IEC/TC 29 Electroacoustics

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Introduction

The Technical Committee TC29: Electroacoustics was established in 1953. The original very broad scope of the Committee covered nearly all aspects of electroacoustical instrumentation, transducers and calibration methods, relating to airborne sound, ultrasonics and vibration. Standardisation of the description and the measurement of vibration, including transducers, was transferred to ISO at an early stage, except for the activities related to audiology.

The current scope of TC29 is:

> *To prepare International Standards related to instrumentation and methods of measurement in the field of electroacoustics*
>
> *Excluded from the scope are:*

a) standards for sound and video recording as dealt with by TC 100;
b) standards for equipment in the field of audio and audio- visual engineering as dealt with by TC 100;
c) standards and terminology for ultrasonic techniques dealt with by TC 87.

NOTE - Close co-operation is, however, maintained with TC 87 in the fields of common interest.

Description of work

TC 29's technical work plays a vital role in underpinning large areas of social, environmental, medical and rehabilitation work, which requires the accurate production, and measurement, of sound. Acoustical instrumentation and devices are therefore required by a very diverse range of users, and the standards themselves by government authorities as well as industry. TC29 has a good mix of experts representing research and development as well as test laboratories, industrial production, quality control and the end users.

The activity of TC29 currently covers the following areas, each including performance requirements, calibration and test methods:

A. Measurement microphones
B. Noise/sound measuring instrumentation: Sound level meters, personal sound exposure meters, equipment for aircraft noise certification, filters, instruments for the measurement of sound intensity and sound calibrators
C. Ear simulators, head and torso simulators, acoustic and mechanical couplers, earphones and bone vibrators
D. Audiological equipment: pure-tone and speech audiometers, extended high frequency audiometers, aural impedance measuring instruments
E. Hearing aids
F. Audio-frequency induction-loop systems and equipment for assisted hearing.

NOTES

Re A: Calibration and specification of measurement microphones continues to be the vital basis for the measuring instrumentation. With the increasingly widespread use of quality management systems the industrial demand for both calibration and traceability of measuring equipment is continuously requesting the development and standardisation of simplified and less costly methods.

Re B: For the control of noise immission there is a growing need for instrumentation for the measurement and analysis of noise exposure in the work place as well as in residential areas, and within the entertainment sector. The available instruments and measuring methods still represent a high degree of simplification compared to the perception of noise by man and to the effect on the human ear. However, current instrumentation provides a consistent means of measurement, which allows preventative action to be taken where appropriate based on the best available data. It is therefore necessary to maintain an ongoing programme for review and update of current specification standards.

Co-operation has been established for some time with OIML for harmonisation of requirements and test procedures for pattern evaluation and periodic testing, and where appropriate TC29 has agreed to issue joint IEC/OIML standards.

Re C: A range of ear simulators is required to realistically measure the performance of earphones used in hearing aids, audiometers, telecommunications equipment and for entertainment purposes. TC29 has produced measurement standards for audiometric earphones as well as a mechanical coupler for the measurement of bone vibrators. High level outputs from audiometric equipment can also be a hazard with the risk of hearing damage. Rationalisation of ear simulators and head and torso simulators is currently starting to take place, and it is likely that in the near future consideration will be given to new ear simulators for specific applications eg. for use with newborns.

Re D: The ability to accurately measure the threshold of hearing is crucial to hearing conservation programmes, the early detection of hearing loss in children and the general diagnosis of hearing loss. TC 29 works in conjunction with ISO/TC 43 to ensure that standards for thresholds of hearing and other techniques for audiometry are integrated. The use of audiometers in industry is widespread, often driven by legislation, and the major change in the business environment via the rapid growth of telephone retailing, banking and information provision has created further demand for the use and development of TC 29 standards. Monitoring of hearing functions with improved audiometric equipment may contribute to an early detection and the minimizing of related risks, and this will require continuing standardisation.

Re E: Changes in technology, particularly use of digital techniques have led to considerable sophistication in hearing aids, in turn requiring new standards within the IEC 118 series.

Re F: The use of audio-frequency induction-loop systems and equipment for assisted hearing is becoming increasingly widespread, and good progress has been on standardisation in this area.

General

a) TC29 has for some time included specifications for EMC requirements and test methods for all relevant areas.

b) Regulation and law on acoustical instrumentation differs widely from country to country. For example, in some countries pattern evaluation of new models of instrument against the international standard is required before the device can be sold, and regular testing of individual specimens is also required by law. In other countries this is not the case and it is up to the user to follow good measurement practice. Hence the aim of TC29 is also to encourage

testing in countries where it is not mandated by use of the same agreed international specified test methods within all countries, ensuring consistency and cost-effective testing across world markets.

c) Of particular, and continuing, interest to TC29 is uncertainty of measurement, and this is to be included in all new and revised standards. Experience is being gained in this area, and this is important to ensure consistent application of the documents at any testing laboratory, or by any manufacturer.

d) A new MT has been established to revise IEC 61265:1995 "Instruments for measurement of aircraft noise – Performance requirements for systems to measure one-third-octave-band sound pressure levels in noise certification of transport-category aeroplanes".

e) Future work: Work will focus on ear and head and torso simulators for different purposes to be used by SC100C, ITU and ISO and CEN for evaluation of hearing protectors and hearing aids. Developments in audiometry and hearing aids require improvements and rationalisation of current ears simulators to more realistically represent the human ear.

f) On hearing aids, 25% now have open fitting so it is important to include new methods of measurements for such devices in the TC29 standards. Also, inclusion of speech signals for testing is now being proposed for hearing aids, and TC29 will start to consider this standardisation requirement.

g) Maintenance and continuous updating of existing standards to reflect technical developments will continue - for example revisions of the sound level meter standard series, and additions to the measurement microphone series are currently taking place. A new document on methods to determine corrections to obtain free-field response of a sound level meter, is also at an advanced stage. From this the resulting corrections will considerably assist the many laboratories around the world performing periodic testing of the widely used sound level meters.

h) Work within TC29 is prioritised through the use of Preliminary Work Items as registered in the Programme of Work of TC 29 in the IEC database.

i) TC29 now has a Strategic Business Plan, which contains general information about the committee and its scope, about the business environment and market demand as well as trends in technology and the markets. It identifies all committee liaisons and co-operations. It also contains Objectives and Strategies for the committee, which are supported by action plans. These include promotion of the work of the committee and encouraging new membership. The SBP is available on the IEC website.

Working Groups/Maintenance Teams under IEC/TC29 'Electroacoustics'

MT 4	Sound level meters
WG 5	Measurement microphones
WG 10	Audiometric equipment
WG 13	Hearing aids
WG 17	Sound calibrators
MT18	EMC requirements and updates of relevant IEC/TC29 standards
MT 19	Revision of IEC 61260, Filters
MT20	Revision of IEC 60118-4, Induction loop systems
WG 21	Head and ear simulators
WG 22	Audio-frequency induction-loop systems and equipment for assisted hearing
MT23	Revision of IEC 61265:1995, Aircraft noise

Existing IEC/TC29 standards related to metrology

IEC 60118-0:1983 Amendment 1:1994	Hearing aids – Part 0: Measurement of electroacoustics characteristics
IEC 60118-1:1999	Hearing aids – Part 1: Hearing aids with induction pick-up coil input
IEC 60118-4:2006	Hearing aids – Part 4: Induction loop systems for hearing aid purposes – Magnetic field strength
IEC 60118-8:2005	Hearing aids – Part 8: Methods of measurement of performance characteristics of hearing aids under simulated in situ working conditions
IEC 60118-9:1985	Hearing aids – Part 9: Methods of measurement of characteristics of hearing with bone vibrator output
IEC 60118-13:2004	Hearing aids – Part 13: Electromagnetic compatibility (EMC)
IEC 60318-1:2009	Simulators of human head and ear – Part 1: Ear simulator for the measurement of supra-aural and circumaural earphones
IEC 60318-3:1998	Simulators of human head and ear – Part 3: Acoustic coupler for the calibration of supra-aural earphones used in audiometry
IEC 60318-4:2010	Simulators of human head and ear - Part 4: Occluded-ear simulator for the measurement of earphones coupled to the ear by means of ear inserts
IEC 60318-5:2006	Simulators of human head and ear – Part 5: 2 cm^3 coupler for the measurement of hearing aids and earphones coupled to the ear by means of ear inserts
IEC 60318-6:2007	Simulators of human head and ear – Part 6: Mechanical coupler for the measurement of bone vibrators
IEC 60645-1:2001	Audiological equipment – Part 1: Pure-tone audiometers
IEC 60645-2:1993	Audiometers – Part 2: Equipment for speech audiometry
IEC 60645-3:2007	Audiometric equipment – Part 3: Test signals of short duration
IEC 60645-4:1994	Audiometers – Part 4: Equipment for extended high-frequency audiometry
IEC 60645-5:2004	Audiometric equipment – Part 5: Instruments for the measurement of aural acoustic impedance/admittance
IEC 60645-6:2009	Audiometric equipment – Part 6: Instruments for the measurement of otoacoustic emissions
IEC 60645-7:2009	Audiometric equipment – Part 7: Instruments for the measurement of auditory brainstem responses
IEC 60942:2003	Sound calibrators
IEC TR 60959:1990	Provisional head and torso simulator for acoustic measurements on air conduction hearing aids
IEC 61043:1993	Instruments for the measurement of sound intensity – Measurement with pairs of pressure sensing microphones
IEC 61094-1:2000	Measurement microphones – Specifications for laboratory standard microphones
IEC 61094-2:2009	Measurement microphones – Part 2: Primary method for pressure calibration of laboratory standard microphones by the reciprocity technique
IEC 61094-3:1995	Measurement microphones – Part 3: Primary method for free-field calibration of Laboratory Standard Microphones by the reciprocity technique
IEC 61094-4:1995	Measurement microphones – Part 4: Specifications for working standard microphones
IEC 61094-5:2001	Measurement microphones - Part 5: Methods for pressure calibration of working standard microphones by comparison
IEC 61094-6: 2004	Measurement microphones - Part 6: Electrostatic actuators for the determination of frequency response
TS 61094-7:2006	Measurement microphones – Part 7: Values for the difference

	between free-field and pressure sensitivity levels of laboratory standard microphones
IEC 61183:1994	Random-incidence and diffuse-field calibration of sound level meters
IEC 61252:2002 Amendment 1:1993	Specifications for personal sound exposure meters (Consolidated with edition 1:1993 and Amendment 1:2000
IEC 61260:1995 Amendment 1:2001	Octave-band and fractional-octave-band filters
IEC 61265:1995	Instruments for measurement of aircraft noise – Performance requirements for systems to measure one-third-octave band sound pressure levels in noise certification of transport-category aeroplanes
IEC 61669:2001	Equipment for the measurement of real-ear acoustical characteristics of hearing aids
IEC 61672-1:2002	Sound level meters – Part 1: Specifications
IEC 61672-2:2003	Sound level meters – Part 2: Pattern evaluation tests
IEC 61672-3:2006	Sound level meters – Part 3: Periodic tests
TS 62370:2004	Instruments for the measurement of sound intensity – Electromagnetic and electrostatic compatibility requirements and test procedures
IEC 62489-1:2010	Audio-frequency induction loop systems for assisted hearing – Part 1: Methods of measuring and specifying the performance of system components

Work programme of IEC/TC29 related to metrology

Title of document	**IEC reference number**	**Stage**
Revision of Sound level meters – Part 1: Specifications	IEC 61672-1	CDV circulated
Revision of Sound level meters – Part 2: Pattern evaluation tests	IEC 61672-2	CDV circulated
Revision of Sound level meters – Part 3 Periodic tests	IEC 61672-3	CDV circulated
Audiometric equipment – Part 1: Equipment for pure-tone audiometry (Revision of IEC 60645-1:2001 and IEC 60645-4:1994)	IEC 60645-1	Approved for FDIS circulation
Audiometric equipment – Part 2: Equipment for speech audiometry (Revision of IEC 60645-2:1993)	IEC 60645-2	Comments received on CD
Hearing aids – Part 13: Electromagnetic compatibility" (Revision of IEC 60118-13:2004)	IEC 60118-13	Approved for FDIS circulation
Hearing aids – Part 15: Methods for characterising signal processing in hearing aids with a speech-like signal	IEC 60118-15	CDV circulated
Methods to determine corrections to obtain the free-field response of a sound level meter	IEC 62585	CDV circulated
Octave-band and fractional-octave-band filters – Part 1: Specifications (Revision of IEC 61260)	IEC 61260-1	Second CD circulated
Simulators of human head and ear – Part 7: Head and torso simulator for the measurement of hearing aids" (Revision of TR 60959:1990)	IEC 60318-7/TS	DTS circulated
Audio-frequency induction loop systems for assisted hearing – Part 2: Methods of calculating and measuring the low-frequency magnetic field emissions from the loop for assessing conformity with guidelines on limits for human exposure	IEC 62489-2	FDIS sent to IEC
Instruments for measurement of aircraft noise –	IEC 61265	Allocated to new

Performance requirements for systems to measure one-third-octave-band sound pressure levels in noise certification of transport-category aeroplanes (Revision of IEC 61265:1995)		MT23

Preliminary work items

Title	IEC reference number	Stage
Calibration of working standard microphones by a comparison technique under free-field conditions	PWI 29-2 to become IEC 61094- 8	WG5 has started work
Measurement microphones – Use of existing standards in the IEC 61094 series	PWI 29-3 to become IEC 61094-0	Allocated to WG5

Proposed work item

Title	IEC reference number	Stage
Hearing Instruments and Hearing Systems - General requirements for basic safety and essential performance		Circulated

The next meeting of IEC/TC29 will take place in Chiswick, UK in March 2011.

S P Dowson
Chairman IEC/TC29
20 September 2010