



IEC/TC or SC 29	Secretariat DS	Date September 2008
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Title of TC Electroacoustics
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**A. Background**

**History**

At the first International Congress on Acoustics, 1953 in Delft, Netherlands, the urgent need for international standardization in electroacoustics was recognized. Some topics were discussed in detail, and working drafts were produced and completed at the first meetings of TC 29 in the Hague, the Netherlands, 1953, in Philadelphia, USA, 1954, and in Bern, Switzerland, 1955. These were published as IEC 89, Recommendations for the characteristics of audio-apparatus to be specified for application purposes, 1957, and IEC 90, Recommendations for the dimensions of polarized plugs for hearing aids, 1957.

Terminology, sound level meters, hearing aids, electroacoustics, electromechanical and electroacoustical transducers as well as ultrasonics were also included in the rather broad scope of the Committee. The problems of the description and the measurement of vibration, including transducers, were very early transferred to ISO.

The Committee was subsequently organized into four Subcommittees, SC 29A, SC 29B, SC 29C and SC 29D:

A working group for sound recording was first transferred into SC 29A, and later into a selfstanding Committee, TC 60 "Recording".

SC 29B "Audio engineering" was formed in 1966 and in 1984 merged with SC 60C to become TC 84 (in November 1995 transformed into SC 100C "Equipment and systems in the field of audio, video and audiovisual engineering").

SC 29D "Ultrasound" became IEC/TC 87 "Ultrasonics" in 1985. At the same time TC 29 and SC 29C "Measuring devices" were amalgamated to form the new TC 29 with the purpose of preparing international standards related to instruments and methods of measurement for electroacoustical purposes, especially performance requirements, calibration and test methods for electroacoustic transducers (e.g. microphones, sound calibrators, earphones, bone vibrators), sound measuring instruments (e.g. sound level meters), audiometric equipment as well as for hearing aids.

**Scope**

To prepare International Standards related to instruments 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 shall, however, be maintained with TC 87 in the fields of common interest.

## Participation

Participating countries (25):

Australia  
Austria  
Canada  
China  
Czech Republic  
Denmark  
Finland  
France  
Germany  
India  
Italy  
Japan  
Korea (Republic of)

Netherlands  
New Zealand  
Norway  
Poland  
Romania  
Russian Federation  
South Africa  
Spain  
Sweden  
Switzerland  
United Kingdom  
USA

Observing countries (12):

Belgium  
Brazil  
Bulgaria  
Croatia  
Greece  
Hungary  
Mexico  
Serbia and  
Montenegro  
Singapore  
Slovakia

Turkey  
Ukraine

## Liaisons

IEC/SC 77B "High frequency phenomena"

IEC/TC 87 "Ultrasonics"

IEC/TC 106 "Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure"

ISO/TC 43 "Acoustics"

ISO/TC 43/SC 1 "Noise"

ISO/TC 108/SC 3 "Use and calibration of vibration and shock measuring instruments"

ETSI/STQ "European Telecommunications Standards Institute/Speech Processing, Transmission And Quality Aspects"

ITU-T "International Telecommunication Union – Telecommunication Standardization Sector"

OIML "International Organization Of Legal Metrology"

ICAO "International Civil Aviation Organization"

## Working groups

WG 4 Sound level meters

WG 5 Measurement microphones

WG 10 Audiometric equipment

WG 13 Hearing aids

WG 17 Sound calibrators

WG 18 Amendments of relevant IEC/TC 29 standards with respect to developments on EMC

WG 21 Head and ear simulators

WG 22 Audio-frequency induction-loop systems and equipment for assisted hearing

## Maintenance teams

MT 19 Filters, Revision of IEC 61260

MT 20 Induction loops, Revision of IEC 60118-4

## System Approach:

### Component committees

(TC 29 as customer)

SC 48B: Mechanical structures for electronic equipment

SC 62A: Common aspects of electrical equipment used in medical practice

TC 100: Audio, video and multimedia systems and equipment

TC 108: Safety of electronic equipment within the field of audio/video, information technology and communication technology

ISO/TC 43: Acoustics

ISO/TC 43/SC1: Noise

ISO/TC 108/SC3: Use and calibration of vibration and shock measuring instruments

### System committees

(TC 29 as supplier)

TC 9: Electrical equipment and systems for railways

SC 17C: High-voltage switchgear and controlgear assemblies

TC 14: Power transformers

TC 59: Performance of household and similar electrical appliances

SC 62A: Common aspects of electrical equipment used in medical

practice  
SC 62D: Electromedical equipment  
SC 65B: Devices and process analysis  
TC 78: Live working  
TC 80: Maritime navigation and radiocommunication equipment and systems  
TC 88: Wind turbines  
TC 94: All-or-nothing electrical relays  
TC 100: Audio, video and multimedia systems and equipment  
TC 105: Fuel cell technologies  
TC 108: Safety of electronic equipment within the field of audio/video, information technology and communication technology

## **B. Environment**

### **B.1 Business environment**

There is at present rapid development in digital measurement and manufacturing techniques offering increased possibilities in sound measuring instrumentation, audiometry and hearing aids. Consequently, this requires a continuous revision and updating of corresponding international standards. TC 29's technical work underpins large areas of social, environmental, medical and rehabilitation work, which requires the accurate production, and measurement of sound.

The declaration and verification of noise emission values for all kinds of machinery as presently required by many national or regional regulations presupposes the use of uniformly specified and sophisticated sound measuring instrumentation with tight tolerances.

A major change in the business environment has been the rapid growth of telephone retailing, banking and information giving. Such development has created a demand for the use and development of TC 29 standards in determining the acoustic environment in which these businesses operate.

For the control of noise immission there is a growing need of instrumentation for the description of the noise exposure at the working places as well as in residential areas. 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 means of measurement which allows preventative action to be taken to the best of available knowledge.

### **B.2 Market demand**

Reports from some countries found that some 30% of the population are highly disturbed by road traffic noise. Measures to be taken to reduce the noise are normally very expensive and must be based on proven facts. Noise induced hearing impairment is one of the most frequent occupational hazards resulting in large social expense. Equipment for the measurement and analysis of noise as covered by TC 29, is highly demanded and allows facts to be gathered based on accurate and reproducible measurements. Worldwide research in psychoacoustics is aiming at a better understanding of human reactions to noise exposure that certainly will call for further development of measuring techniques and instrumentation. Monitoring of hearing functions with improved audiometric equipment may contribute to an early detection and the minimizing of related risks.

Some 8 million hearing aids are manufactured worldwide each year, and the basis for their performance specification and measurement is the IEC 60118-series of standards produced by TC 29. The associated standardization of ear simulators and head and torso simulators for measuring performance has allowed a better understanding to be found of the relationship between subjective and objective measurements. The effect of these standards has been to improve the means by which the vast majority of hard of hearing people communicate.

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 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 same close cooperation also takes place on the

integration of measurement methods and the necessary instrumentation for determination of acoustic power emission from machinery, total noise exposure of workers during a work day, etc.

**B.3 Trends in technology and trade**

See item C

**B.4 Ecological environment**

Not relevant since TC 29 standards specify only measurement performance requirements.

**C. Work programme**

**C.1 Current work**

The standards produced by TC 29 are used by governmental authorities as well as by industry. For using these international standards by governmental authorities it is necessary to ensure the security of the measured values, the safeguard against manipulation of the measuring instrument and to consider realistic environmental conditions for the measurement. It is very important that experts preparing the draft standards represent research and development as well as test laboratories, industrial production, quality control and the users. The activity of TC 29 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. Audiometric equipment: Pure-tone and speech audiometers, extended high frequency audiometers, aural impedance measuring instruments.
- E. Hearing aids and equipment for assisted hearing.

**NOTES:**

- Ad A Calibration and specification of measurement microphones will continue to be a vital basis for the measuring instrumentation. In the context of quality system certification the industrial demand for calibration and traceability of measuring equipment is continuously requesting the development and standardization of simplified and less costly methods.
- Ad B The development of instrumentation for noise measurements/analysis and the control of the individual noise exposure calls for continued revision of existing standards as an iterative process resulting from growing better knowledge about the effects of noise on man. A close co-operation with OIML has been established for e.g. harmonization of requirements and test procedures for pattern evaluation and periodic verification, and TC 29 has agreed to issue joint IEC/OIML standards.
- Ad C In order to realistically measure the performance of earphones used in hearing aids, audiometers, telecommunication equipment and for entertainment purposes a range of ear simulators are required. TC 29 has produced measurement standards for hearing aid and audiometric earphones as well as a mechanical coupler for the measurement of bone vibrators. The current challenge is to meet the need for ear simulators for the wide range of earphones.
- Ad D The use of audiometers to measure the threshold of hearing has become widespread in industry, school education and in the medical and rehabilitation audiology fields. Due to increasing legislation concerning the effects of noise and the technical developments in audiology, a requirement exists to ensure that standards are available to meet both the needs of practitioners and manufacturers, e.g. for the implementation of extensive and effective hearing conservation programmes. Close cooperation with OIML has also been established in this area.

Ad E Changes in technology, particularly the use of digital techniques, and the increasing knowledge on the requirements for hearing aids has lead to the development of new standards to supplement the IEC 118-series.

Developments in the telecommunications industry have meant that particular attention has to be given to the interface between hearing aid and the telephone. In addition, the question of interfering effects of RF transmissions from digital mobile phones is a current and ongoing matter in which TC 29 is engaged. The use of new technology also calls for modifications of required measurements, especially including in-situ measurements and the specification of digital interfaces.

#### General

At present specifications for EMC requirements and test methods are especially relevant to all of these areas.

The questions of

- 1) uncertainty statements and
- 2) amount of testing required

are to be given special consideration in all future new standards and revisions of existing standards of TC 29.

#### C.2 Resources/infrastructure needed

TC 29 notes a general lack of support for establishing and maintaining standards. It is increasingly difficult to get a sufficient number of experts to participate voluntarily in standards work, in particular from non-commercial institutions. This creates problems in meeting the increasingly stricter progress requirements of the SMB.

#### C.3 Safety aspects (only for committees which do not have a reference to safety in their scope)

High level outputs from audiometric equipment and hearing aids may be a potential risk for hearing damage.

#### D. Future work

Further work on ear simulators and head and torso simulators for different purposes to be used by SC 100C, by ITU and by ISO and CEN for evaluation of hearing protectors and hearing aids. Developments in audiometry and hearing aids require improvements in current ear simulators to more realistically represent the human ear.

Maintenance and continuously updating of existing standards to reflect the technical development and in order to comply with the latest findings and understanding about the nature of human sound perception, notably with regard to:

- measuring devices for the control of the effect of noise on man, and
- specifications and calibration methods for working standard microphones.

The work is prioritised i.a. through the use of Preliminary Work Items as registered in the programme of work of TC 29 in the IEC database.

<b>E. Maintenance cycle</b>				
<b>Publication no.</b>	<b>Date of publication</b>	<b>Review date</b>	<b>Maintenance result date</b>	<b>Responsibility (Maintenance Team)</b>
60118-0,A1	1983	-	2011	WG 13
60118-1	1999	-	2011	WG 13
60118-2,A1,A2	1983	-	2011	WG 13
60118-3	1983	-	2011	MT 20
60118-4	2006	-	2011	MT 20
60118-5	1983	-	2011	WG 13
60118-6	1999	-	2011	WG 13
60118-7	2005	-	2011	WG 13
60118-8	2005	-	2012	WG 13
60118-9	1985	-	2011	WG 13
60118-12	1996	-	2011	WG 13
60118-13	2004	-	2009	WG 13
60118-14	1998	-	2010	TC 29 MT
60263	1982	-	2010	TC 29 MT
60318-1	1998	-	2009	WG 21
60318-2	1998	-	2009	WG 21
60318-3	1998	-	2010	WG 21
60318-5	2006	-	2011	WG 21
60318-6	2007	-	2010	WG 21
60645-1	2001	-	2009	WG 10
60645-2	1993	-	2011	WG 10
60645-3	2007	-	2012	WG 10
60645-4	1994	-	2010	WG 10
60645-5	2004	-	2012	WG 10
60711	1981	-	2009	WG 21
60942	2003	-	2010	WG 17
TR 60959	1990	-	2010	WG 21
61012	1990	-	2015	WG 4
61043	1993	-	2010	TC 29 MT
61094-1	2000	-	2011	WG 5
61094-2	1992	-	2009	WG 5
61094-3	1995	-	2011	WG 5
61094-4	1995	-	2013	WG 5
61094-5	2001	-	2012	WG 5
61094-6	2004	-	2011	WG 5
TS 61094-7	2006	-	2011	WG 5
61183	1994	-	2010	TC 29 MT
61252,A1	1993	-	2012	WG 4
61260,A1	1995	-	2010	MT 19
61265	1995	-	2010	TC 29 MT
61669	2001	-	2010	TC 29 MT
61672-1	2002	-	2010	WG 4
61672-2	2003	-	2010	WG 4
61672-3	2006	-	2010	WG 4
TS 62370	2004	-	2010	WG 18

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