



**REPORT FROM  
EUROMET TECHNICAL COMMITTEE ON  
ACOUSTICS, ULTRASOUND and VIBRATION (TC AUV)**

## **1. Introduction**

This report summarizes activities within EUROMET Technical Committee Acoustics, Ultrasound and Vibration (TC AUV) from April 2005 to August 2006.

TC AUV activities are organized in the following way: general issues are under the responsibility of the Technical Committee, and technical issues are dealt with in the four Sub-Committees (SC) covering different subject fields. Activities of each Sub-Committee are coordinated by permanent convener. The structure of TC AUV remains the same as for the last 4 years, while participation in the work of SCs is increasing. The membership within Sub-Committees is following:

SC "Acceleration and Vibration"	: 17
SC "Sound in Air"	: 23
SC "Ultrasound"	: 8
SC "Underwater Acoustics"	: 6

Overall, TC AUV has representatives from 25 members of EUROMET out of 34.

The period under review started with the meeting of SC "Ultrasound" held at FORCE Technology Institute (Copenhagen, Denmark) on April 15, 2005. The representatives from Italy attended the meeting for the first time. The meeting of SC "Acceleration and Vibration" was held on 18-19th of April, 2005 at GUM (Warsaw, Poland). Then "Sound in Air" SC and TC AUV Contact Persons meetings were held at INRIM (Torino, Italy) on 12-13th of May, 2005. In the period under review, SC "Ultrasound" had the second meeting held at INRIM (Torino, Italy) on 31st of March 2006. The SC "Acceleration and Vibration" was held on 24-25th of April, 2006 at DPLA (Copenhagen, Denmark). The meeting of SC "Underwater Acoustics" was held on 10th of May, 2006, while "Sound in Air" SC and TC AUV Contact Persons meetings were held on 12th and 13th of May, 2006, respectively. NPL (UK) was a host of the last three meetings. The representative of Serbia and Montenegro attended the SC "Sound in Air" and TC AUV meetings for the first time.

## **2. Projects**

In the period under review, in TC-AUV there were a total of 16 active projects (4 comparisons, 4 consultation, 5 cooperation, 3 traceability). 3 projects (2 comparison, 1 cooperation) were completed in 2005. Statistics for TC AUV projects are given in following tables.



**Table 1.** TC AUV Project Statistics

Project Status	Number of Projects
Proposed	3
Agreed	16
Completed	22
<b>TOTAL</b>	<b>41</b>

**Table 2.** Distribution of Projects by Category

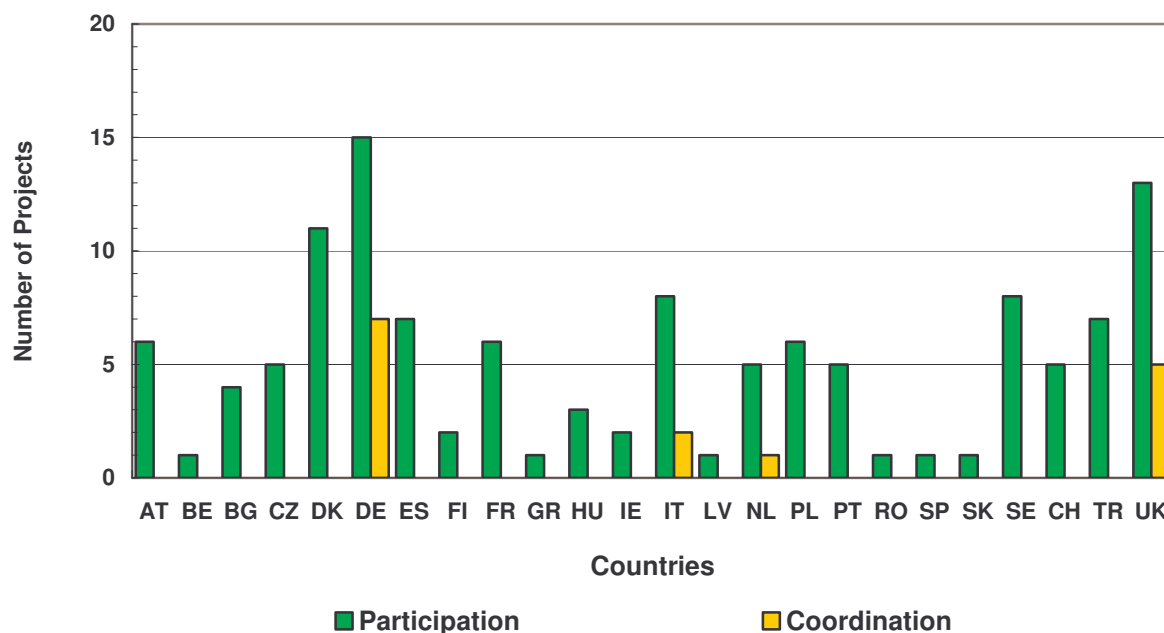
	Comparison	Co-operation	Traceability	Consultation	Total
<b>Proposed</b>	1	2	-	-	3
<b>Agreed</b>	3 (3)	5 (8)	3 (3)	4 (4)	15 (18)
<b>Completed</b>	10	13	-	-	23

(Figures in brackets denote the numbers for the previous period, 2004-2005)

**Table 3.** Distribution of Active Projects by Subject Field

	Number of Projects
Sound in Air	6
Vibration	6
Ultrasound	2
Underwater acoustics	1
<b>TOTAL</b>	<b>15</b>

The involvement of EUROMET members in EUROMET AUV projects is shown in the following graph.





Summary of active TC AUV projects under the category “Cooperation in Research” is given below:

- Project No 493** The project entitled “**Radial wave motion correction for microphone calibration**”, which is coordinated by PTB (Germany), is a follow-up to the completed EUROMET Project No 294, which covered tests of software for the pressure reciprocity calibration of laboratory standard microphones. The target of the project is to investigate the correction for radial wave motion in the cylindrical couplers at high frequencies. In addition, test configurations with diameters differing from those of the microphone's diagrams are under investigation. The collection of data from participants has been completed and preparation of the project report is in progress.
- Project No 671** The project entitled “**Development of transfer standard devices for ensuring the accurate calibration of ultrasonic therapy machines in clinical use**”, conducted with an Australian partner, is nearly finished. Within the project, four Ultrasound Portable Power Standards intended for testing of ultrasound therapy equipment in small companies and hospitals have been designed, developed and calibrated. The guidance documents were produced on best practice for carrying out power measurements for physiotherapists and technicians involved in testing of ultrasound therapy equipment. The documents will be posted on the EUROMET web site and newsletter. The final report for the project will be submitted to the EUROMET Secretary soon.
- Project No 790** The project entitled “**Specifications of requirements for the calibration of impedance heads for measurements on mechanical couplers**” is coordinated by NPL (UK). 7 laboratories participate in the project, whose purpose is to gather information on the requirements for measurement accuracy in all stages of audiological bone conduction measurements. The project involves participants consulting with the audiometric community in their countries and reporting on their requirements. Issues to be discussed include frequency range, uncertainty, approximate number of mechanical couplers in service, frequency of calibration, and other points deemed to be important to users. All necessary data was collected and reported to the project coordinator. Preparation of the project report is in progress.
- Project No 791** The title of the project is “**Measurement of the acoustical impedance of artificial ears**”. The project is coordinated by NPL (UK) and includes participants from 7 countries. The objective of the project is to evaluate the proposed measurement procedure and refine the method of measurement of artificial ears, and also collect data on the acoustical impedance of a number of devices. The output from the project will feed directly into the revision process for IEC 60318-1, which is already underway. Most of the participants completed the measurements. The first draft of the project report is expected to be ready by August 2006.

**Project No 792**

The project is entitled “**Investigation of methods of secondary free-field calibration of working standard microphones**”. The project is intended to investigate the viability of different methods of secondary free-field calibration and compare the results of these methods. It also addresses the need for a suitable sound source for free-field calibration. The results of the project are to be the input for the IEC working group preparing the next part of the IEC 61094 series of standards on measurement microphones to describe methods of secondary free-field calibration of working standard microphones by comparison with laboratory standard microphones.

### 3. Mutual Recognition Arrangement

#### 3.1. Key Comparisons

EUROMET members are participating in the following CCAUV comparisons:

**CCAUV.A-K2** with 6 participants from EUROMET (BEV, CEM, DPLA, NPL, PTB, UME). Measurement stage within the comparison is completed.

**CCAUV.A-K3.** 6 participants from EUROMET (BNM-LNE, DPLA, GUM, NPL, PTB, UME) Draft B of the comparison report was approved by CCAUV and published in KCDB in 2006.

The following EUROMET AUV key comparisons are in progress:

**EUROMET AUV.A-K3** with 9 participants: BEV (AT), CEM (ES), CMI (CZ), DPLA (DK), IEN (IT), METAS (CH), MIKES (FI), NMi VSL (NL), SP (SE). IEN is the pilot laboratory. Draft B of the comparison report was approved by participants and sent to CCAUV Executive Secretary for CCAUV approval on August 2006.

**EUROMET AUV.V-K1** with 16 participants: BEV (AT), METAS (CH), CMI (CZ), CEM (ES), IA (Spain), PTB (DE), DPLA (DK), BNM-CESTA (FR), GBARL (HU), CNR-IMGC (IT), NMi-VSL (NL), SP (SE), GUM (PL), INETI (PT), SIRA (UK) and UME (TR). PTB is the pilot laboratory.

Draft B of the comparison report was approved by participants in April 2006. After a few editorial changes, the final report was sent to CCAUV Executive Secretary in June 2006.

**EUROMET AUV.V-K1.1** with 5 participants: BEV (AT), INETI (PT), LNE (FR), NCM (BG), PTB (DE). PTB is acting as the pilot laboratory. Measurement stage within the comparison is in progress.

EUROMET NMIs are also involved in key comparisons within other RMOs.

**COOMET.A-K1.** 4 participants out of 6 are from EUROMET (PTB, SMU, GUM, UME). New version (ver. 3.1) of Draft A of the comparison report was distributed to participants for comments in August 2006.



**COOMET.A-K3.** 3 participants out of 5 are from EUROMET (DPLA, GUM, INM). Measurement stage within the comparison was completed in March 2006 and Draft A of the comparison report is under preparation.

### 3.2. Bilateral Comparisons

Three bilateral comparisons were completed in 2005-2006 and the final reports were placed on the EUROMET web site.

**EUROMET project 750.** Bilateral comparison on pressure calibration of LS1P and LS2P microphones (DPLA, CEM).

**EUROMET project 805.** Bilateral comparison on pressure calibration of LS1P and LS2P microphones (DPLA, BNM-LNE).

**EUROMET Project 879.** Bilateral comparison of ultrasonic power (10 mW to 15 W) in the frequency range from 1.8 MHz to 11 MHz. (PTB, IEN/INRIM).

**EUROMET Project 745.** Comparison of high frequency hydrophone calibrations up to a frequency of 40 MHz (NPL, PTB).

In addition, one bilateral comparison is in progress.

**EUROMET Project 908.** Bilateral comparison of the national sound pressure measurement standards of Germany and Bulgaria based on LS2P microphones. (PTB, NCM). Measurement stage within the comparison is in progress.

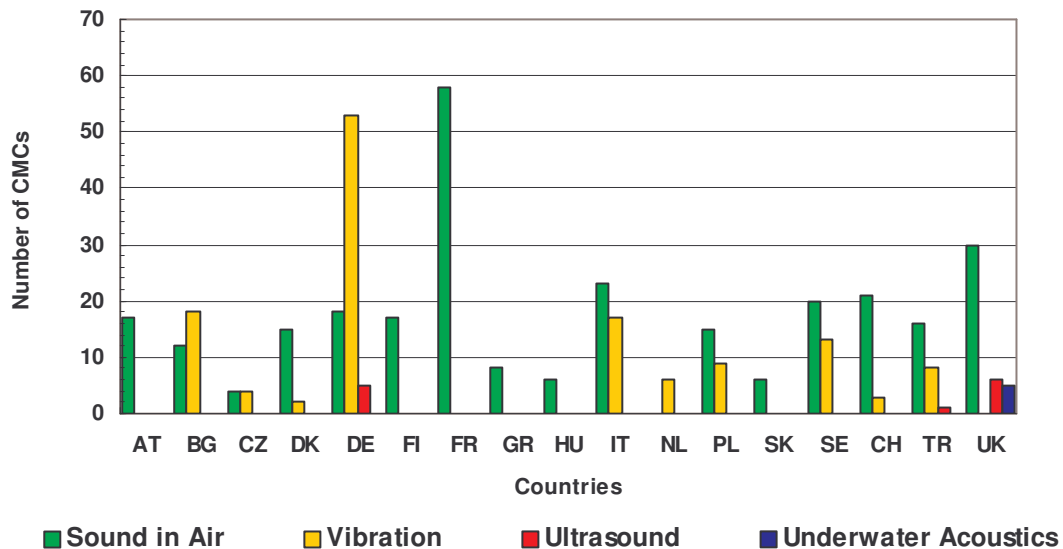
### 3.3. Status of EUROMET AUV CMCs

16 European countries have data approved and published on the BIPM data base. The overall number of EUROMET CMC entries published on BIPM data base is 436.

In October 2005, the batch EUROMET.AUV.5.2004 containing revised data from Germany, France, and new data from Switzerland (vibration), Turkey (ultrasound) and Bulgaria (acoustics and vibration) was approved and published on BIPM KCDB.

EUROMET.AUV.6.2005 batch containing new CMC entries from Spain and a modified entry from Finland was posted for interregional review on 15.07.2005. CMC batch is still under interregional review.

A new EUROMET CMC batch is under preparation. Internal review of the batch will start in October 2006.



EUROMET TC AUV reviewed and approved COOMET.AUV.3.2005 CMC batch containing new CMC entries from Ukraine in June 2005.

EUROMET TC AUV reviewed and approved SADC MET.AUV.1.2005 CMC batch containing new and modified CMC entries from South Africa in September 2005.

EUROMET TC AUV reviewed and approved APMP.AUV.2.2006 CMC batch containing a single entry for shock calibration from ITRI (Chinese Taipei) in June 2006.

#### 4. iMERA and Roadmapping

As a part of iMERA (implementing Metrology in European Research Area), EUROMET TC AUV was involved in the preparation of roadmaps in the AUV field. The purpose of the roadmaps is to identify subjects for coordinated research within European Metrology Research Program (EMRP). 6 roadmaps were drafted and uploaded to the iMERA web portal. The titles of the roadmaps are as follows:

- Development of acoustical measurement technology to sustain and improve quality of life in the 21st Century: Core metrology requirements
- Development of acoustical measurement technology to sustain and improve quality of life in the 21st Century: Metrology in practice
- Improving safety and quality assurance by advances in vibration metrology
- Metrology for medical applications of ultrasound to support improvement in healthcare of EU citizens
- Metrology for industrial applications of ultrasound to support sustainability and competitiveness of the EU
- Underwater acoustical metrology to sustain marine technology and the marine environment



## 5. Other Issues

The terms of all SC Conveners within TC AUV have expired. In three SCs, Sound in Air, Vibration, and Ultrasound, new conveners were formally elected. Merita Sinojmeri (BEV), Thomas Bruns (PTB) and Bajram Zeqiri (NPL) were elected as new conveners for Sub-Committees “Sound in Air”, “Vibration” and “Ultrasound” respectively. The decision for Sub-Committee “Underwater Acoustics” will be made at the end of the year.

September 5, 2006  
Gebze, Turkey

Enver Sadıkoğlu,  
EUROMET TC AUV Chairman