

List of Publications by the laboratory of acoustics & vibration at METAS

- Zwahlen G., Hof C., "*La chorégraphie des marteaux – dans la machine à chocs normalisée*", METinfo 01, 2015
- Hof C., Zwahlen G., "*Measurement setup for the efficient calibration of tapping machines at METAS*", Get-Together of National Metrology Institutes at SPEKTRA, 3.- 05.12. 2014
- Hof C., "*Traceability in bone conduction audiometry*", Proc. 42nd Internoise, Innsbruck, Austria, 15. - 18. September 2013
- Hof C., Zwahlen G., "*On the measurement of the mechanical impedance of artificial mastoids*", Meas. Sci. Technol. 23, 125102, 2012
- Hof C., "*Metrologie im Bereich Vibration am METAS*", Spektra Kalibrierseminar, Dresden, 2012
- Hof C., "*Final report on bilateral comparison EURAMET.AUV.V-K1.2: Vibration acceleration*", Metrologia, 48, Tech. Suppl., 09003, 2011
- Hof C., "*Metrologie im Bereich Akustik am METAS*", Spektra Kalibrierseminar, Dresden, 2011
- Hof C., "*Flexible Prüfeinrichtung für Schallpegelmessgeräte*", METinfo 03, 2010
- Hof C., "*Kalibrierung von Vibrations-Sensoren am METAS*", 12. Symposium für Bauwerksdynamik und Erschütterungsmessungen“, Dübendorf, 2009
- Hof C., "*Calibration of artificial mastoids*", XIX IMEKO World Congress, Lisbon, Portugal, 2009
- Hof C., "*Kalibrierung von Vibrationsaufnehmern im Tieffrequenzbereich*", DAGA, Conférence de la société d'acoustique Allemande, Dresden, 2008
- Hof C., M. Kobusch, "*Comparison of the Calibration of a Heavy Multi-Component Vibration Transducer on Different Exciter Systems*", IMEKO 20th TC3, 3rd TC16 and 1st TC22 International Conference, Merida, Mexico, 2007
- Hof C., "*Prestations et incertitudes au laboratoire d'acoustique du METAS*", journées d'automne de la société d'acoustique Suisse, 2007

AUV-Comparisons in which METAS participated

- **EURAMET.AUV.A-K5** (23/2013 - 41/2014)
(primary pressure calibration of two LS1P **laboratory standard microphones** in terms of modulus (mandatory) and phase (optional) at specified frequencies from **2 Hz to 10 kHz**)
- **AFRIMETS.AUV.A-S1** (28/2013 - 13/2014)
(primary pressure calibration of two LS2aP **laboratory standard microphones**, in terms of modulus (mandatory), phase (optional, but desirable), microphone lumped circuit parameters at specified frequencies from **1 Hz to 31.5 kHz**)
- **CCAUV.V-K3**, (35/2014 - 33/2015)
(complex voltage sensitivity of a quartz-flexure **accelerometer** in terms of magnitude and phase between **0.1 to 40 Hz**)
- **EURAMET.AUV.V-K2** (5/2012 - 15/2013)
(complex voltage sensitivity of a quartz-flexure **accelerometer** in terms of magnitude and phase between **0.1 to 200 Hz**)
- **CCAUV.V-K2**, (37/2009 - 28/2011)
(complex charge sensitivity in terms of magnitude and phase of two different **accelerometers** (single ended and back-to-back) at specified frequencies from **10 Hz to 10 kHz**)
- **EURAMET.AUV.V-K1.2** (42/2009 - 10/2010)
(charge sensitivity in terms of magnitude of two different **accelerometers** (single ended and back-to-back) at specified frequencies from **40 Hz to 5 kHz**)

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					NMI Service Identifier	Comments
Quantity	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage factor	Level of Confidence	Is the expanded uncertainty a relative one?		
Pressure sensitivity level	Measurement microphone type LS1	Reciprocity calibration IEC 61094-2:1992			dB (reference: 1 V/Pa)	Frequency	31 Hz to 63 Hz	0.1 to 0.05	dB	2	95%	No	Approved on 18 October 2005	
Pressure sensitivity level	Measurement microphone type LS1	Reciprocity calibration IEC 61094-2:1992			dB (reference: 1 V/Pa)	Frequency	125 Hz to 2 kHz	0.05	dB	2	95%	No	Approved on 18 October 2005	
Pressure sensitivity level	Measurement microphone type LS1	Reciprocity calibration IEC 61094-2:1992			dB (reference: 1 V/Pa)	Frequency	2.5 kHz to 8 kHz	0.05 to 0.07	dB	2	95%	No	Approved on 18 October 2005	
Pressure sensitivity level	Measurement microphone type LS1	Reciprocity calibration IEC 61094-2:1992			dB (reference: 1 V/Pa)	Frequency	10 kHz	0.12	dB	2	95%	No	Approved on 18 October 2005	
Pressure sensitivity level	Measurement microphone type LS2	Reciprocity calibration IEC 61094-2:1992			dB (reference: 1 V/Pa)	Frequency	31 Hz to 63 Hz	0.10 to 0.07	dB	2	95%	No	Approved on 18 October 2005	
Pressure sensitivity level	Measurement microphone type LS2	Reciprocity calibration IEC 61094-2:1992			dB (reference: 1 V/Pa)	Frequency	125 Hz to 8 kHz	0.07	dB	2	95%	No	Approved on 18 October 2005	
Pressure sensitivity level	Measurement microphone type LS2	Reciprocity calibration IEC 61094-2:1992			dB (reference: 1 V/Pa)	Frequency	10 kHz to 16 kHz	0.08 to 0.12	dB	2	95%	No	Approved on 18 October 2005	
Pressure sensitivity level	Measurement microphone type LS2	Reciprocity calibration IEC 61094-2:1992			dB (reference: 1 V/Pa)	Frequency	20 kHz	0.22	dB	2	95%	No	Approved on 18 October 2005	
Free-field sensitivity level	Measurement microphone	Sequential comparison			dB (reference: 1 V/Pa)	Frequency	63 Hz to 5 kHz	0.3 to 0.4	dB	2	95%	No	Approved on 18 October 2005	
Free-field sensitivity level	Measurement microphone	Sequential comparison			dB (reference: 1 V/Pa)	Frequency	6.3 kHz to 10 kHz	0.4 to 0.6	dB	2	95%	No	Approved on 18 October 2005	
Free-field sensitivity level	Measurement microphone	Sequential comparison			dB (reference: 1 V/Pa)	Frequency	12.5 kHz	0.7	dB	2	95%	No	Approved on 18 October 2005	
System response level	Sound level meter	Sequential comparison			dB (reference: true sound pressure)	Frequency	31.5 Hz to 5 kHz	0.3 to 0.5	dB	2	95%	No	Approved on 18 October 2005	

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					NMI Service Identifier	Comments
Quantity	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage factor	Level of Confidence	Is the expanded uncertainty a relative one?		
System response level	Sound level meter	Sequential comparison			dB (reference: true sound pressure)	Frequency	6.3 kHz to 10 kHz	0.5 to 0.7	dB	2	95%	No		Approved on 18 October 2005
System response level	Sound level meter	Sequential comparison			dB (reference: true sound pressure)	Frequency	12.5 kHz	0.8	dB	2	95%	No		Approved on 18 October 2005
Sound pressure level	Pistonphone or sound calibrator, single frequency	Calibrated measurement microphone	70	130	dB (reference: 20 μ Pa)	Microphone type	LS1P	0.07	dB	2	95%	No		Approved on 18 October 2005
Sound pressure level	Pistonphone or sound calibrator, single frequency	Calibrated measurement microphone	70	130	dB (reference: 20 μ Pa)	Microphone type	WS1P	0.08	dB	2	95%	No		Approved on 18 October 2005
Sound pressure level	Pistonphone or sound calibrator, single frequency	Calibrated measurement microphone	70	130	dB (reference: 20 μ Pa)	Microphone type	LS2P	0.08	dB	2	95%	No		Approved on 18 October 2005
Sound pressure level	Pistonphone or sound calibrator, single frequency	Calibrated measurement microphone	70	130	dB (reference: 20 μ Pa)	Microphone type	WS2P	0.1	dB	2	95%	No		Approved on 18 October 2005
Sound pressure level	Sound calibrator multifrequency	Calibrated measurement microphone	70	115	dB (reference: 20 μ Pa)	Frequency	31 Hz to 2 kHz	0.12	dB	2	95%	No		Approved on 18 October 2005
						Microphone type	LS2P							
Sound pressure level	Sound calibrator multifrequency	Calibrated measurement microphone	70	115	dB (reference: 20 μ Pa)	Frequency	4 kHz to 12.5 kHz	0.16	dB	2	95%	No		Approved on 18 October 2005
						Microphone type	LS2P							
Sound pressure level	Reference coupler system, artificial ear system	ISO 389, IEC60645	40	140	dB (reference: 20 μ Pa)	Frequency	125 Hz to 8 kHz	0.3	dB	2	95%	No		Approved on 18 October 2005
						Microphone type	WS2P							
Charge sensitivity (modulus)	Accelerometer	Comparison, ISO 16063-21			C/(m/s ²)	Frequency	10 Hz to 1.6 kHz	1	%	2	95%	Yes	100	Approved on 18 October 2005

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					NMI Service Identifier	Comments
Quantity	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage factor	Level of Confidence	Is the expanded uncertainty a relative one?		
Charge sensitivity (modulus)	Accelerometer	Comparison, ISO 16063-21			C/(m/s ²)	Frequency	2 kHz to 5 kHz	1.5	%	2	95%	Yes	101	Approved on 18 October 2005
Charge sensitivity (modulus)	Accelerometer	Comparison, ISO 16063-21			C/(m/s ²)	Frequency	6.3 kHz to 10 kHz	2	%	2	95%	Yes	102	Approved on 18 October 2005