001	0,00001	0,00001	0,00001
14	Temperature change	rectangular (B)	0,00002	0,00002	0,00002	0,00002	0,00002	0,00002
15	Linearity	rectangular (B)	0,00001	0,00001	0,00001	0,00001	0,00001	0,00001
16	Instability of vibration signal with time	rectangular (B)	0,00001	0,00001	0,00001	0,00001	0,00001	0,00001
17	Residual interferometric effects on measurement	rectangular (B)	0,00050	0,00050	0,00050	0,00050	0,00050	0,00050
18	Standard deviation of arithmetic mean	normal (A)	0,00017	0,00081	0,00042	0,00093	0,00170	0,00130
Total relative measurement uncertainty			0,00302	0,00260	0,00283	0,00560	0,00578	0,00665
Expanded measurement uncertainty (k = 2), rounded			0,6 %	0,5 %	0,6 %	1,1 %	1,2 %	1,3 %

C.6.4 BB-Sensor, phase

Central Office of Measures (GUM), Poland 2010-05-05
Calibration report 2 of CIPM Key Comparison CCAUV.V-K2 Page 4/4

10.2 **Uncertainty budget for phase**

i	Source of uncertainty	Distribution (type of uncertainty)	Uncertainty contribution in °					
			10 Hz	12,5 Hz to 16 Hz	20 Hz to < 5 kHz	5 kHz	>5 kHz to < 10 kHz	10 kHz
1	Accelerometer output voltage measurement	normal (B)	0,1	0,1	0,1	0,1	0,1	0,1
2	Vibration velocity	normal (B)	0,01	0,01	0,01	0,01	0,01	0,015
3	Frequency of vibration signal	rectangular (B)	0	0	0	0	0	0
4	Amplifier transfer coefficient (gain)	normal (B)	0,1	0,1	0,1	0,1	0,1	0,1
5	Frequency response	normal (B)	0,1	0,1	0,1	0,1	0,2	0,2
6	Transverse motion	rectangular (B)	0,1	0,1	0,1	0,1	0,2	0,2
7	Harmonics	rectangular (B)	0	0	0	0	0	0
8	Hum	normal (B)	0,01	0,01	0,01	0,01	0,01	0,01
9	Noise	normal (B)	0,01	0,01	0,01	0,01	0,01	0,01
10	Geometrical dependence on measurement location	Rectangular (B)	0,1	0,1	0,1	0,25	0,25	0,25
11	Transducer mounting	rectangular (B)	0,1	0,1	0,1	0,1	0,2	0,2
12	Cable mounting	rectangular (B)	0,2	0,2	0,1	0,1	0,1	0,1
13	Relative motion	rectangular (B)	0,1	0,05	0,05	0,05	0,05	0,05
14	Temperature change	rectangular (B)	0,01	0,01	0,01	0,01	0,01	0,01
15	Linearity	rectangular (B)	0,01	0,01	0,01	0,01	0,01	0,01
16	Instability of vibration signal with time	rectangular (B)	0,01	0,01	0,01	0,01	0,01	0,01
17	Residual interferometric effects on measurement	rectangular (B)	0,1	0,1	0,1	0,1	0,1	0,1
18	Standard deviation of arithmetic mean	normal (A)	0,01	0,01	0,03	0,01	0,03	0,01
Total relative measurement uncertainty			0,35 °	0,34 °	0,29 °	0,37 °	0,48 °	0,48 °
Expanded measurement uncertainty (k = 2), rounded			0,70 °	0,70 °	0,60 °	0,80 °	1,00 °	1,00 °

C.7 METAS

Measurement uncertainty budget for the primary calibration of accelerometers, type B&K 8305, single ended, (amplitude)

uncertainty contribution Component		Distribution	Factor	Evaluation Type	frequency range / Hz 5 - < 20 contribution	20 - < 63 contribution	63 - < 1 k contribution	1 k - 5 k contribution	5 k - 10 k contribution
electrical measurement	including charge amplifier calibration	normal	2.00	Type B	3.00E-04	3.00E-04	3.00E-04	3.00E-04	3.00E-04
frequency	including the influence of speed to acceleration conversion	rectangular	1.73	Type B	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
signal conditioner gain	including level non-linearity	normal	2.00	Type B	2.00E-04	2.00E-04	2.00E-04	2.00E-04	2.00E-04
signal conditioner frequency response	including frequency non-linearity	normal	2.00	Type B	5.00E-04	5.00E-04	5.00E-04	5.00E-04	2.00E-03
transverse motion	typical values for 8305-type of transducer	rectangular	1.73	Type B	1.40E-04	1.40E-04	1.40E-04	7.00E-04	2.50E-03
contribution of harmonics	nonlinearities affecting mechanical excitation	rectangular	1.73	Type B	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
hum	max. tolerated contribution of powerline hum	rectangular	1.73	Type B	1.00E-04	1.00E-04	1.00E-04	1.00E-04	1.00E-04
noise	broadband noise (including DUT, mechanical, electrical contributions)	normal	2.00	Type B	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
position dependence	reproducibility and averaging from different measurement positions * (determined for each calibration)	rectangular	1.73	Type A*	2.10E-05	2.94E-05	5.22E-04	2.70E-04	4.30E-04
transducer mounting	including reproducibility of mounting torque	rectangular	1.73	Type A	7.00E-05	7.00E-05	1.40E-04	5.00E-04	1.00E-03
cable fixture	including connector strain and triboelectric effects	rectangular	1.73	Type B	9.00E-04	7.00E-04	7.00E-04	3.50E-04	0.00E+00
relative motion	including imperfections of the laser vibration isolation	rectangular	1.73	Type B	1.00E-04	1.00E-05	1.00E-05	1.00E-05	1.00E-05
thermal stability	combinde effect on laser reference, signal acquisition and DUT	rectangular	1.73	Type B	1.50E-05	1.50E-05	1.50E-05	1.50E-05	1.50E-05
linearity	additional effects of non-linearity	rectangular	1.73	Type B	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
reference signal	instabilities affecting the velocity signal after demodulation	rectangular	1.73	Type B	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
residual components		rectangular	1.73	Type B	1.00E-04	1.00E-04	1.00E-04	1.00E-04	1.00E-04
relative standard uncertainty					1.12E-03	9.57E-04	1.10E-03	1.16E-03	3.40E-03
expanded uncertainty					2.23E-03	1.91E-03	2.19E-03	2.31E-03	6.81E-03
expanded uncertainty (%)					**0.22**	**0.19**	**0.22**	**0.23**	**0.68**

Measurement uncertainty budget for the primary calibration of accelerometers, type B&K 8305, single ended, (phase)

uncertainty contribution					frequency range / Hz				
					5 - < 20	20 - < 63	63 - < 1 k	1 k - 5 k	5 k - 10 k
Component		Distribution	Factor	Evaluation Type	contribution	contribution	contribution	contribution	contribution
electrical measurement	including charge amplifier calibration	normal	2.00	Type B	5.00E-02	5.00E-02	5.00E-02	5.00E-02	5.00E-02
frequency	including the influence of speed to acceleration conversion	rectangular	1.73	Type B	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
signal conditioner gain	including level non-linearity	normal	2.00	Type B	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
signal conditioner frequency response	including frequency non-linearity	normal	2.00	Type B	1.00E-01	1.00E-01	1.00E-01	1.00E-01	2.00E-01
transverse motion	typical values for 8305-type of transducer	rectangular	1.73	Type B	7.00E-02	7.00E-02	7.00E-02	1.40E-01	3.00E-01
contribution of harmonics	nonlinearities affecting mechanical excitation	rectangular	1.73	Type B	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
hum	max. tolerated contribution of powerline hum	rectangular	1.73	Type B	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
noise	broadband noise (including DUT, mechanical, electrical contributions)	normal	2.00	Type B	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
position dependence	reproducibility and averaging from different measurement positions * (determined for each calibration)	rectangular	1.73	Type A*	1.04E-03	4.96E-04	4.71E-02	3.67E-03	6.22E-03
transducer mounting	including reproducibility of mounting torque	rectangular	1.73	Type A	5.00E-02	5.00E-02	5.00E-02	1.00E-01	2.00E-01
cable fixture	including connector strain and triboelectric effects	rectangular	1.73	Type B	7.00E-02	5.00E-02	5.00E-02	0.00E+00	0.00E+00
relative motion	including imperfections of the laser vibration isolation	rectangular	1.73	Type B	5.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
thermal stability	combinde effect on laser reference, signal acquisition and DUT	rectangular	1.73	Type B	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
linearity	additional effects of non-linearity	rectangular	1.73	Type B	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
reference signal	instabilities affecting the velocity signal after demodulation	rectangular	1.73	Type B	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
residual components		rectangular	1.73	Type B	5.00E-02	5.00E-02	5.00E-02	5.00E-02	5.00E-02
relative standard uncertainty					2.01E-01	1.88E-01	1.94E-01	2.35E-01	4.31E-01
expanded uncertainty (°)					**0.40**	**0.38**	**0.39**	**0.47**	**0.86**

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Uncertainty Component	type (A or B)	Distribution	Relative standard uncertainty [%]	Degree of freedom	Relative standard uncertainty [%]	Degree of freedom	Relative standard uncertainty [%]	Degree of freedom
DUT: B&K 8305-001; Applied Calibration Method: SAM; Applied Calibration system: Middle								
			10 Hz		12.5 Hz		16 Hz	
			3.5 m/s^2		5 m/s^2		5 m/s^2	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.141	76	0.082	76	0.065	76
Quantization error of RMS voltmeter	B	Rectangular	8.2E-06	∞	5.8E-06	∞	5.8E-06	∞
Measurement repeatability of accelerometer output	A	Normal	0.082	474	0.040	474	0.028	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.045	474	0.039	474	0.017	474
Effect of re-mounting	B	Normal	0.172	∞	0.172	∞	0.172	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	0.61	∞	0.19	∞	0.04	∞
Relative combined uncertainty [%]			**0.66**	**Effective degree of freedom**	**0.29**	**Effective degree of freedom**	**0.21**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**1.32**		**0.58**		**0.42**	
Stated Relative expanded uncertainty (*k* =2) [%]			**1.4**	**35751**	**0.6**	**11601**	**0.5**	**8757**

Remarks
Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

Uncertainty Component	type (A or B)	Distribution	Relative standard uncertainty [%]	Degree of freedom	Relative standard uncertainty [%]	Degree of freedom	Relative standard uncertainty [%]	Degree of freedom
DUT: B&K 8305-001; Applied Calibration Method: SAM; Applied Calibration system: Middle								
			20 Hz		25 Hz		31.5 Hz	
			10 m/s^2		10 m/s^2		10 m/s^2	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.021	76	0.016	76	0.014	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-06	∞	2.9E-06	∞	2.9E-06	∞
Measurement repeatability of accelerometer output	A	Normal	0.017	474	0.014	474	0.009	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.021	474	0.010	474	0.006	474
Effect of re-mounting	B	Normal	0.172	∞	0.172	∞	0.172	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	0.03	∞	0.01	∞	0.00	∞
Relative combined uncertainty [%]			**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.40**		**0.39**		**0.39**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.5**	**521523**	**0.4**	**1658588**	**0.4**	**3123070**

Remarks
Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			40 Hz		**63 Hz**		**80 Hz**	
			10 m/s²		**10 m/s²**		**10 m/s²**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.014	76	0.011	76	0.013	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-06	∞	2.9E-06	∞	2.9E-06	∞
Measurement repeatability of accelerometer output	A	Normal	0.005	474	0.006	474	0.003	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.004	474	0.003	474	0.002	474
Effect of re-mounting	B	Normal	0.172	∞	0.172	∞	0.172	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	0.00	∞	0.00	∞	0.00	∞
Relative combined uncertainty [%]			**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.39**		**0.39**		**0.39**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.4**	**3011884**	**0.4**	**8051151**	**0.4**	**3770956**

Remarks

Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			100 Hz		**125 Hz**		**160 Hz**	
			10 m/s²		**10 m/s²**		**10 m/s²**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.024	76	0.015	76	0.013	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-06	∞	2.9E-06	∞	2.9E-06	∞
Measurement repeatability of accelerometer output	A	Normal	0.011	474	0.002	474	0.003	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.002	474	0.003	474	0.004	474
Effect of re-mounting	B	Normal	0.172	∞	0.172	∞	0.172	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.39**		**0.39**		**0.39**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.4**	**344270**	**0.4**	**2400604**	**0.4**	**3383615**

Remarks

Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			200 Hz		**250 Hz**		**315 Hz**	
			10 m/s^2		**10 m/s^2**		**50 m/s^2**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.014	76	0.014	76	0.013	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-06	∞	2.9E-06	∞	2.9E-06	∞
Measurement repeatability of accelerometer output	A	Normal	0.006	474	0.003	474	0.001	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.005	474	0.006	474	0.006	474
Effect of re-mounting	B	Normal	0.172	∞	0.172	∞	0.172	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.39**		**0.39**		**0.39**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.4**	**3117432**	**0.4**	**2747444**	**0.4**	**3935769**

Remarks
Middle stands for the calibration system for the middle frequency.
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SAM means the sine-approximation method.

DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			400 Hz		**500 Hz**		**630 Hz**	
			50 m/s^2		**50 m/s^2**		**50 m/s^2**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.013	76	0.013	76	0.013	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-06	∞	2.9E-06	∞	2.9E-06	∞
Measurement repeatability of accelerometer output	A	Normal	0.002	474	0.002	474	0.001	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.007	474	0.007	474	0.007	474
Effect of re-mounting	B	Normal	0.172	∞	0.172	∞	0.172	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.39**		**0.39**		**0.39**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.4**	**3560895**	**0.4**	**4470521**	**0.4**	**4039161**

Remarks
Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			800 Hz		**1000 Hz**		**1250 Hz**	
			50 m/s^2		**100 m/s^2**		**100 m/s^2**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.013	76	0.013	76	0.013	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-06	∞	2.9E-07	∞	2.9E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.001	474	0.005	474	0.006	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.008	474	0.006	474	0.009	474
Effect of re-mounting	B	Normal	0.172	∞	0.172	∞	0.172	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.39**		**0.39**		**0.39**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.4**	**3930378**	**0.4**	**3957348**	**0.4**	**4035979**

Remarks

Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305-001			
Applied Calibration Method	SAM			
Applied Calibration system	Middle			
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**
			1500 Hz	
			100 m/s^2	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.013	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.002	474
Instability of laser wavelength	B	Normal	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.011	474
Effect of re-mounting	B	Normal	0.172	∞
Effect of transverse motion	B	Normal	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞
Relative combined uncertainty [%]			**0.20**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.39**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.4**	**4061718**

Remarks

Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305-001
Applied Calibration Method	SAM
Applied Calibration system	Middle

Uncertainty Component	type (A or B)	Distribution	Relative standard uncertainty [%]	Degree of freedom	Relative standard uncertainty [%]	Degree of freedom	Relative standard uncertainty [%]	Degree of freedom
			1600 Hz		2000 Hz		2500 Hz	
			100 m/s^2		100 m/s^2		100 m/s^2	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.013	76	0.013	76	0.013	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-07	∞	2.9E-07	∞	2.9E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.047	474	0.040	474	0.024	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.004	474	0.007	474	0.015	474
Effect of re-mounting	B	Normal	0.172	∞	0.172	∞	0.172	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.40**		**0.40**		**0.40**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.5**	**31232**	**0.5**	**55943**	**0.4**	**349089**

Remarks
Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305-001
Applied Calibration Method	SAM
Applied Calibration system	High

Uncertainty Component	type (A or B)	Distribution	Relative standard uncertainty [%]	Degree of freedom	Relative standard uncertainty [%]	Degree of freedom	Relative standard uncertainty [%]	Degree of freedom
			3000 Hz		3150 Hz		3500 Hz	
			100 m/s^2		100 m/s^2		100 m/s^2	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.013	76	0.013	76	0.013	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-07	∞	2.9E-07	∞	2.9E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.019	474	0.012	474	0.016	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.016	474	0.013	474	0.012	474
Effect of re-mounting	B	Normal	0.172	∞	0.172	∞	0.172	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.40**		**0.39**		**0.39**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.4**	**604895**	**0.4**	**1590611**	**0.4**	**1191926**

Remarks
Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	High							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			4000 Hz		**4500 Hz**		**5000 Hz**	
			100 m/s²		**100 m/s²**		**100 m/s²**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.013	76	0.013	76	0.013	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-07	∞	2.9E-07	∞	2.9E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.014	474	0.018	95	0.013	95
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.003	474	0.004	95	0.005	95
Effect of re-mounting	B	Normal	0.172	∞	0.172	∞	0.172	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.39**		**0.39**		**0.39**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.4**	**2032945**	**0.4**	**1057960**	**0.4**	**2115287**

Remarks
Middle stands for the calibration system for the middle frequency.
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DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	High							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			5500 Hz		**6000 Hz**		**6300 Hz**	
			100 m/s²		**100 m/s²**		**100 m/s²**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.013	76	0.013	76	0.013	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-07	∞	2.9E-07	∞	2.9E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.019	95	0.039	95	0.040	95
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.006	95	0.007	95	0.007	95
Effect of re-mounting	B	Normal	0.172	∞	0.172	∞	0.172	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.39**		**0.40**		**0.40**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.4**	**892846**	**0.4**	**65973**	**0.5**	**57939**

Remarks
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DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	High							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			6500 Hz		**7000 Hz**		**7500 Hz**	
			150 m/s^2		**150 m/s^2**		**150 m/s^2**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.014	76	0.014	76	0.013	76
Quantization error of RMS voltmeter	B	Rectangular	1.9E-07	∞	1.9E-07	∞	1.9E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.017	95	0.036	95	0.047	95
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.006	95	0.007	95	0.007	95
Effect of re-mounting	B	Normal	0.172	∞	0.172	∞	0.172	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.39**		**0.40**		**0.40**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.4**	**1072097**	**0.4**	**89204**	**0.5**	**31092**

Remarks

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DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	High							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			8000 Hz		**8500 Hz**		**9000 Hz**	
			150 m/s^2		**150 m/s^2**		**150 m/s^2**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.013	76	0.013	76	0.013	76
Quantization error of RMS voltmeter	B	Rectangular	1.9E-07	∞	1.4E-07	∞	1.4E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.053	95	0.031	95	0.052	95
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.008	95	0.007	95	0.008	95
Effect of re-mounting	B	Normal	0.172	∞	0.172	∞	0.172	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.41**		**0.40**		**0.41**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.5**	**21081**	**0.4**	**154628**	**0.5**	**21831**

Remarks

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DUT	B&K 8305-001					
Applied Calibration Method	SAM					
Applied Calibration system	High					
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			9500 Hz		**10000 Hz**	
			200 m/s^2		**200 m/s^2**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.013	76	0.013	76
Quantization error of RMS voltmeter	B	Rectangular	1.4E-07	∞	1.4E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.069	95	0.138	95
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.010	95	0.011	95
Effect of re-mounting	B	Normal	0.172	∞	0.172	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.21**	**Effective degree of freedom**	**0.24**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.42**		**0.48**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.5**	**7922**	**0.5**	**860**

Remarks
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DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			10 Hz		**12.5 Hz**		**16 Hz**	
			3.5 m/s^2		**5 m/s^2**		**5 m/s^2**	
Initial phase uncertainty of charge amplifier	A	Normal	0.19	76	0.23	76	0.14	76
Initial phase uncertainty of voltage generator	A	Normal	0.22	76	0.25	76	0.16	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.02	76	0.02	76	0.02	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.26	237	0.21	237	0.15	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.03	237	0.02	237	0.01	237
Residual effects on phase shift measurement	B	Normal	0.14	∞	0.14	∞	0.14	∞
Relative combined uncertainty [%]			**0.41**	**Effective degree of freedom**	**0.42**	**Effective degree of freedom**	**0.30**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.82**		**0.85**		**0.60**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.9**	**446**	**0.9**	**335**	**0.6**	**487**

Remarks

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DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			20 Hz		**25 Hz**		**31.5 Hz**	
			10 m/s^2		**10 m/s^2**		**10 m/s^2**	
Initial phase uncertainty of charge amplifier	A	Normal	0.07	76	0.08	76	0.12	76
Initial phase uncertainty of voltage generator	A	Normal	0.09	76	0.09	76	0.13	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.04	76	0.00	76	0.01	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.12	237	0.09	237	0.08	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.01	237	0.01	237	0.00	237
Residual effects on phase shift measurement	B	Normal	0.14	∞	0.14	∞	0.14	∞
Relative combined uncertainty [%]			**0.22**	**Effective degree of freedom**	**0.21**	**Effective degree of freedom**	**0.24**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.43**		**0.41**		**0.48**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.5**	**1193**	**0.5**	**1094**	**0.5**	**501**

Remarks

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DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			40 Hz		**63 Hz**		**80 Hz**	
			10 m/s²		**10 m/s²**		**10 m/s²**	
Initial phase uncertainty of charge amplifier	A	Normal	0.08	76	0.09	76	0.10	76
Initial phase uncertainty of voltage generator	A	Normal	0.10	76	0.11	76	0.12	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.02	76	0.00	76	0.03	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.09	237	0.09	237	0.10	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.00	237	0.00	237	0.00	237
Residual effects on phase shift measurement	B	Normal	0.14	∞	0.14	∞	0.14	∞
Relative combined uncertainty [%]			**0.21**	**Effective degree of freedom**	**0.22**	**Effective degree of freedom**	**0.24**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.42**		**0.45**		**0.47**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.5**	**867**	**0.5**	**706**	**0.5**	**662**

Remarks

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DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			100 Hz		**125 Hz**		**160 Hz**	
			10 m/s²		**10 m/s²**		**10 m/s²**	
Initial phase uncertainty of charge amplifier	A	Normal	0.11	76	0.11	76	0.12	76
Initial phase uncertainty of voltage generator	A	Normal	0.13	76	0.14	76	0.14	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.01	76	0.01	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.11	237	0.11	237	0.12	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.00	237	0.00	237	0.00	237
Residual effects on phase shift measurement	B	Normal	0.14	∞	0.14	∞	0.14	∞
Relative combined uncertainty [%]			**0.24**	**Effective degree of freedom**	**0.25**	**Effective degree of freedom**	**0.26**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.48**		**0.50**		**0.52**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.5**	**594**	**0.6**	**549**	**0.6**	**513**

Remarks

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DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			200 Hz		**250 Hz**		**315 Hz**	
			10 m/s²		**10 m/s²**		**50 m/s²**	
Initial phase uncertainty of charge amplifier	A	Normal	0.13	76	0.13	76	0.03	76
Initial phase uncertainty of voltage generator	A	Normal	0.15	76	0.16	76	0.04	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.02	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.12	237	0.13	237	0.03	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.00	237	0.00	237	0.00	237
Residual effects on phase shift measurement	B	Normal	0.14	∞	0.14	∞	0.14	∞
Relative combined uncertainty [%]			**0.27**	**Effective degree of freedom**	**0.28**	**Effective degree of freedom**	**0.15**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.55**		**0.57**		**0.30**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.6**	**480**	**0.6**	**459**	**0.4**	**12469**

Remarks
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DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			400 Hz		**500 Hz**		**630 Hz**	
			50 m/s²		**50 m/s²**		**50 m/s²**	
Initial phase uncertainty of charge amplifier	A	Normal	0.04	76	0.04	76	0.03	76
Initial phase uncertainty of voltage generator	A	Normal	0.04	76	0.04	76	0.04	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.04	237	0.04	237	0.03	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.00	237	0.00	237	0.00	237
Residual effects on phase shift measurement	B	Normal	0.14	∞	0.14	∞	0.14	∞
Relative combined uncertainty [%]			**0.15**	**Effective degree of freedom**	**0.16**	**Effective degree of freedom**	**0.15**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.31**		**0.31**		**0.30**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.4**	**9324**	**0.4**	**8216**	**0.4**	**12261**

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DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			800 Hz		**1000 Hz**		**1250 Hz**	
			50 m/s²		**100 m/s²**		**100 m/s²**	
Initial phase uncertainty of charge amplifier	A	Normal	0.04	76	0.03	76	0.03	76
Initial phase uncertainty of voltage generator	A	Normal	0.04	76	0.02	76	0.02	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.04	237	0.03	237	0.03	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.01	237	0.00	237	0.01	237
Residual effects on phase shift measurement	B	Normal	0.14	∞	0.14	∞	0.14	∞
Relative combined uncertainty [%]			**0.15**	**Effective degree of freedom**	**0.15**	**Effective degree of freedom**	**0.15**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.31**		**0.29**		**0.29**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.4**	**8648**	**0.3**	**38789**	**0.3**	**37580**

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DUT	B&K 8305-001			
Applied Calibration Method	SAM			
Applied Calibration system	Middle			
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			1500 Hz	
			100 m/s²	
Initial phase uncertainty of charge amplifier	A	Normal	0.02	76
Initial phase uncertainty of voltage generator	A	Normal	0.02	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.02	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.01	237
Residual effects on phase shift measurement	B	Normal	0.14	∞
Relative combined uncertainty [%]			**0.14**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.29**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**84432**

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DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	High							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			1600 Hz		**2000 Hz**		**2500 Hz**	
			100 m/s^2		**100 m/s^2**		**100 m/s^2**	
Initial phase uncertainty of charge amplifier	A	Normal	0.02	76	0.02	76	0.03	76
Initial phase uncertainty of voltage generator	A	Normal	0.02	76	0.02	76	0.02	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.02	237	0.02	237	0.02	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.00	237	0.01	237	0.01	237
Residual effects on phase shift measurement	B	Normal	0.14	∞	0.14	∞	0.14	∞
Relative combined uncertainty [%]			**0.14**	**Effective degree of freedom**	**0.14**	**Effective degree of freedom**	**0.15**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.29**		**0.29**		**0.29**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**59201**	**0.3**	**52898**	**0.3**	**47768**

Remarks
Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	High							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			3000 Hz		**3150 Hz**		**3500 Hz**	
			100 m/s^2		**100 m/s^2**		**100 m/s^2**	
Initial phase uncertainty of charge amplifier	A	Normal	0.02	76	0.02	76	0.02	76
Initial phase uncertainty of voltage generator	A	Normal	0.02	76	0.02	76	0.02	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.03	237	0.02	237	0.01	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.01	237	0.01	237	0.01	237
Residual effects on phase shift measurement	B	Normal	0.14	∞	0.14	∞	0.14	∞
Relative combined uncertainty [%]			**0.15**	**Effective degree of freedom**	**0.14**	**Effective degree of freedom**	**0.14**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.29**		**0.29**		**0.29**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**36471**	**0.3**	**57747**	**0.3**	**63113**

Remarks
Middle stands for the calibration system for the middle frequency.
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SAM means the sine-approximation method.

DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	High							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			4000 Hz		**4500 Hz**		**5000 Hz**	
			100 m/s²		**100 m/s²**		**100 m/s²**	
Initial phase uncertainty of charge amplifier	A	Normal	0.02	76	0.02	76	0.03	76
Initial phase uncertainty of voltage generator	A	Normal	0.02	76	0.02	76	0.02	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.01	237	0.01	237	0.01	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.00	237	0.00	237	0.00	237
Residual effects on phase shift measurement	B	Normal	0.14	∞	0.14	∞	0.14	∞
Relative combined uncertainty [%]			**0.14**	**Effective degree of freedom**	**0.14**	**Effective degree of freedom**	**0.14**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.29**		**0.29**		**0.29**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**76944**	**0.3**	**63933**	**0.3**	**52589**

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Middle stands for the calibration system for the middle frequency.
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DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	High							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			5500 Hz		**6000 Hz**		**6300 Hz**	
			100 m/s²		**100 m/s²**		**100 m/s²**	
Initial phase uncertainty of charge amplifier	A	Normal	0.03	76	0.03	76	0.03	76
Initial phase uncertainty of voltage generator	A	Normal	0.02	76	0.02	76	0.02	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.01	237	0.01	237	0.01	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.00	237	0.00	237	0.00	237
Residual effects on phase shift measurement	B	Normal	0.14	∞	0.14	∞	0.14	∞
Relative combined uncertainty [%]			**0.14**	**Effective degree of freedom**	**0.14**	**Effective degree of freedom**	**0.14**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.29**		**0.29**		**0.29**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**49398**	**0.3**	**42128**	**0.3**	**40820**

Remarks
Middle stands for the calibration system for the middle frequency.
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DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	High							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			6500 Hz		**7000 Hz**		**7500 Hz**	
			150 m/s²		**150 m/s²**		**150 m/s²**	
Initial phase uncertainty of charge amplifier	A	Normal	0.03	76	0.03	76	0.03	76
Initial phase uncertainty of voltage generator	A	Normal	0.04	76	0.05	76	0.05	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.01	237	0.01	237	0.01	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.00	237	0.00	237	0.00	237
Residual effects on phase shift measurement	B	Normal	0.14	∞	0.14	∞	0.14	∞
Relative combined uncertainty [%]			**0.15**	**Effective degree of freedom**	**0.15**	**Effective degree of freedom**	**0.15**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.30**		**0.30**		**0.30**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**8460**	**0.3**	**7906**	**0.4**	**7123**

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DUT	B&K 8305-001							
Applied Calibration Method	SAM							
Applied Calibration system	High							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			8000 Hz		**8500 Hz**		**9000 Hz**	
			150 m/s²		**200 m/s²**		**200 m/s²**	
Initial phase uncertainty of charge amplifier	A	Normal	0.03	76	0.02	76	0.02	76
Initial phase uncertainty of voltage generator	A	Normal	0.05	76	0.03	76	0.04	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.01	237	0.01	237	0.01	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.00	237	0.00	237	0.00	237
Residual effects on phase shift measurement	B	Normal	0.14	∞	0.14	∞	0.14	∞
Relative combined uncertainty [%]			**0.15**	**Effective degree of freedom**	**0.15**	**Effective degree of freedom**	**0.15**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.30**		**0.29**		**0.29**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**7949**	**0.3**	**21777**	**0.3**	**20158**

Remarks

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DUT	B&K 8305-001					
Applied Calibration Method	SAM					
Applied Calibration system	High					
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			9500 Hz		**10000 Hz**	
			200 m/s^2		**200 m/s^2**	
Initial phase uncertainty of charge amplifier	A	Normal	0.02	76	0.02	76
Initial phase uncertainty of voltage generator	A	Normal	0.04	76	0.04	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.01	237	0.01	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.01	237	0.01	237
Residual effects on phase shift measurement	B	Normal	0.14	∞	0.14	∞
Relative combined uncertainty [%]			**0.15**	**Effective degree of freedom**	**0.15**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.29**		**0.29**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**19033**	**0.3**	**17234**

Remarks
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DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			10 Hz		**12.5 Hz**		**16 Hz**	
			3.5 m/s²		**5 m/s²**		**5 m/s²**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.229	76	0.134	76	0.048	76
Quantization error of RMS voltmeter	B	Rectangular	8.2E-06	∞	5.8E-06	∞	5.8E-06	∞
Measurement repeatability of accelerometer output	A	Normal	0.073	474	0.032	474	0.022	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.048	474	0.042	474	0.018	474
Effect of re-mounting	B	Normal	0.072	∞	0.072	∞	0.072	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	0.61	∞	0.19	∞	0.04	∞
Relative combined uncertainty [%]			**0.67**	**Effective degree of freedom**	**0.27**	**Effective degree of freedom**	**0.14**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**1.33**		**0.53**		**0.27**	
Stated Relative expanded uncertainty (*k* =2) [%]			**1.4**	**5416**	**0.6**	**1180**	**0.3**	**4757**

Remarks

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SAM means the sine-approximation method.

DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			20 Hz		**25 Hz**		**31.5 Hz**	
			10 m/s²		**10 m/s²**		**10 m/s²**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.026	76	0.014	76	0.015	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-06	∞	2.9E-06	∞	2.9E-06	∞
Measurement repeatability of accelerometer output	A	Normal	0.012	474	0.008	474	0.006	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.024	474	0.011	474	0.006	474
Effect of re-mounting	B	Normal	0.072	∞	0.072	∞	0.072	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	0.030	∞	0.008	∞	0.001	∞
Relative combined uncertainty [%]			**0.13**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.25**		**0.24**		**0.24**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**39719**	**0.3**	**399326**	**0.3**	**269498**

Remarks

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DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			40 Hz		**63 Hz**		**80 Hz**	
			10 m/s²		**10 m/s²**		**10 m/s²**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.013	76	0.015	76	0.012	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-06	∞	2.9E-06	∞	2.9E-06	∞
Measurement repeatability of accelerometer output	A	Normal	0.005	474	0.004	474	0.002	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.005	474	0.003	474	0.003	474
Effect of re-mounting	B	Normal	0.072	∞	0.072	∞	0.072	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	0.001	∞	0.0003	∞	0.0003	∞
Relative combined uncertainty [%]			**0.12**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.24**		**0.24**		**0.24**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**597759**	**0.3**	**271298**	**0.3**	**825866**

Remarks
Middle stands for the calibration system for the middle frequency.
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SAM means the sine-approximation method.

DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			100 Hz		**125 Hz**		**160 Hz**	
			10 m/s²		**10 m/s²**		**10 m/s²**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.012	76	0.011	76	0.010	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-06	∞	2.9E-06	∞	2.9E-06	∞
Measurement repeatability of accelerometer output	A	Normal	0.021	474	0.002	474	0.002	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.003	474	0.003	474	0.004	474
Effect of re-mounting	B	Normal	0.072	∞	0.072	∞	0.072	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.12**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.24**		**0.24**		**0.24**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**335352**	**0.3**	**1074044**	**0.3**	**1394816**

Remarks
Middle stands for the calibration system for the middle frequency.
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DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			200 Hz		**250 Hz**		**315 Hz**	
			10 m/s²		**10 m/s²**		**50 m/s²**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.011	76	0.010	76	0.011	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-06	∞	2.9E-06	∞	2.9E-06	∞
Measurement repeatability of accelerometer output	A	Normal	0.006	474	0.003	474	0.001	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.006	474	0.007	474	0.006	474
Effect of re-mounting	B	Normal	0.072	∞	0.072	∞	0.072	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.12**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.24**		**0.24**		**0.24**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**913514**	**0.3**	**1659251**	**0.3**	**1184365**

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DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			400 Hz		**500 Hz**		**630 Hz**	
			50 m/s²		**50 m/s²**		**50 m/s²**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.010	76	0.010	76	0.011	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-06	∞	2.9E-06	∞	2.9E-06	∞
Measurement repeatability of accelerometer output	A	Normal	0.002	474	0.002	474	0.000	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.007	474	0.008	474	0.007	474
Effect of re-mounting	B	Normal	0.072	∞	0.072	∞	0.072	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.12**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.24**		**0.24**		**0.24**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**1211725**	**0.3**	**1161633**	**0.3**	**1163280**

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DUT	B&K 8305						
Applied Calibration Method	SAM						
Applied Calibration system	Middle						
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			800 Hz		**1000 Hz**		**1250 Hz**	
			50 m/s^2		**100 m/s^2**		**100 m/s^2**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.010	76	0.011	76	0.011	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-06	∞	2.9E-07	∞	2.9E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.001	474	0.005	474	0.006	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.009	474	0.007	474	0.010	474
Effect of re-mounting	B	Normal	0.072	∞	0.072	∞	0.072	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.12**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.24**		**0.24**		**0.24**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**1143832**	**0.3**	**1126850**	**0.3**	**1024033**

Remarks
Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			1500 Hz		**1600 Hz**		**2000 Hz**	
			100 m/s^2		**100 m/s^2**		**100 m/s^2**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.011	76	0.011	76	0.011	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-07	∞	2.9E-07	∞	2.9E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.002	474	0.002	474	0.002	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.012	474	0.014	474	0.022	474
Effect of re-mounting	B	Normal	0.072	∞	0.072	∞	0.072	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.12**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.24**		**0.24**		**0.24**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**948844**	**0.3**	**798396**	**0.3**	**316516**

Remarks
Middle stands for the calibration system for the middle frequency.
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SAM means the sine-approximation method.

DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			2500 Hz		**3000 Hz**		**3150 Hz**	
			100 m/s^2		**100 m/s^2**		**100 m/s^2**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.011	76	0.010	76	0.011	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-07	∞	2.9E-07	∞	2.9E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.002	474	0.002	474	0.002	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.035	474	0.043	474	0.049	474
Effect of re-mounting	B	Normal	0.072	∞	0.072	∞	0.072	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.12**	**Effective degree of freedom**	**0.13**	**Effective degree of freedom**	**0.13**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.25**		**0.25**		**0.26**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**68322**	**0.3**	**33418**	**0.3**	**22352**

Remarks
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SAM means the sine-approximation method.

DUT	B&K 8305					
Applied Calibration Method	SAM					
Applied Calibration system	Middle					
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			3500 Hz		**4000 Hz**	
			100 m/s^2		**100 m/s^2**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.011	76	0.010	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-07	∞	2.9E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.001	474	0.001	474
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.062	474	0.081	474
Effect of re-mounting	B	Normal	0.072	∞	0.072	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.13**	**Effective degree of freedom**	**0.14**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.27**		**0.29**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**9939**	**0.3**	**4585**

Remarks
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SAM means the sine-approximation method.

DUT	B&K 8305						
Applied Calibration Method	SAM						
Applied Calibration system	High						
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			4500 Hz		**5000 Hz**		**5500 Hz**	
			100 m/s^2		**100 m/s^2**		**100 m/s^2**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.010	76	0.010	76	0.010	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-07	∞	2.9E-07	∞	2.9E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.032	95	0.036	95	0.034	95
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.004	95	0.006	95	0.006	95
Effect of re-mounting	B	Normal	0.072	∞	0.072	∞	0.072	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.12**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.24**		**0.25**		**0.25**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**19222**	**0.3**	**12441**	**0.3**	**16789**

Remarks
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SAM means the sine-approximation method.

DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	High							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			6000 Hz		**6300 Hz**		**6500 Hz**	
			100 m/s^2		**100 m/s^2**		**150 m/s^2**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.010	76	0.010	76	0.009	76
Quantization error of RMS voltmeter	B	Rectangular	2.9E-07	∞	2.9E-07	∞	1.9E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.037	95	0.043	95	0.028	95
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.006	95	0.005	95	0.007	95
Effect of re-mounting	B	Normal	0.072	∞	0.072	∞	0.072	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.12**	**Effective degree of freedom**	**0.13**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.25**		**0.25**		**0.24**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**12040**	**0.3**	**6844**	**0.3**	**30998**

Remarks
Middle stands for the calibration system for the middle frequency.
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SAM means the sine-approximation method.

DUT	B&K 8305
Applied Calibration Method	SAM
Applied Calibration system	High

Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			7000 Hz		**7500 Hz**		**8000 Hz**	
			150 m/s^2		**150 m/s^2**		**150 m/s^2**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.010	76	0.009	76	0.009	76
Quantization error of RMS voltmeter	B	Rectangular	1.9E-07	∞	1.9E-07	∞	1.9E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.025	95	0.041	95	0.044	95
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.007	95	0.006	95	0.006	95
Effect of re-mounting	B	Normal	0.072	∞	0.072	∞	0.072	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.12**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**	**0.13**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.24**		**0.25**		**0.25**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**46933**	**0.3**	**8461**	**0.3**	**6596**

Remarks

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SAM means the sine-approximation method.

DUT	B&K 8305
Applied Calibration Method	SAM
Applied Calibration system	High

Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**	**Relative standard uncertainty [%]**	**Degree of freedom**
			8500 Hz		**9000 Hz**		**9500 Hz**	
			200 m/s^2		**200 m/s^2**		**200 m/s^2**	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞	0.0035	∞	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞	0.05	∞	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.009	76	0.009	76	0.010	76
Quantization error of RMS voltmeter	B	Rectangular	1.4E-07	∞	1.4E-07	∞	1.4E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.035	95	0.038	95	0.059	95
Instability of laser wavelength	B	Normal	0.0016	∞	0.0016	∞	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞	0.006	∞	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.006	95	0.006	95	0.007	95
Effect of re-mounting	B	Normal	0.072	∞	0.072	∞	0.072	∞
Effect of transverse motion	B	Normal	0.078	∞	0.078	∞	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞	negligible	∞	negligible	∞
Relative combined uncertainty [%]			**0.12**	**Effective degree of freedom**	**0.12**	**Effective degree of freedom**	**0.13**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.25**		**0.25**		**0.26**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**14818**	**0.3**	**10862**	**0.3**	**2407**

Remarks

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High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305			
Applied Calibration Method	SAM			
Applied Calibration system	High			
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [%]**	**Degree of freedom**
			10000 Hz	
			200 m/s^2	
Uncertainty of reference standard capacitance	B	Normal	0.0035	∞
Uncertainty of reference standard voltage generator	B	Normal	0.05	∞
Calibration uncertainty of charge amplifier	A	Normal	0.009	76
Quantization error of RMS voltmeter	B	Rectangular	1.4E-07	∞
Measurement repeatability of accelerometer output	A	Normal	0.086	95
Instability of laser wavelength	B	Normal	0.0016	∞
Instability of vibration frequency	B	Normal	0.006	∞
Measurement uncertainty of phase amplitude	A	Normal	0.009	95
Effect of re-mounting	B	Normal	0.072	∞
Effect of transverse motion	B	Normal	0.078	∞
Effect of total distortion of accelerometer output	B	Normal	negligible	∞
Relative combined uncertainty [%]			**0.15**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.29**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**804**

Remarks
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SAM means the sine-approximation method.

DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			10 Hz		**12.5 Hz**		**16 Hz**	
			3.5 m/s^2		**5 m/s^2**		**5 m/s^2**	
Initial phase uncertainty of charge amplifier	A	Normal	0.19	76	0.19	76	0.11	76
Initial phase uncertainty of voltage generator	A	Normal	0.17	76	0.20	76	0.13	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.13	76	0.04	76	0.04	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.26	237	0.21	237	0.16	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.03	237	0.02	237	0.01	237
Residual effects on phase shift measurement	B	Normal	0.05	∞	0.05	∞	0.05	∞
Relative combined uncertainty [%]			**0.39**	**Effective degree of freedom**	**0.35**	**Effective degree of freedom**	**0.24**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.79**		**0.71**		**0.48**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.8**	**456**	**0.8**	**338**	**0.5**	**403**

Remarks
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SAM means the sine-approximation method.

DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			20 Hz		**25 Hz**		**31.5 Hz**	
			10 m/s^2		**10 m/s^2**		**10 m/s^2**	
Initial phase uncertainty of charge amplifier	A	Normal	0.06	76	0.06	76	0.10	76
Initial phase uncertainty of voltage generator	A	Normal	0.07	76	0.07	76	0.11	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.03	76	0.02	76	0.02	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.12	237	0.09	237	0.08	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.01	237	0.01	237	0.00	237
Residual effects on phase shift measurement	B	Normal	0.05	∞	0.05	∞	0.05	∞
Relative combined uncertainty [%]			**0.16**	**Effective degree of freedom**	**0.14**	**Effective degree of freedom**	**0.18**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.32**		**0.28**		**0.35**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.4**	**498**	**0.3**	**469**	**0.4**	**302**

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SAM means the sine-approximation method.

DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			40 Hz		**63 Hz**		**80 Hz**	
			10 m/s²		**10 m/s²**		**10 m/s²**	
Initial phase uncertainty of charge amplifier	A	Normal	0.07	76	0.08	76	0.08	76
Initial phase uncertainty of voltage generator	A	Normal	0.08	76	0.09	76	0.10	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.03	76	0.04	76	0.01	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.09	237	0.10	237	0.10	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.00	237	0.00	237	0.00	237
Residual effects on phase shift measurement	B	Normal	0.05	∞	0.05	∞	0.05	∞
Relative combined uncertainty [%]			**0.15**	**Effective degree of freedom**	**0.17**	**Effective degree of freedom**	**0.17**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.30**		**0.33**		**0.34**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.3**	**435**	**0.4**	**417**	**0.4**	**375**

Remarks
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DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			100 Hz		**125 Hz**		**160 Hz**	
			10 m/s²		**10 m/s²**		**10 m/s²**	
Initial phase uncertainty of charge amplifier	A	Normal	0.09	76	0.09	76	0.10	76
Initial phase uncertainty of voltage generator	A	Normal	0.10	76	0.11	76	0.12	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.05	76	0.03	76	0.01	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.11	237	0.11	237	0.12	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.00	237	0.00	237	0.00	237
Residual effects on phase shift measurement	B	Normal	0.05	∞	0.05	∞	0.05	∞
Relative combined uncertainty [%]			**0.19**	**Effective degree of freedom**	**0.19**	**Effective degree of freedom**	**0.20**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.37**		**0.38**		**0.40**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.4**	**416**	**0.4**	**379**	**0.4**	**362**

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DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			200 Hz		**250 Hz**		**315 Hz**	
			10 m/s²		**10 m/s²**		**50 m/s²**	
Initial phase uncertainty of charge amplifier	A	Normal	0.10	76	0.11	76	0.03	76
Initial phase uncertainty of voltage generator	A	Normal	0.12	76	0.13	76	0.03	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.01	76	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.13	237	0.14	237	0.04	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.00	237	0.00	237	0.00	237
Residual effects on phase shift measurement	B	Normal	0.05	∞	0.05	∞	0.05	∞
Relative combined uncertainty [%]			**0.21**	**Effective degree of freedom**	**0.22**	**Effective degree of freedom**	**0.07**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.42**		**0.44**		**0.15**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.5**	**354**	**0.5**	**351**	**0.2**	**985**

Remarks

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DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			400 Hz		**500 Hz**		**630 Hz**	
			50 m/s²		**50 m/s²**		**50 m/s²**	
Initial phase uncertainty of charge amplifier	A	Normal	0.04	76	0.04	76	0.03	76
Initial phase uncertainty of voltage generator	A	Normal	0.03	76	0.03	76	0.03	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.04	237	0.04	237	0.04	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.00	237	0.00	237	0.01	237
Residual effects on phase shift measurement	B	Normal	0.05	∞	0.05	∞	0.05	∞
Relative combined uncertainty [%]			**0.08**	**Effective degree of freedom**	**0.08**	**Effective degree of freedom**	**0.07**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.16**		**0.16**		**0.15**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.2**	**862**	**0.2**	**816**	**0.2**	**993**

Remarks

Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			800 Hz		**1000 Hz**		**1250 Hz**	
			50 m/s²		**100 m/s²**		**100 m/s²**	
Initial phase uncertainty of charge amplifier	A	Normal	0.04	76	0.03	76	0.03	76
Initial phase uncertainty of voltage generator	A	Normal	0.03	76	0.02	76	0.02	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.04	237	0.03	237	0.03	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.01	237	0.01	237	0.01	237
Residual effects on phase shift measurement	B	Normal	0.05	∞	0.05	∞	0.05	∞
Relative combined uncertainty [%]			**0.08**	**Effective degree of freedom**	**0.07**	**Effective degree of freedom**	**0.07**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.16**		**0.13**		**0.14**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.2**	**812**	**0.2**	**1044**	**0.2**	**1103**

Remarks

Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			1500 Hz		**1600 Hz**		**2000 Hz**	
			100 m/s²		**100 m/s²**		**100 m/s²**	
Initial phase uncertainty of charge amplifier	A	Normal	0.03	76	0.03	76	0.03	76
Initial phase uncertainty of voltage generator	A	Normal	0.01	76	0.02	76	0.02	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.02	237	0.03	237	0.03	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.01	237	0.01	237	0.02	237
Residual effects on phase shift measurement	B	Normal	0.05	∞	0.05	∞	0.05	∞
Relative combined uncertainty [%]			**0.06**	**Effective degree of freedom**	**0.07**	**Effective degree of freedom**	**0.07**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.13**		**0.13**		**0.14**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.2**	**1830**	**0.2**	**1426**	**0.2**	**1422**

Remarks

Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	Middle							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			2500 Hz		**3000 Hz**		**3150 Hz**	
			100 m/s^2		**100 m/s^2**		**100 m/s^2**	
Initial phase uncertainty of charge amplifier	A	Normal	0.03	76	0.03	76	0.03	76
Initial phase uncertainty of voltage generator	A	Normal	0.02	76	0.02	76	0.02	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.03	237	0.03	237	0.03	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.03	237	0.04	237	0.04	237
Residual effects on phase shift measurement	B	Normal	0.05	∞	0.05	∞	0.05	∞
Relative combined uncertainty [%]			**0.07**	**Effective degree of freedom**	**0.07**	**Effective degree of freedom**	**0.08**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.15**		**0.15**		**0.16**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.2**	**1364**	**0.2**	**1518**	**0.2**	**1354**

Remarks
Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305					
Applied Calibration Method	SAM					
Applied Calibration system	Middle					
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			3500 Hz		**4000 Hz**	
			100 m/s^2		**100 m/s^2**	
Initial phase uncertainty of charge amplifier	A	Normal	0.03	76	0.03	76
Initial phase uncertainty of voltage generator	A	Normal	0.02	76	0.02	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.03	237	0.03	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.05	237	0.07	237
Residual effects on phase shift measurement	B	Normal	0.05	∞	0.05	∞
Relative combined uncertainty [%]			**0.09**	**Effective degree of freedom**	**0.10**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.17**		**0.20**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.2**	**1066**	**0.2**	**731**

Remarks
Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	High							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			4500 Hz		**5000 Hz**		**5500 Hz**	
			100 m/s²		**100 m/s²**		**100 m/s²**	
Initial phase uncertainty of charge amplifier	A	Normal	0.02	76	0.02	76	0.02	76
Initial phase uncertainty of voltage generator	A	Normal	0.01	76	0.01	76	0.01	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.02	237	0.01	237	0.01	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.00	237	0.00	237	0.00	237
Residual effects on phase shift measurement	B	Normal	0.05	∞	0.05	∞	0.05	∞
Relative combined uncertainty [%]			**0.06**	**Effective degree of freedom**	**0.06**	**Effective degree of freedom**	**0.06**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.11**		**0.11**		**0.11**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.2**	**2632**	**0.2**	**2819**	**0.2**	**2607**

Remarks
Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	High							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			6000 Hz		**6300 Hz**		**6500 Hz**	
			100 m/s²		**100 m/s²**		**150 m/s²**	
Initial phase uncertainty of charge amplifier	A	Normal	0.02	76	0.02	76	0.03	76
Initial phase uncertainty of voltage generator	A	Normal	0.01	76	0.01	76	0.03	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.01	237	0.01	237	0.01	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.00	237	0.00	237	0.00	237
Residual effects on phase shift measurement	B	Normal	0.05	∞	0.05	∞	0.05	∞
Relative combined uncertainty [%]			**0.06**	**Effective degree of freedom**	**0.06**	**Effective degree of freedom**	**0.06**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.11**		**0.11**		**0.13**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.2**	**2363**	**0.2**	**2098**	**0.2**	**962**

Remarks
Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	High							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			7000 Hz		**7500 Hz**		**8000 Hz**	
			150 m/s^2		**150 m/s^2**		**150 m/s^2**	
Initial phase uncertainty of charge amplifier	A	Normal	0.03	76	0.03	76	0.03	76
Initial phase uncertainty of voltage generator	A	Normal	0.03	76	0.03	76	0.03	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.03	237	0.03	237	0.01	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.00	237	0.00	237	0.00	237
Residual effects on phase shift measurement	B	Normal	0.05	∞	0.05	∞	0.05	∞
Relative combined uncertainty [%]			**0.07**	**Effective degree of freedom**	**0.07**	**Effective degree of freedom**	**0.06**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.14**		**0.14**		**0.13**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.2**	**870**	**0.2**	**864**	**0.2**	**917**

Remarks

Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305							
Applied Calibration Method	SAM							
Applied Calibration system	High							
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			8500 Hz		**9000 Hz**		**9500 Hz**	
			150 m/s^2		**200 m/s^2**		**200 m/s^2**	
Initial phase uncertainty of charge amplifier	A	Normal	0.03	76	0.03	76	0.03	76
Initial phase uncertainty of voltage generator	A	Normal	0.02	76	0.02	76	0.02	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76	0.00	76	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.01	237	0.01	237	0.01	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.00	237	0.00	237	0.00	237
Residual effects on phase shift measurement	B	Normal	0.05	∞	0.05	∞	0.05	∞
Relative combined uncertainty [%]			**0.06**	**Effective degree of freedom**	**0.06**	**Effective degree of freedom**	**0.06**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.12**		**0.12**		**0.12**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.2**	**1366**	**0.2**	**1219**	**0.2**	**1135**

Remarks

Middle stands for the calibration system for the middle frequency.
High stands for the calibration system for the high frequency.
SAM means the sine-approximation method.

DUT	B&K 8305			
Applied Calibration Method	SAM			
Applied Calibration system	High			
Uncertainty Component	**type (A or B)**	**Distribution**	**Relative standard uncertainty [degree]**	**Degree of freedom**
			10000 Hz	
			200 m/s^2	
Initial phase uncertainty of charge amplifier	A	Normal	0.03	76
Initial phase uncertainty of voltage generator	A	Normal	0.02	76
Phase shift calibration uncertainty of charge amplifier	A	Normal	0.00	76
Uncertainty on initial phase measurement from accelerometer output	A	Normal	0.01	237
Uncertainty on intital phase measurement from quadrature signals	A	Normal	0.01	237
Residual effects on phase shift measurement	B	Normal	0.05	∞
Relative combined uncertainty [%]			**0.06**	**Effective degree of freedom**
Relative expanded uncertainty (*k* =2) [%]			**0.12**	
Stated Relative expanded uncertainty (*k* =2) [%]			**0.2**	**1027**

Remarks

Middle stands for the calibration system for the middle frequency.

High stands for the calibration system for the high frequency.

SAM means the sine-approximation method.

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Table 4 Uncertainty budget of the back-to-back design accelerometer (B&K 8305 S/N 2602106)

Frequency	Acceleration	Relative standard uncertainty, %														$u_c(S)$	$U(S)$
Hz	m/s^2	u_1	u_2	u_3	u_4	u_5	u_6	u_7	u_8	u_9	u_{10}	u_{11}	u_{12}	u_{13}	u_{14}	%	% (k=2)
10	3	0.16	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.01	0.02	0.02	0.19	0.38
12.5	5	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.01	0.02	0.02	0.18	0.36
16	5	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.01	0.01	0.02	0.18	0.36
20	10	0.18	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.01	0.01	0.02	0.20	0.41
25	10	0.18	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.01	0.02	0.20	0.41
31.5	30	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.01	0.02	0.18	0.35
40	50	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.01	0.02	0.18	0.36
50	50	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.01	0.02	0.18	0.36
63	50	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.01	0.02	0.18	0.36
80	100	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.01	0.02	0.18	0.36
100	100	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.02	0.02	0.18	0.36
125	70	0.16	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.02	0.02	0.19	0.37
160	100	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.07	0.02	0.19	0.38
200	70	0.16	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.08	0.02	0.20	0.40
250	100	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.01	0.02	0.18	0.36
315	70	0.16	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.02	0.02	0.19	0.37
400	70	0.16	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.04	0.02	0.19	0.37
500	100	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.07	0.02	0.19	0.38
630	100	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.05	0.02	0.18	0.37

800	70	0.16	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.04	0.02	0.20	0.39
1000	70	0.16	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.02	0.02	0.19	0.39
1250	100	0.15	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.04	0.02	0.19	0.38
1500	100	0.15	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.03	0.02	0.19	0.38
1600	100	0.15	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.04	0.02	0.19	0.38
2000	100	0.15	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.03	0.02	0.19	0.38
2500	100	0.15	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.05	0.02	0.19	0.38
3000	100	0.15	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.07	0.02	0.20	0.40
3150	100	0.15	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.09	0.02	0.21	0.41
3500	100	0.15	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.12	0.02	0.22	0.44
4000	70	0.16	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.15	0.02	0.24	0.49
4500	70	0.16	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.31	0.02	0.37	0.73
5000	100	0.15	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.19	0.02	0.27	0.54

Table 5 Uncertainty components and descriptions for the calibration of the back-to-back accelerometer (B&K 8305 S/N 2571390)

Quantity	Description	Probability distribution model	Factor x_i	Sensitivity coefficient c_i
u_1	Accelerometer output voltage measurement (voltmeter)	Normal	$1/2$	1
u_2	Effect of total distortion on accelerometer output voltage measurement During the calibration total distortion was less than 1.0 % at all frequencies and acceleration levels	Rectangular	$1/\sqrt{3}$	1
u_3	Effect of transverse, rocking and bending acceleration on accelerometer output voltage measurement. Transverse sensitivity of B&K 8305 : max. 1 %. Transverse acceleration, max. 5 %	Rectangular	$1/\sqrt{3}$	1
u_4	Effect of displacement quantization on displacement measurement	Rectangular	$1/\sqrt{3}$	1
u_5	Effect of harmonic component ratio on displacement measurement	Rectangular	$1/\sqrt{3}$	1
u_6	Effect of trigger hysteresis on displacement measurement	Rectangular	$1/\sqrt{3}$	1
u_7	Filtering effect on displacement measurement	Rectangular	$1/\sqrt{3}$	1
u_8	Effect of voltage disturbance on displacement measurement	Normal	$1/2$	-1
u_9	Effect of motion disturbance on displacement measurement	Rectangular	$1/\sqrt{3}$	1
u_{10}	Effect of phase disturbance on displacement measurement	Rectangular	$1/\sqrt{3}$	1
u_{11}	Residual interferometric effects on displacement measurement (interferometer function)	Rectangular	$1/\sqrt{3}$	1
u_{12}	Vibration frequency measurement	Rectangular	$1/\sqrt{3}$	1
u_{13}	Residual effects on sensitivity measurement	Type A	$1/2$	1
u_{14}	Sensitivity of the charge amplifier calibration	Rectangular	$1/\sqrt{3}$	1
$u_c(S)$	Relative combined uncertainty for accelerometer sensitivity S			
$U(S)$	Expanded uncertainty for accelerometer sensitivity S			

Table 6 Uncertainty budget of the single-ended accelerometer (B&K 8305/WH2335 S/N 2571390)

Frequency Hz	Acceleration ms^{-2}	Relative standard uncertainty, %														$u_c(S)$	$U(S)$
		u_1	u_2	u_3	u_4	u_5	u_6	u_7	u_8	u_9	u_{10}	u_{11}	u_{12}	u_{13}	u_{14}	%	% (k=2)
10	5	0.16	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.03	0.02	0.19	0.39
12.5	5	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.03	0.02	0.18	0.36
16	5	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.02	0.02	0.18	0.36
20	10	0.18	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.02	0.02	0.21	0.41
25	20	0.18	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.02	0.02	0.21	0.41
31.5	30	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.02	0.02	0.18	0.36
40	30	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.02	0.02	0.18	0.36
63	50	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.00	0.02	0.18	0.36
80	100	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.03	0.02	0.18	0.36
100	100	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.04	0.02	0.18	0.37
125	100	0.16	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.06	0.02	0.20	0.39
160	100	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.19	0.02	0.26	0.53
200	70	0.16	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.21	0.02	0.28	0.57
250	70	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.07	0.02	0.19	0.38
315	100	0.16	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.03	0.02	0.19	0.38
400	70	0.16	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.08	0.02	0.20	0.41
500	100	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.15	0.02	0.23	0.46
630	100	0.15	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.11	0.02	0.21	0.42
800	70	0.16	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.07	0.02	0.21	0.41

1000	100	0.16	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.06	0.02	0.20	0.41
1250	70	0.15	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.08	0.02	0.21	0.41
1500	70	0.15	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.09	0.02	0.21	0.42
1600	70	0.15	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.09	0.02	0.21	0.42
2000	70	0.15	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.08	0.02	0.20	0.41
2500	100	0.15	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.14	0.02	0.23	0.47
3000	70	0.15	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.16	0.02	0.25	0.49
3150	100	0.15	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.20	0.02	0.27	0.55
3500	100	0.15	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.27	0.02	0.33	0.65
4000	100	0.16	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.20	0.02	0.28	0.56
4500	70	0.16	0.01	0.06	0.00	0.06	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.15	0.02	0.24	0.49

Table 7 Uncertainties and their descriptions for the calibration of the single-ended accelerometer (B&K 8305/WH2335 S/N 1610174)

Quantity	Description	Probability distribution model	Factor x_i	Sensitivity coefficient c_i
u_1	Accelerometer output voltage measurement (voltmeter)	Normal	$1/2$	1
u_2	Effect of total distortion on accelerometer output voltage measurement During the calibration total distortion was less than 1.0 % at all frequencies and acceleration levels	Rectangular	$1/\sqrt{3}$	1
u_3	Effect of transverse, rocking and bending acceleration on accelerometer output voltage measurement. Transverse sensitivity of B&K 8305 : max. 1 %. Transverse acceleration, max. 5 %	Rectangular	$1/\sqrt{3}$	1
u_4	Effect of displacement quantization on displacement measurement	Rectangular	$1/\sqrt{3}$	1
u_5	Effect of harmonic component ratio on displacement measurement	Rectangular	$1/\sqrt{3}$	1
u_6	Effect of trigger hysteresis on displacement measurement	Rectangular	$1/\sqrt{3}$	1
u_7	Filtering effect on displacement measurement	Rectangular	$1/\sqrt{3}$	1
u_8	Effect of voltage disturbance on displacement measurement	Normal	$1/2$	-1
u_9	Effect of motion disturbance on displacement measurement	Rectangular	$1/\sqrt{3}$	1
u_{10}	Effect of phase disturbance on displacement measurement	Rectangular	$1/\sqrt{3}$	1
u_{11}	Residual interferometric effects on displacement measurement (interferometer function)	Rectangular	$1/\sqrt{3}$	1
u_{12}	Vibration frequency measurement	Rectangular	$1/\sqrt{3}$	1
u_{13}	Residual effects on sensitivity measurement	Type A	$1/2$	1
u_{14}	Sensitivity of the charge amplifier calibration	Rectangular	$1/\sqrt{3}$	1
$u_c(S)$	Relative combined uncertainty for accelerometer sensitivity S			
$U(S)$	Expanded uncertainty for accelerometer sensitivity S			

C.10 LNE

i		Description	type	Contribution Incertitude	10 Hz to 40 Hz	> 40 Hz to 2 kHz	> 2 kHz to 5 kHz	> 5 kHz to 7 kHz	> 7 kHz to 10 kHz
i					%	%	%	%	%
		uncertainty on the measurement of the output of the accelerometer signal							
1	$u(\hat{u}V)$	output voltage measurement	B	u1 (S)	0,054	0,052	0,053	0,053	0,053
1a	$u(sA)$	conditionner gain	B	u1a (SA)	0,104	0,104	0,104	0,104	0,104
2	$u(\hat{u}F)$	voltage filtering effects on the amplitude output	B	u2 (S)	0,006	0,006	0,006	0,006	0,006
3	$u(\hat{u}D)$	voltage perturbation on the measure of the ouput voltage	B	u3 (S)	0,006	0,006	0,006	0,006	0,006
4	$u(\hat{u}T)$	effect of transverse acceleration on the output voltage	B	u4 (S)	0,033	0,033	0,033	0,067	0,133
5	$u(STE)$	effect of temperature sensitivity of the accelerometer on the output voltage	B	u12 (S)	0,030	0,030	0,030	0,030	0,030
		uncertainty on the measurement of the phase amplitude amplitude							
6	$u(\hat{\varphi}M,Q)$	effects of the interferometric quadrature output signal disturbance on the phase amplitude measurement	B	u5 (S)	0,029	0,029	0,029	0,058	0,058
7	$u(\hat{\varphi}M,F)$	Effect of the interferometric signal filtering on the phase amplitude measurement (limitation of the frequency band)		u6 (S)	included in i6				
8	$u(\hat{\varphi}M,VD\hat{\varphi}$	effect of voltage disturbance on the phase amplitude measurement		u7 (S)	included in i6				
9	$u(\hat{\varphi}M,MD)$	effect of motion of the vibration disturbance on the phase amplitude measurement	B	u8 (S)	0,017	0,017	0,017	0,101	0,267
10	$u(\hat{\varphi}M,PD)$	residual interferometrics effects on the phase amplitude measurement		u9 (S)	included in i6				
11	$u(\hat{\varphi}M,RE)$	longitudinal and transverse motion of the insulated table of the laser	B	u10 (S)	0,041	0,041	0,041	0,041	0,041
11b	$u(\hat{\varphi}M,LD)$	wavelenght of the laser effect	B	u10b (S)	0,001	0,001	0,001	0,001	0,001
12	$u(fFG)$	vibration frequency measurement	B	u11 (S)	0,002	0,002	0,002	0,002	0,002
13		repeatability on the 3 measurements	A	u13(S)	0,020	0,020	0,020	0,100	0,100
		Relative standard uncertainty on accelerometer magnitude sensitivity (k=1)			**0,15**	**0,15**	**0,15**	**0,29**	**0,49**
		Relative expanded uncertainty on accelerometer magnitude sensitivity (k=2)				**0,30%**		**0,60%**	**1,0%**

i		Description	type	Contribution Incertitude	10 Hz to 40 Hz	> 40 Hz to 2 kHz	> 2 kHz to 5 kHz	> 5 kHz to 7 kHz	> 7 kHz to 10 kHz
					degrees	degrees	degrees	degrees	degrees
		uncertainty on the measurement of the output of the accelerometer signal							
1	$u(\hat{\varphi}_{u,V})$	output phase measurement	B	$u1\ (\Delta\varphi)$	0,50	0,50	1,00	1,00	1,00
1a	$u(sA)$	conditionner gain	B	$u1a\ (\Delta\varphi)$	0,50	0,10	0,10	0,10	0,10
2	$u(\hat{\varphi}_{u,F})$	voltage filtering effects on the output phase	B	$u2\ (\Delta\varphi)$	0,10	0,10	0,10	0,10	0,10
3	$u(\hat{\varphi}_{u,D})$	voltage perturbation on the measure of the ouput phase	B	$u3\ (\Delta\varphi)$	0,10	0,10	0,10	0,10	0,10
4	$u(\hat{\varphi}_{u,T})$	effect of transverse acceleration on the output phase	B	$u4\ (\Delta\varphi)$	0,50	0,50	1,00	2,00	2,00
		uncertainty on the measurement of the phase amplitude amplitude							
5	$u(\hat{\varphi}_{S}{}^{Q})$	effects of the interferometric quadrature output signal disturbance on the phase amplitude measurement	B	$u5\ (\Delta\varphi)$	0,10	0,10	0,10	0,10	0,10
6	$u(\hat{\varphi}_{S,F})$	Effect of the interferometric signal filtering on the phase amplitude measurement (limitation of the frequency band)		$u6\ (\Delta\varphi)$	included in i6				
7	$u(\hat{\varphi}_{S,VD})$	effect of voltage disturbance on the phase amplitude measurement		$u7\ (\Delta\varphi)$	included in i6				
8	$u(\hat{\varphi}_{S,MD})$	effect of motion of the vibration disturbance on the phase amplitude measurement	B	$u8\ (\Delta\varphi)$	0,10	0,10	0,10	0,10	0,10
9	$u(\hat{\varphi}_{S,PD})$	residual interferometrics effects on the phase amplitude measurement		$u9\ (\Delta\varphi)$	included in i6				
10	$u(\hat{\varphi}_{S,RE})$	longitudinal and transverse motion of the insulated table of the laser	B	$u10\ (\Delta\varphi)$	0,10	0,10	0,10	0,10	0,10
11b	$u(\hat{\varphi}_{S,LD})$	wavelenght of the laser effect	B	$u10b\ (\Delta\varphi)$	0,00	0,00	0,00	0,00	0,00
11	$u(fFG)$	vibration frequency measurement	B	$u11\ (\Delta\varphi)$	0,10	0,10	0,10	0,50	0,50
12	$u(R)$	repetability on the 3 measurements	A	$u12(\Delta\varphi)$	0,10	0,05	0,05	0,05	0,05
		Absolute standard uncertainty on accelerometer phase shift (k=1)			**1,0**	**0,9**	**1,5**	**2,4**	**2,4**
		Absolute expanded uncertainty on accelerometer phase shift (k=2)			**2°**		**5°**		

C.11 NIM

NIM- Uncertainty Budget for Magnitude of Complex Sensitivity

Disturbing Component	Probability distribution	Factor	Estimated uncertainty			Uncertainty contribution u_i,(k =1) (%)		
			10Hz～1kHz	>1kHz～5kHz	>5kHz～10kHz	10Hz～1kHz	>1kHz～5kHz	>5kHz～10kHz
Interferometer output signal disturbance on phase amplitude	retangular	1.732	0.01	0.01	0.15	5.77E-03	5.77E-03	8.66E-02
Effect of voltage disturbance on phase amplitude measurement	retangular	1.732	0.01	0.01	0.10	5.77E-03	5.77E-03	5.77E-02
Effect of motion disturbance on phase amplitude measurement	retangular	1.732	0.10	0.10	0.40	5.77E-02	5.77E-02	2.31E-01
Effect of phase disturbance on phase amplitude measurement	retangular	1.732	0.01	0.01	0.10	5.77E-03	5.77E-03	5.77E-02
Residual interferometric effects on phase amplitude measurement	retangular	1.732	0.05	0.05	0.10	2.89E-02	2.89E-02	5.77E-02
Vibration frequency measurement accuracy	retangular	1.732	0.05	0.05	0.10	2.89E-02	2.89E-02	5.77E-02
Accelerometer output voltage measurement (ADC resolution+DAQ range linearity)	retangular	1.732	0.02	0.02	0.10	1.15E-02	1.15E-02	5.77E-02
Filtering effect on sensitivity measurement	retangular	1.732	0.05	0.05	0.15	2.89E-02	2.89E-02	8.66E-02
Charge amplifier gain accuracy	normal(k =2)	2.000	0.10	0.10	0.10	5.00E-02	5.00E-02	5.00E-02
Effect of voltage disturbance on accelerometer output voltage measurement	retangular	1.732	0.05	0.05	0.10	2.89E-02	2.89E-02	5.77E-02
Effect of transverse motion on accelerometer output voltage measurement	retangular	1.732	0.04	0.04	0.30	2.31E-02	2.31E-02	1.73E-01
Residual effects on accelerometer output voltage measurement	normal(k =2)	2.000	0.10	0.10	0.10	5.00E-02	5.00E-02	5.00E-02
Standard deviation on accelerometer output voltage measurement	normal(k =2)	2.000	0.15	0.20	0.30	7.50E-02	1.00E-01	1.50E-01
Relative Combained Uncertainty, in %						0.14	0.15	0.39
Relative Expanded Uncertainty (k =2), in %						0.28	0.30	0.78
Stated Expanded Uncertainty (k =2),in %						**0.40**	**0.40**	**1.00**

NIM- Uncertainty Budget for Phase Shift of Complex Sensitivity

Disturbing Component	Probability distribution	Factor	Estimated uncertainty			Uncertainty contribution u_i,(k =1) (in 1°)		
			10Hz～1kHz	>1kHz～5kHz	>5kHz～10kHz	10Hz～1kHz	>1kHz～5kHz	>5kHz～10kHz
Interferometer output signal disturbance on displacement phase measurement	retangular	1.732	0.10	0.08	0.24	5.77E-02	4.62E-02	1.39E-01
Effect of voltage disturbance on displacement phase measurement	retangular	1.732	0.05	0.10	0.20	2.89E-02	5.77E-02	1.15E-01
Effect of motion disturbance on displacement phase measurement	retangular	1.732	0.10	0.10	0.20	5.77E-02	5.77E-02	1.15E-01
Effect of phase disturbance on displacement phase measurement	retangular	1.732	0.20	0.15	0.35	1.15E-01	8.66E-02	2.02E-01
Residual interferometric effects on displacement phase measurement	retangular	1.732	0.05	0.10	0.20	2.89E-02	5.77E-02	1.15E-01
Environmental effects on phase shift measurement	retangular	1.732	0.05	0.05	0.10	2.89E-02	2.89E-02	5.77E-02
Accelerometer output phase measurement (ADC)	normal(k =2)	2.000	0.08	0.10	0.20	4.00E-02	5.00E-02	1.00E-01
Filtering effect on accelerometer output phase measurement	retangular	1.732	0.15	0.15	0.30	8.66E-02	8.66E-02	1.73E-01
Charge amplifier phase accuracy	normal(k =2)	2.000	0.18	0.18	0.18	9.00E-02	9.00E-02	9.00E-02
Filtering effect on Interferometer output phase measurement	retangular	1.732	0.10	0.15	0.30	5.77E-02	8.66E-02	1.73E-01
Effect of voltage disturbance on accelerometer output phase measurement	retangular	1.732	0.10	0.12	0.15	5.77E-02	6.93E-02	8.66E-02
Effect of transverse motion on accelerometer output phase measurement	retangular	1.732	0.10	0.10	0.20	5.77E-02	5.77E-02	1.15E-01
Standard deviation on accelerometer phase shift measurement	normal(k =2)	2.000	0.05	0.05	0.10	2.50E-02	2.50E-02	5.00E-02
Relative Combained Uncertainty, in1°						0.23	0.24	0.46
Relative Expanded Uncertainty (k =2), in 1°						0.46	0.48	0.92
Stated Expanded Uncertainty (k =2),in 1°						**0.50**	**0.50**	**1.00**

C.12 CENAM

no submission

C.13 INMETRO

The uncertainty budgets presented in the following Tables were condensed in sub- frequency ranges, for which INMETRO has chosen to report similar values of uncertainty. The full uncertainty budgets, including all individual frequencies measured, were submitted in an Excel spreadsheet. Since these extended budgets are quite large and difficult to print properly, they were not included in this document.

CHARGE SENSITIVITY - MAGNITUDE

INMETRO - SE accelerometer

i	Standard uncertainty component $u(x_i)$	Source of uncertainty	description	Probability distribution model	Factor x_i	Relative uncertainty contribution $u_{rel,i}(y)$ (%) frequency (Hz) 10 to 3000	3150 to 4500	5000 to 6500	7000 to 10000
1	$u(\hat{u}_V)$	accelerometer output voltage measurement (ADC resolution + DAQ range linearity)	results of different calibrations measured against hp3458A	rectangular	0,58	0,03	0,03	0,03	0,03
2	$u(\hat{u}_F)$	voltage filtering effect on accelerometer output amplitude measurement	No analog filtering applied	rectangular	0,58	0,01	0,01	0,01	0,01
3	$u(\hat{u}_D)$	effect of voltage disturbance on accelerometer output voltage measurement	effect on sensitivity by simulated noise on interferometer and accel channels	normal (k=1)	1	0,05	0,05	0,05	0,06
4	$u(\hat{u}_T)$	effect of transverse, rocking and bending acceleration on accelerometer voltage measurement (transverse sensitivity)	The residual effect on sensitivity is estimated by the error to a LS fit, which is to be less than	rectangular	0,58	0,00	0,05	0,14	0,23
5	$u(\Phi_{M,Q})$	effect of interferometer quadrature output signal disturbance on phase amplitude measurement (e.g. offsets, voltage amplitude deviation, deviation from 90° nominal angle difference)	Ellipse fit correction implemented. Residual effect already included in i = 3			0,00	0,00	0,00	0,00
6	$u(\Phi_{M,F})$	interferometer signal filtering effect on phase amplitude measurement (frequency band limitation)	No analog filtering applied.	rectangular	0,58	0,01	0,01	0,01	0,01
7	$u(\Phi_{M,VD})$	effect of voltage disturbance on phase amplitude measurement	Estimated to be less than	rectangular	0,58	0,02	0,02	0,02	0,02
8	$u(\Phi_{M,MD})$	effect of motion disturbance on phase amplitude measurement	Estimated to be less than	rectangular	0,58	0,03	0,03	0,03	0,03
9	$u(\Phi_{M,PD})$	effect of phase disturbance on phase amplitude measurement	Estimated to be less than	rectangular	0,58	0,03	0,03	0,03	0,03
10	$u(\Phi_{M,RE})$	residual interferometric effects on phase amplitude measurement	Estimated to be less than	normal (sqrt(N))	0,30	0,02	0,02	0,02	0,02
11	$u(f_{FG})$	vibration frequency measurement (frequency generator and indicator)	Estimated to be less than (standard limit)	normal (k=2)	0,5	0,00	0,00	0,00	0,00
12	$u(S_{RE})$	residual effects on sensitivity measurement (e.g. random effect in repeat measurements; experimental standard deviation of arithmetic mean)	measured (for N=6, std dev of the mean)	normal (sqrt(N))	0,41	0,02	0,02	0,07	0,06
13	$u(\lambda\,\text{cal})$	laser wavelength calibration	calibration of laser + bandwidth (1200 MHz)	normal (k=2)	0,5	0,00	0,00	0,00	0,00
14	$u(\lambda_E)$	environmental effects on laser wavelength (dT =+/- 3 °C, dP = +/- 70 hPa, dH = +/- 20 %)	Estimated to be less than	rectangular	0,58	0,00	0,00	0,00	0,00
15	$u(A\ \text{cal})$	amplifier gain calibration	calibration of amplifier BK 2650 with constant charge input	normal (k=2)	0,5	0,05	0,03	0,03	0,03
16	$u(e_{T,A})$	reference amplifiers tracking (deviations in gain for different amplif. settings)	Not applicable. Amplifier used at a fixed gain setting			0,00	0,00	0,00	0,00
17	$u(e_{L,f,A})$	deviation from constant amplitude-frequency characteristic of ref. amplifier	Not applicable. Amplifier calibrated at all frequencies			0,00	0,00	0,00	0,00
18	$u(e_{L,f,P})$	deviation from constant amplitude-frequency characteristic of ref. accelerometer	Not applicable. Results reported with the input acceleration			0,00	0,00	0,00	0,00
19	$u(e_{L,a,A})$	amplitude effect on gain of reference amplifier	Estimated to be less than (amplitude range up to 100 m/s^2)	rectangular	0,58	0,01	0,01	0,01	0,01
20	$u(e_{L,a,P})$	amplitude effect on sensitivity (magnitude) of reference accelerometer	Estimated to be less than (amplitude range up to 100 m/s^2)	rectangular	0,58	0,01	0,01	0,01	0,01
21	$u(e_{I,A})$	instability of reference amplifier gain, and effect of source impedance on gain	Estimated to be less than	rectangular	0,58	0,02	0,02	0,02	0,02
22	$u(e_{I,P})$	instability of sensitivity (magnitude) of reference accelerometer	Estimated to be less than	rectangular	0,58	0,01	0,01	0,01	0,01
23	$u(e_{E,A})$	environmental effects on gain of reference amplifier	Estimated to be less than (dT =+/- 1 °C during one complete calibration)	rectangular	0,58	0,04	0,01	0,01	0,01
24	$u(e_{E,P})$	environmental effects on sensitivity (magnitude) of reference accelerometer	Estimated to be less than (dT =+/- 1 °C during calibration, St = 0.02%/°C)	rectangular	0,58	0,01	0,01	0,01	0,01
25	$u(S_{SF})$	safety factor (reproducibility)	Estimated to be less than	rectangular	0,58	0,00	0,00	0,12	0,29

		10 to 3000	3150 to 4500	5000 to 6500	7000 to 10000
$u_c(S_2)/S_2\,\%$	Estimated relative combined standard uncertainty (%) for accelerometer sensitivity (k=1)	0,11	0,10	0,21	0,39
$U(S_2)/S_2\,\%$	Estimated relative expanded uncertainty (%) for accelerometer sensitivity (k=2)	0,21	0,20	0,43	0,77

	frequency (Hz) 10 to 3000	3150 to 4500	5000 to 6500	7000 to 10000
Reported relative expanded Uncertainty for accelerometer sensitivity (k=2)	**0,24**	**0,34**	**0,6**	**0,8**

CHARGE SENSITIVITY - PHASE SHIFT

INMETRO - SE accelerometer

i	Standard uncertainty component $u(x_i)$	Source of uncertainty	description	Probability distribution model	Factor x_i	Uncertainty contribution $u_{rel,i}(y)$ (°) frequency (Hz) 10 to 3000	3150 to 3800	4000 to 5000	5500 to 7000	7000 to 10000
1	$u(\Phi_{u,V})$	accelerometer output phase measurement (ADC resolution)	results of different calibrations measured against hp3458A	normal (k=1)	0,58	0,03	0,03	0,03	0,03	0,03
2	$u(\Phi_{u,F})$	voltage filtering effect on accelerometer output phase measurement	No filtering applied	rectangular	0,58	0,00	0,00	0,00	0,00	0,00
3	$u(\Phi_{u,D})$	effect of voltage disturbance on accelerometer output phase measurement	effect on sensitivity by simulated noise on interferometer and accel channels	normal (k=1)	1	0,05	0,05	0,10	0,10	0,10
4	$u(\Phi_{u,T})$	effect of transverse, rocking and bending acceleration on accelerometer output phase measurement (transverse sensitivity)	The residual effect on sensitivity is estimated by the error to a LS fit, which is to be less than	rectangular	0,58	0,06	0,12	0,12	0,23	0,23
5	$u(\Phi_{s,Q})$	effect of interferometer quadrature output signal disturbance on phase amplitude measurement (e.g. offsets, voltage amplitude deviation, deviation from 90° nominal angle difference)	already included in i = 3			0,00	0,00	0,00	0,00	0,00
6	$u(\Phi_{s,F})$	interferometer signal filtering effect on phase amplitude measurement (frequency band limitation)	No filtering applied	rectangular	0,58	0,01	0,01	0,01	0,01	0,01
7	$u(\Phi_{s,VD})$	effect of voltage disturbance on displacement phase measurement (e.g. random noise in the photoelectric measuring chains)	Estimated to be less than	rectangular	0,58	0,02	0,02	0,02	0,02	0,02
8	$u(\Phi_{s,MD})$	effect of motion disturbance on diaplacementphase measurement	Estimated to be less than	rectangular	0,58	0,03	0,03	0,03	0,03	0,03
9	$u(\Phi_{s,PD})$	effect of phase disturbance on phase amplitude measurement	Estimated to be less than	rectangular	0,58	0,03	0,03	0,03	0,03	0,03
10	$u(\Phi_{s,RE})$	residual interferometric effects on phase amplitude measurement	Estimated to be less than	normal (sqrt(N))	0,30	0,02	0,02	0,02	0,02	0,02
11	$u(\Delta\Phi_{RE})$	vibration frequency measurement (frequency generator and indicator)	Estimated to be less than (standard limit)	normal (sqrt(N))	0,5	0,00	0,04	0,07	0,19	0,18
12	$u(\Delta\Phi_{A,cal})$	residual effects on sensitivity measurement (e.g. random effect in repeat measurements; experimental standard deviation of arithmetic mean)	measured (for N=6, std dev of the mean)	normal (k=2)	0,41	0,02	0,02	0,02	0,02	0,02
13	$u(e_{T,A})$	laser wavelength calibration	calibration of laser + bandwidth (1200 MHz)	rectangular	0,5	0,00	0,00	0,00	0,00	0,00
14	$u(e_{T,f,A})$	environmental effects on laser wavelength (dT =+/- 3 °C, dP = +/- 70 hPa, dH = +/- 20 %)	Estimated to be less than	rectangular	0,58	0,00	0,00	0,00	0,00	0,00
15	$u(\lambda\,\mathrm{cal})$	amplifier gain calibration	calibration of amplifier BK 2650 with constant charge input	normal (k=2)	0,5	0,03	0,03	0,03	0,03	0,03
17	$u(e_{L,a,A})$	amplitude effect on gain of reference amplifier	Estimated to be less than	rectangular	0,58	0,01	0,01	0,01	0,01	0,01
18	$u(e_{L,a,P})$	amplitude effect on sensitivity (magnitude) of reference accelerometer	Estimated to be less than (amplitude range up to 100 m/s²)	rectangular	0,58	0,01	0,01	0,01	0,01	0,01
19	$u(e_{I,A})$	instability of reference amplifier gain, and effect of source impedance on gain	Estimated to be less than	rectangular	0,58	0,02	0,02	0,02	0,02	0,02
20	$u(e_{I,P})$	instability of sensitivity (magnitude) of reference accelerometer	Estimated to be less than	rectangular	0,58	0,01	0,01	0,01	0,01	0,01
21	$u(e_{E,A})$	environmental effects on gain of reference amplifier	Estimated to be less than (dT =+/- 1 oC during one complete calibration)	rectangular	0,58	0,04	0,01	0,01	0,01	0,01
22	$u(e_{E,P})$	environmental effects on sensitivity (magnitude) of reference accelerometer	Estimated to be less than (dT =+/- 1 °C during calibration, St = 0.02%/°C)	rectangular	0,58	0,01	0,01	0,01	0,01	0,01
23	$u(\Delta\Phi_{SF})$	safety factor (reproducibility)	Estimated to be less than	rectangular	0,58	0,00	0,00	0,00	0,12	0,29
	$u_c(\Delta\Phi)$		Estimated combined standard uncertainty (°) for accelerometer phase shift (k=1)			0,11	0,15	0,18	0,34	0,43
	$U(\Delta\Phi)$		Estimated expanded uncertainty (°) for accelerometer phase shift (k=2)			0,22	0,30	0,37	0,69	0,86

	frequency (Hz) 10 to 3000	3150 to 3800	4000 to 5000	5500 to 7000	7000 to 10000
Reported expanded uncertainty (°) for accelerometer phase shift (k=2)	**0,24**	**0,34**	**0,5**	**0,8**	1

CHARGE SENSITIVITY - MAGNITUDE

INMETRO - BTB accelerometer

i	Standard uncertainty component $u(x_i)$	Source of uncertainty	description	Probability distribution model	Factor x_i	Relative uncertainty contribution $u_{rel,i}(y)$ (%) frequency (Hz) 10 to 3000	3150 to 4500	5000 to 6500	7000 to 10000
1	$u(\hat{u}_V)$	accelerometer output voltage measurement (ADC resolution + DAQ range linearity)	results of different calibrations measured against hp3458A	rectangular	0,58	0,03	0,03	0,03	0,03
2	$u(\hat{u}_F)$	voltage filtering effect on accelerometer output amplitude measurement	No analog filtering applied	rectangular	0,58	0,01	0,01	0,01	0,01
3	$u(\hat{u}_D)$	effect of voltage disturbance on accelerometer output voltage measurement	effect on sensitivity by simulated noise on interferometer and accel channels	normal (k=1)	1	0,05	0,05	0,05	0,06
4	$u(\hat{u}_T)$	effect of transverse, rocking and bending acceleration on accelerometer voltage measurement (transverse sensitivity)	The residual effect on sensitivity is estimated by the error to a LS fit, which is to be less than	rectangular	0,58	0,00	0,06	0,12	0,07
5	$u(\Phi_{M,Q})$	effect of interferometer quadrature output signal disturbance on phase amplitude measurement (e.g. offsets, voltage amplitude deviation, deviation from 90° nominal angle difference)	Ellipse fit correction implemented. Residual effect already included in i = 3			0,00	0,00	0,00	0,00
6	$u(\Phi_{M,F})$	interferometer signal filtering effect on phase amplitude measurement (frequency band limitation)	No analog filtering applied.	rectangular	0,58	0,01	0,01	0,01	0,01
7	$u(\Phi_{M,VD})$	effect of voltage disturbance on phase amplitude measurement	Estimated to be less than	rectangular	0,58	0,02	0,02	0,02	0,02
8	$u(\Phi_{M,MD})$	effect of motion disturbance on phase amplitude measurement	Estimated to be less than	rectangular	0,58	0,03	0,03	0,03	0,03
9	$u(\Phi_{M,PD})$	effect of phase disturbance on phase amplitude measurement	Estimated to be less than	rectangular	0,58	0,03	0,03	0,03	0,03
10	$u(\Phi_{M,RE})$	residual interferometric effects on phase amplitude measurement	Estimated to be less than	normal (sqrt(N))	0,30	0,02	0,02	0,02	0,02
11	$u(f_{FG})$	vibration frequency measurement (frequency generator and indicator)	Estimated to be less than (standard limit)	normal (k=2)	0,5	0,00	0,00	0,00	0,00
12	$u(S_{RE})$	residual effects on sensitivity measurement (e.g. random effect in repeat measurements; experimental standard deviation of arithmetic mean)	measured (for N=6, std dev of the mean)	normal (sqrt(N))	0,41	0,01	0,01	0,05	0,06
13	$u(\lambda$ cal)	laser wavelength calibration	calibration of laser + bandwidth (1200 MHz)	normal (k=2)	0,5	0,00	0,00	0,00	0,00
14	$u(\lambda_E)$	environmental effects on laser wavelength (dT =+/- 3 °C, dP = +/- 70 hPa, dH = +/- 20 %)	Estimated to be less than	rectangular	0,58	0,00	0,00	0,00	0,00
15	$u(A$ cal)	amplifier gain calibration	calibration of amplifier BK 2650 with constant charge input	normal (k=2)	0,5	0,03	0,03	0,03	0,03
16	$u(e_{T,A})$	reference amplifiers tracking (deviations in gain for different amplif. settings)	Not applicable. Amplifier used at a fixed gain setting			0,00	0,00	0,00	0,00
17	$u(e_{L,f,A})$	deviation from constant amplitude-frequency characteristic of ref. amplifier	Not applicable. Amplifier calibrated at all frequencies			0,00	0,00	0,00	0,00
18	$u(e_{L,f,P})$	deviation from constant amplitude-frequency characteristic of ref. accelerometer	Not applicable. Results reported with the input acceleration			0,00	0,00	0,00	0,00
19	$u(e_{L,a,A})$	amplitude effect on gain of reference amplifier	Estimated to be less than (amplitude range up to 100 m/s^2)	rectangular	0,58	0,01	0,01	0,01	0,01
20	$u(e_{L,a,P})$	amplitude effect on sensitivity (magnitude) of reference accelerometer	Estimated to be less than (amplitude range up to 100 m/s^2)	rectangular	0,58	0,01	0,01	0,01	0,01
21	$u(e_{I,A})$	instability of reference amplifier gain, and effect of source impedance on gain	Estimated to be less than	rectangular	0,58	0,02	0,02	0,02	0,02
22	$u(e_{I,P})$	instability of sensitivity (magnitude) of reference accelerometer	Estimated to be less than	rectangular	0,58	0,01	0,01	0,01	0,01
23	$u(e_{E,A})$	environmental effects on gain of reference amplifier	Estimated to be less than (dT =+/- 1 °C during one complete calibration)	rectangular	0,58	0,04	0,01	0,01	0,01
24	$u(e_{E,P})$	environmental effects on sensitivity (magnitude) of reference accelerometer	Estimated to be less than (dT =+/- 1 °C during calibration, St = 0.02%/°C)	rectangular	0,58	0,01	0,01	0,01	0,01
25	$u(S_{SF})$	safety factor (reproducibility)	Estimated to be less than	rectangular	0,58	0,00	0,00	0,12	0,29

		10 to 3000	3150 to 4500	5000 to 6500	7000 to 10000
$u_c(S_2)/S_2$ %	Estimated relative combined standard uncertainty (%) for accelerometer sensitivity (k=1)	0,09	0,10	0,19	0,32
$U(S_2)/S_2$ %	Estimated relative expanded uncertainty (%) for accelerometer sensitivity (k=2)	0,19	0,21	0,38	0,63

	frequency (Hz) 10 to 3000	3150 to 4500	5000 to 6500	7000 to 10000
Reported relative expanded Uncertainty for accelerometer sensitivity (k=2)	**0,24**	**0,34**	**0,6**	**0,8**

CHARGE SENSITIVITY - PHASE SHIFT

INMETRO - BTB accelerometer

Standard uncertainty component $u(x_i)$	Source of uncertainty	description	Probability distribution model	Factor x_i	Uncertainty contribution $u_{rel,i}(y)$ (°) frequency (Hz) 10 to 3000	3150 to 3800	4000 to 5000	5500 to 7000	7000 to 10000
$u(\Phi_{u,V})$	accelerometer output phase measurement (ADC resolution)	results of different calibrations measured against hp3458A	normal (k=1)	0,58	0,03	0,03	0,03	0,03	0,03
$u(\Phi_{u,F})$	voltage filtering effect on accelerometer output phase measurement	No filtering applied	rectangular	0,58	0,00	0,00	0,00	0,00	0,00
$u(\Phi_{u,D})$	effect of voltage disturbance on accelerometer output phase measurement	effect on sensitivity by simulated noise on interferometer and accel channels	normal (k=1)	1	0,05	0,05	0,10	0,10	0,10
$u(\Phi_{u,T})$	effect of transverse, rocking and bending acceleration on accelerometer output phase measurement (transverse sensitivity)	The residual effect on sensitivity is estimated by the error to a LS fit, which is to be less than	rectangular	0,58	0,06	0,12	0,12	0,23	0,29
$u(\Phi_{s,Q})$	effect of interferometer quadrature output signal disturbance on phase amplitude measurement (e.g. offsets, voltage amplitude deviation, deviation from 90° nominal angle difference)	already included in i = 3			0,00	0,00	0,00	0,00	0,00
$u(\Phi_{s,F})$	interferometer signal filtering effect on phase amplitude measurement (frequency band limitation)	No filtering applied	rectangular	0,58	0,01	0,01	0,01	0,01	0,01
$u(\Phi_{s,VD})$	effect of voltage disturbance on displacement phase measurement (e.g. random noise in the photoelectric measuring chains)	Estimated to be less than	rectangular	0,58	0,02	0,02	0,02	0,02	0,02
$u(\Phi_{s,MD})$	effect of motion disturbance on diaplacementphase measurement	Estimated to be less than	rectangular	0,58	0,03	0,03	0,03	0,03	0,03
$u(\Phi_{s,PD})$	effect of phase disturbance on phase amplitude measurement	Estimated to be less than	rectangular	0,58	0,03	0,03	0,03	0,03	0,03
$u(\Phi_{s,RE})$	residual interferometric effects on phase amplitude measurement	Estimated to be less than	normal (sqrt(N))	0,30	0,02	0,02	0,02	0,02	0,02
$u(\Delta\Phi_{RE})$	vibration frequency measurement (frequency generator and indicator)	Estimated to be less than (standard limit)	normal (sqrt(N))	0,5	0,01	0,00	0,02	0,05	0,03
$u(\Delta\Phi_{A,cal})$	residual effects on sensitivity measurement (e.g. random effect in repeat measurements; experimental standard deviation of arithmetic mean)	measured (for N=6, std dev of the mean)	normal (k=2)	0,41	0,02	0,02	0,02	0,02	0,02
$u(e_{T,A})$	laser wavelength calibration	calibration of laser + bandwidth (1200 MHz)	rectangular	0,5	0,00	0,00	0,00	0,00	0,00
$u(e_{T,f,A})$	environmental effects on laser wavelength (dT =+/- 3 °C, dP = +/- 70 hPa, dH = +/- 20 %)	Estimated to be less than	rectangular	0,58	0,00	0,00	0,00	0,00	0,00
$u(\lambda\,cal)$	amplifier gain calibration	calibration of amplifier BK 2650 with constant charge input	normal (k=2)	0,5	0,03	0,03	0,03	0,03	0,03
$u(e_{L,a,A})$	amplitude effect on gain of reference amplifier	Estimated to be less than	rectangular	0,58	0,01	0,01	0,01	0,01	0,01
$u(e_{L,a,P})$	amplitude effect on sensitivity (magnitude) of reference accelerometer	Estimated to be less than (amplitude range up to 100 m/s^2)	rectangular	0,58	0,01	0,01	0,01	0,01	0,01
$u(e_{I,A})$	instability of reference amplifier gain, and effect of source impedance on gain	Estimated to be less than	rectangular	0,58	0,02	0,02	0,02	0,02	0,02
$u(e_{I,P})$	instability of sensitivity (magnitude) of reference accelerometer	Estimated to be less than	rectangular	0,58	0,01	0,01	0,01	0,01	0,01
$u(e_{E,A})$	environmental effects on gain of reference amplifier	Estimated to be less than (dT =+/- 1 oC during one complete calibration)	rectangular	0,58	0,04	0,01	0,01	0,01	0,01
$u(e_{E,P})$	environmental effects on sensitivity (magnitude) of reference accelerometer	Estimated to be less than (dT =+/- 1 °C during calibration, St = 0.02%/°C)	rectangular	0,58	0,01	0,01	0,01	0,01	0,01
$u(\Delta\Phi_{SF})$	safety factor (reproducibility)	Estimated to be less than	rectangular	0,58	0,00	0,00	0,00	0,12	0,29
$u_c(\Delta\Phi)$		Estimated combined standard uncertainty (°) for accelerometer phase shift (k=1)			0,11	0,14	0,17	0,29	0,43
$U(\Delta\Phi)$		Estimated expanded uncertainty (°) for accelerometer phase shift (k=2)			0,22	0,29	0,34	0,58	0,85

	frequency (Hz) 10 to 3000	3150 to 3800	4000 to 5000	5500 to 7000	7000 to 10000
Reported expanded uncertainty (°) for accelerometer phase shift (k=2)	**0,24**	**0,34**	**0,5**	**0,8**	**1**

C.14 UME

UME- Uncertainty Budget for Magnitude of Complex Sensitivity

i	Disturbing Component	Distribution Function	Factor	95% value				Uncertainty Contribution u_i , (k=1) (%)			
				10 Hz to 1kHz	1.25 kHz to 5 kHz	5.5 kHz to 7 kHz	7.5 kHz to 10 kHz	10 Hz to 1kHz	1.25 kHz to 5 kHz	5.5 kHz to 7 kHz	7.5 kHz to 10 kHz
1	Accelerometer output voltage measurement (ADC resolution + DAQ range linearity)	Normal (k=1)	1,000	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
2	Voltage filtering effect on accelerometer output voltage measurement	Rectangular	0,577	0,05	0,05	0,1	0,1	0,029	0,029	0,058	0,058
3	Effect of voltage disturbance on accelerometer output voltage measurement	Normal (k=1)	1,000	0,1	0,1	0,1	0,1	0,100	0,100	0,100	0,100
4	Effect of transverse, rocking and bending acceleration on accelerometer voltage measurement (transverse sensitivity) - dev% from fit	Rectangular	0,577	0,1	0,2	0,3	0,5	0,058	0,115	0,173	0,289
5	Effect of interferometer quadrature output signal disturbance on phase amplitude measurement (e.g. Offsets, voltage amplitude deviation, deviation from 90° nominal angle difference)	Rectangular	0,577	0,05	0,05	0,1	0,1	0,029	0,029	0,058	0,058
6	Interferometer signal filtering effect on phase amplitude measurement (frequency band limitation)	Rectangular	0,577	0,05	0,05	0,05	0,05	0,029	0,029	0,029	0,029
7	Effect of voltage disturbance on phase amplitude measurement	Rectangular	0,577	0,05	0,05	0,05	0,05	0,029	0,029	0,029	0,029
8	Effect of motion disturbance on phase amplitude measurement	Rectangular	0,577	0,05	0,05	0,1	0,1	0,029	0,029	0,058	0,058
9	Effect of phase disturbance on phase amplitude measurement	Rectangular	0,577	0,05	0,05	0,05	0,05	0,029	0,029	0,029	0,029
10	Residual interferometric effects on phase amplitude measurement	Rectangular	0,577	0,05	0,05	0,1	0,1	0,029	0,029	0,058	0,058
11	Vibration frequency measurement (frequency generator and indicator)	Normal (k=2)	0,500	0,0001	0,0001	0,0001	0,0001	0,000	0,000	0,000	0,000
12	Residual effects on sensitivity measurement (e.g. Random effect in repeated measurements; experimental standard deviation of arithmetic mean)	Normal (k=1)	1,000	0,125	0,35	0,6	0,75	0,125	0,350	0,600	0,750
13	Environmental effects on laser wavelength, Estimated to be less than (dT=± 3 ℃, dP=± 70 hPa, dU=± 20%)	Rectangular	0,577	0,0007	0,0007	0,0007	0,0007	0,000	0,000	0,000	0,000
14	Amplifier gain calibration	Normal (k=2)	0,500	0,09	0,09	0,09	0,09	0,045	0,045	0,045	0,045
15	Reference amplifiers tracking (deviation in gain for different amplification settings)	N/A	0,577	0	0	0	0	0,000	0,000	0,000	0,000
16	Deviation from constant amplitude-frequency characteristic of reference amplifier	N/A	0,577	0	0	0	0	0,000	0,000	0,000	0,000
17	Deviation from constant amplitude-frequency characteristic of reference accelerometer	N/A	0,577	0	0	0	0	0,000	0,000	0,000	0,000
18	Amplitude effect on gain of reference amplifier	Rectangular	0,577	0,1	0,1	0,1	0,1	0,058	0,058	0,058	0,058
19	Amplitude effect on sensitivity (magnitude) of reference accelerometer	Rectangular	0,577	0,1	0,1	0,1	0,1	0,058	0,058	0,058	0,058
20	Instability of reference amplifier gain, and effect of source impedance on gain	Rectangular	0,577	0,05	0,05	0,05	0,05	0,029	0,029	0,029	0,029
21	Instability of sensitivity (magnitude) of reference accelerometer	Rectangular	0,577	0,05	0,05	0,05	0,05	0,029	0,029	0,029	0,029
22	Environmental effects on gain of reference amplifier	Rectangular	0,577	0,05	0,05	0,05	0,1	0,029	0,029	0,029	0,058
23	Environmental effects on sensitivity (magnitude) of reference accelerometer	Rectangular	0,577	0,1	0,1	0,1	0,1	0,058	0,058	0,058	0,058
Relative Combained Uncertainty, in %								0,23	0,41	0,66	0,83
Relative Expanded Uncertainty (k=2), in %								0,46	0,82	1,31	1,66
Stated Expanded Uncertainty (k=2), in %								**0,50**	**1,00**	**1,50**	**1,70**

UME- Uncertainty Budget for Phase Shift of Complex Sensitivity

i	Disturbing Component	Distribution Function	Factor	95% value			Uncertainty Contribution u_i, (k=1) (in 1°)		
				10 Hz to 1 kHz	1.25 kHz to 5 kHz	5.5 kHz to 10 kHz	10 Hz to 1 kHz	1.25 kHz to 5 kHz	5.5 kHz to 10 kHz
1	Accelerometer output phase measurement (e.g. ADC resolution)	Normal (k=1)	1,0	0,05	0,05	0,05	0,050	0,050	0,050
2	Voltage filtering effect on accelerometer output phase measurement (frequency band limitation)	Rectangular	0,577	0,05	0,05	0,05	0,029	0,029	0,029
3	Effect of voltage disturbance on accelerometer output phase measurement (e.g. hum and noise)	Normal (k=1)	1,0	0,1	0,1	0,1	0,100	0,100	0,100
4	Effect of transverse, rocking and bending acceleration on accelerometer output phase measurement (transverse sensitivity)	Rectangular	0,577	0,1	0,4	0,5	0,058	0,231	0,289
5	Effect of interferometer quadrature output signal disturbance on displacement phase measurement (e.g. offsets, voltage amplitude deviation, deviation from 90° nominal angle differe nce)	Rectangular	0,577	0,05	0,05	0,05	0,029	0,029	0,029
6	Interferometer signal filtering effect on displacement phase measurement (frequency band limitation)	Rectangular	0,577	0,05	0,05	0,05	0,029	0,029	0,029
7	Effect of voltage disturbance on displacement phase measurement (e.g. random noise in the photoelectric measuring chains)	Rectangular	0,577	0,03	0,03	0,03	0,017	0,017	0,017
8	Effect of motion disturbance on displacement phase measurement (e.g. drift; relative motion between the accelerometer reference surface and the spot sensed by the interferometer)	Rectangular	0,577	0,05	0,05	0,05	0,029	0,029	0,029
9	Effect of phase disturbance on displacement phase measurement (e.g. phase noise of the interferometer signals)	Rectangular	0,577	0,05	0,05	0,05	0,029	0,029	0,029
10	Residual interferometric effects on displacement phase measurement (interferometer function)	Rectangular	0,577	0,05	0,05	0,05	0,029	0,029	0,029
11	Residual effects on phase shift measurement (e.g. random effect in repeat measurements; experimental standard deviation of arithmetic mean)	Normal (k=1)	1,000	0,1	0,3	0,4	0,100	0,300	0,400
12	Amplifier phase shift calibration	Normal (k=2)	0,500	0,25	0,25	0,25	0,125	0,125	0,125
13	Reference amplifier tracking (deviations in phase for different amplification settings)	Rectangular	0,577	0,01	0,01	0,01	0,006	0,006	0,006
14	Deviation from linear phase-frequency characteristic of reference amplifier	Rectangular	0,577	0,01	0,01	0,01	0,006	0,006	0,006
15	Deviation from linear phase-frequency characteristic of reference accelerometer	Rectangular	0,577	0,05	0,05	0,05	0,029	0,029	0,029
16	Amplitude effect on phase shift of reference amplifier	Rectangular	0,577	0,01	0,01	0,01	0,006	0,006	0,006
17	Amplitude effect on phase shift of reference accelerometer	Rectangular	0,577	0,03	0,03	0,03	0,017	0,017	0,017
18	Instability of reference amplifier phase shift, and effect of source impedance on phase shift	Rectangular	0,577	0,05	0,05	0,05	0,029	0,029	0,029
19	Instability of reference accelerometer phase shift	Rectangular	0,577	0,05	0,05	0,05	0,029	0,029	0,029
20	Environmental effects on phase shift of reference amplifier	Rectangular	0,577	0,03	0,03	0,03	0,017	0,017	0,017
21	Environmental effects on phase shift of reference accelerometer	Rectangular	0,577	0,03	0,03	0,03	0,017	0,017	0,017
Combined Uncertainty, in 1°							0,22	0,42	0,53
Expanded Uncertainty (k=2), in 1°							0,44	0,85	1,06
Stated Expanded Uncertainty (k=2), in 1°							**0,50**	**1,00**	**1,50**

C.15 VNIIM

EXPLANATORY NOTE

on the measurement results obtained in comparison CCAUV.V-K2
reported by VNIIM (St.Petersburg, Russia)

31-Jan-12

Description of the measuring system:

- Vibration exciter Type B&K 4801 with vibration head 4815
- Laser vibrometer;
- Power amplifier Type B&K 2707 ;
- Conditioning amplifier Type B&K 2525;
- Software VNIIM-Vibro.

Calibration methods:

- Method 1 according to ISO 16063-11 in the frequency range from 10 to 800 Hz,
- Method 2 according to ISO 16063-11 in the frequency range from 1000 to 2000 Hz,
- Analog of Method 3 according to ISO 16063-11 in the frequency range from 2500 to 10000 Hz.

Environmental conditions:

- Ambient temperature, °C: from 21.0 to 22.0
- Relative humidity, %: from 50.0 to 70.0.

Calibration results:

The measuring frequencies: 10, 12.5, 16, 20, 25, 31.5, 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1500, 1600, 2000, 2500, 3150, 3500, 4000, 4500, 5000, 5500, 6000, 6300, 6500, 7000, 7500, 8000, 8500, 9000, 9500, 10000 Hz, the base frequency value is 160 Hz.

The values of vibration acceleration amplitudes: from 10 m/s^2 to 200 m/s^2. The measurements of the accelerometers sensitivity were conducted in five series. There were more than 12 measurements of the accelerometer sensitivity at each frequency in each series. The measurements of the accelerometers shift phase were conducted in four series. There were more than five measurements of the accelerometers phase shift at each frequency in each series. The measurements of parameters of the accelerometer (S/N 2602106) model 8305 were performed in accordance with the requirements of the Technical Protocol of the Key Comparison CCAUV.V-K2 (2009-07-09).

The accelerometer (S/N 2571390) of model 8305-001 was mounted on a special device along one axis with the reflection element of the Laser vibrometer (see fig. 1).

The uncertainty budget of the accelerometer sensitivity measurements (in relative units) is given in Table 1.

$$U_{rel}(S) = k \cdot u_{crel}(S);$$

$$u_{crel}(S) = \sqrt{\sum_i u_i^2(S)},$$

The uncertainty budget of the accelerometer phase shift measurements (in absolute units) is given in Table 2.

$$U\ (\Delta\varphi) = k \cdot u_c(\Delta\varphi);$$

$$u_c(\Delta\varphi) = \sqrt{\sum_i u_i^2(\Delta\varphi)}.$$

Table 1 The uncertainty budget of the accelerometer sensitivity measurements

No.	Uncertainty source $u_{irel}(S)$	Uncertainty in the frequency range (relative units)				
		from 10 to 16 Hz	from 20 to 800 Hz	from 1000 to 2000 Hz	from 2500 to 5000 Hz	above 5000 to 10000 Hz
1	Accelerometer output voltage measurement (voltmeter)	0,001	0,0006	0,0006	0,0006	0,0006
2	Influence of summary distortions on accelerometer output voltage measurement	0,001	0,0006	0,0006	0,0012	0,002
3	Influence of filtration on accelerometer output voltage measurement	-	-	-	0,0006	0,002
4	Influence of transverse, bending and rocking acceleration on accelerometer output voltage measurement	0,002	0,0012	0,0006	0,002	0,003
5	Influence of minimum-point resolution on displacement measurement	-	-	0,0012	-	-
6	Influence of displacement quantization on displacement measurement	0,00006	0,00012	-	-	-
7	Influence of interferometer quadrature output signal disturbance on phase amplitude measurement	-	-	-	0,002	0,0025
8	Influence of trigger hysteresis on displacement measurement	0,0001	0,00012	-	-	-
9	Influence of filtration on displacement measurement (limitation of frequency range)	0,0006	0,0003	-	-	-
10	Influence of filtration of interferometer output signal on phase amplitude measurement	-	-	-	0,0012	0,002
11	Influence of voltage disturbance on phase amplitude measurement	-	-	-	0,0006	0,0012
12	Influence of voltage disturbance on displacement measurement	0,0006	0,0003	0,0003	-	-
13	Influence of motion disturbance on displacement measurement	0,002	0,0006	0,0006	-	-
14	Influence of motion disturbance on phase amplitude measurement	-	-	-	0,0006	0,002
15	Influence of phase disturbance on displacement measurement	0,00006	0,00006	-	-	-
16	Influence of phase disturbance on phase amplitude measurement	-	-	-	0,0006	0,0012
17	Residual interferometric influences on displacement measurement	0,0006	0,0003	0,0003	0,0003	0,002
18	Uncertainty of measurement vibration frequency	0,00006	0,00006	0,00006	0,00006	0,00006
19	Residual influences on sensitivity measurement (experimental standard deviation of arithmetic mean)	0,003	0,001	0,0015	0,003	0,005
20	Total relative measurement uncertainty $u_{crel}(S)$	≈ 0,0045	≈ 0,002	≈ 0,0023	≈ 0,0047	≈0,008
21	Expanded measurement uncertainty $U_{rel}(S)$ $(k = 2)$	0,009	0,004	0,0046	0,0094	0,016
22	Accepted value of expanded uncertainty	0,01	0,005	0,005	0,01	0,02

Table 1 The uncertainty budget of the accelerometer phase shift measurements

№ п/п	Uncertainty source $u_i(\Delta\varphi)$	Uncertainty in the frequency range, degree				
		from 10 to 16 Hz	from 20 to 800 Hz	from 1000 to 2000 Hz	from 2500 to 5000 Hz	above 5000 to 10000 Hz
1	Phase of accelerometer output signal measurement	0,1	0,1	0,1	0,1	0,1
2	Influence of filtration on phase of accelerometer output voltage measurement	0,05	0,05	0,05	0,05	0,05
3	Influence of voltage disturbance on phase of accelerometer output signal measurement	0,2	0,1	0,05	0,05	0,05
4	Influence of transverse, bending and rocking acceleration on phase of accelerometer output signal measurement	0,1	0,05	0,05	0,05	0,2
5	Influence of interferometer quadrature output signal disturbance on phase measurement	0,2	0,1	0,1	0,2	0,3
6	Influence of filtration of interferometer output signal on phase amplitude of displacement measurement	0,05	0,05	0,05	0,1	0,2
7	Influence of voltage disturbance on phase amplitude of displacement measurement	0,05	0,05	0,05	0,05	0,05
8	Influence of motion disturbance on phase amplitude of displacement measurement	0,05	0,05	0,05	0,05	0,05
9	Influence of phase disturbance on phase amplitude of displacement measurement	0,2	0,1	0,1	0,2	0,4
10	Residual interferometric influences on phase amplitude of displacement measurement	0,1	0,1	0,1	0,2	0,3
11	Residual influences on phase shift measurement (random effects by repeated measurements, experimental standard deviation of arithmetic mean)	0,2	0,2	0,2	0,3	0,3
12	Total relative measurement uncertainty $u_c(\Delta\varphi)$	≈ 0,45	≈ 0,32	≈ 0,31	≈ 0,49	≈ 0,73
13	Expanded measurement uncertainty $U\ (\Delta\varphi)$ $(k = 2)$	0,9	0,64	0,62	0,98	1,46
14	Accepted value of expanded uncertainty	1	0,75	0,75	1	1,5

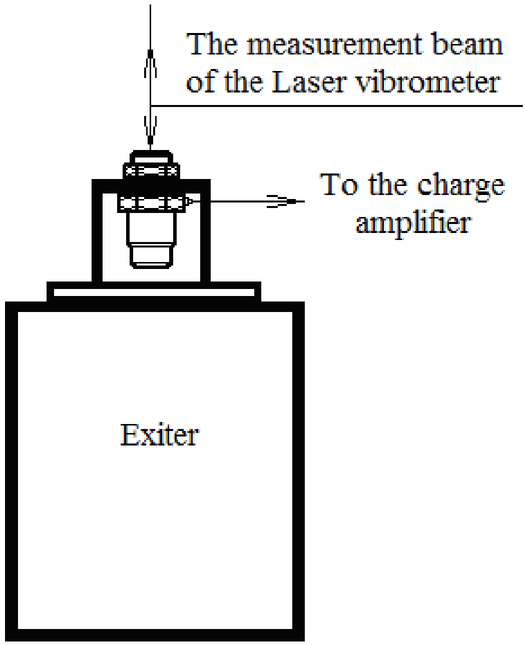

Fig.1

The measurements results

- of the model 8305 accelerometer (S/N 2602106) sensitivity are shown in table 3 in dependence on frequency,
- of the model 8305-001 accelerometer (S/N 2571390) sensitivity are shown in table 4 in dependence on frequency,
- of the model 8305 accelerometer (S/N 2602106) phase shift are shown in table 5 in dependence on frequency,
- of the model 8305-001 accelerometer (S/N 2571390) phase shift are shown in table 6 in dependence on frequency.