



## **BUSINESS PLAN**

**ISO/TC 43**

**Acoustics**

### **EXECUTIVE SUMMARY**

ISO/TC 43 was established in 1947 and has the following scope:

“Standardization in the field of acoustics, including methods of measuring acoustical phenomena, their generation, transmission and reception, and all aspects of their effects on man and his environment. Excluded: electro-acoustics and the implementation of specifications of the characteristics of measuring instruments for acoustic purposes”.

Today, TC 43 and its two subcommittees have developed 172 International Standards, and 82 new standards or revisions are in preparation at various stages of development. These standards provide information and guidance to practitioners, scientists and authorities around the world.

Acoustics includes all aspects of generation, propagation, transmission, reproduction, reception, measurement and the effects of sound, and noise affects virtually every aspect of human endeavour. The main objectives of the standards are to establish a good technical basis for noise reduction measures, for prevention, diagnose and therapy for hearing damage due to noise as well as for determining the acoustic quality of rooms and products. The standards also provide guidance to the acoustic adequacy for the basic design of machines, vehicles and buildings and are also important for the reduction of trade barriers.

The stakeholders are manifold, including industry, community, public authorities, test laboratories and consulting engineers, research institutes, health and safety experts and inspectors, physiologists and audiologists, communication engineers and trade and consumer groups. A number of the standards of TC 43 are implemented directly or indirectly in both national and regional regulations all over the world. Notably a number of European EU directives, concerning machinery safety, noise emission in the environment, personal protective equipment and construction products have significantly affected the work and the priorities of TC 43 and its subcommittees.

It is a basic philosophy not to set limits for noise or sound insulation in standards but to provide the technical basis for information on the basis of which users can make a valid comparison of different products with regard to their acoustic properties and make their own choice. TC 43 is basically responsible for all ISO standards on noise and therefore maintains a close cooperation with a great number of other committees on noise from specific products.

It is hoped that the result of the work of TC 43 and its subcommittees will help to pave the way to a higher quality of life resulting from lower noise exposure levels by reduction of the risk for hearing damage and annoyance due to noise for all humans in public, working and private environments.

It is hoped that readers of this Business Plan will find it informative enough to answer many of their questions about the Technical Committee, its goals and accomplishments. Questions as well as comments on its contents or the activities of the TC and its subcommittees are welcomed. Please contact the Secretariat of TC 43 at [len@ds.dk](mailto:len@ds.dk) or the Chairman, Prof. Dr. Klaus Brinkmann, at [klaus.brinkmann@ptb.de](mailto:klaus.brinkmann@ptb.de)

Persons interested in participating in the work of TC 43 or any of its subcommittees should contact their country's ISO national member body for information.

## 1 INTRODUCTION

### 1.1 ISO technical committees and business planning

The extension of formal business planning to ISO Technical Committees (ISO/TCs) is an important measure which forms part of a major review of business. The aim is to align the ISO work programme with expressed business environment needs and trends and to allow ISO/TCs to prioritize among different projects, to identify the benefits expected from the availability of International Standards, and to ensure adequate resources for projects throughout their development.

### 1.2 International standardization and the role of ISO

The foremost aim of international standardization is to facilitate the exchange of goods and services through the elimination of technical barriers to trade.

Three bodies are responsible for the planning, development and adoption of International Standards: [ISO](#) (International Organization for Standardization) is responsible for all sectors excluding Electrotechnical, which is the responsibility of [IEC](#) (International Electrotechnical Committee), and most of the Telecommunications Technologies, which are largely the responsibility of [ITU](#) (International Telecommunication Union).

ISO is a legal association, the members of which are the National Standards Bodies (NSBs) of some 140 countries (organizations representing social and economic interests at the international level), supported by a Central Secretariat based in Geneva, Switzerland.

The principal deliverable of ISO is the [International Standard](#).

An International Standard embodies the essential principles of global openness and transparency, consensus and technical coherence. These are safeguarded through its development in an ISO Technical Committee (ISO/TC), representative of all interested parties, supported by a public comment phase (the ISO Technical Enquiry). ISO and its [Technical Committees](#) are also able to offer the ISO Technical Specification (ISO/TS), the ISO Public Available Specification (ISO/PAS) and the ISO Technical Report (ISO/TR) as solutions to market needs. These ISO products represent lower levels of consensus and have therefore not the same status as an International Standard.

ISO offers also the International Workshop Agreement (IWA) as a deliverable which aims to bridge the gap between the activities of consortia and the formal process of standardization represented by ISO and its national members. An important distinction is that the IWA is developed by ISO workshops and fora, comprising only participants with direct interest, and so it is not accorded the status of an International Standard.

## 2 BUSINESS ENVIRONMENT OF THE ISO/TC

### 2.1 Description of the Business Environment

The following political, economic, technical, regulatory, legal and social dynamics describe the business environment of the industry sector, products, materials, disciplines or practices related to the scope of this ISO/TC, and they may significantly influence how the relevant standards development processes are conducted and the content of the resulting standards:

### 2.1.1 General

Acoustics is the science of

- generation
- propagation
- transmission
- reproduction
- reception
- measurement, and
- the effects of sound.

It is intertwined with our lives in many ways. There is a positive aspect of sound, for example, in human communication, culture, technology, medicine and navigation, but also a rather negative one since, in connection with traffic, manufacturing, community activities and sports, sound can turn into noise. Noise annoys and irritates man. Exposure to intense noise over long periods can lead to heavy psychological and physical impairment and damage.

Standardization in the field of acoustics covers both the negative and positive aspects of sound. Its major objectives are

- to harmonize noise measurement methods in order to establish a good basis for noise reduction measures
- to harmonize measurement methods for the effects of noise especially on human hearing functions in order to avoid, diagnose and give therapy for hearing damage
- to establish measurement methods for material properties which influence the sound fields in rooms
- to establish methods to determine the acoustical quality of rooms and also acoustical quality of products (emission of sound sources).

In building acoustics, standardization covers the field of acoustic properties of building elements and of buildings, including laboratory methods and field measurement methods and its expressions of results and accuracy, rating of acoustic properties of elements and buildings and also methods for determining the acoustics of buildings from the performance of its elements.

To summarize, the international standards produced by ISO/TC 43 involve the quality of life for all human beings. The work is deeply tied to the economies of all nations in the form of trade, jobs, manufacturing, national competitiveness and GDP. Its economic impact is impossible to measure but it involves governments, manufacturing sectors, consumers, labour forces and the public at large. All have a major stake in the standards produced in this technical area ranging from vocabulary and nomenclature to the basics of measurement, analysis, evaluation and prognostication.

### 2.1.2 Specific areas

The noise control market is generated by the following aspects:

- consumer demands (noise control in cars, noise control of domestic equipment, etc.; this part is market driven).
- the protection of workers (occupational noise; driven by law),
- the protection of people in their domestic environment against noise from outdoor sources (environmental noise; driven by law).

The noise market related to occupational and environmental noise has two complementary sides:

- The financial damage due to noise.
- Business opportunities (sale of products and services).

The (financial) damage is indicating the potential market for noise control because, at a macro scale, the costs of noise control shall not exceed the costs of damage due to noise.

Although international standards do not carry the weight of law, they profoundly influence the language, interpretation and direct extent of the law. Technical standards are often written into contracts to monitor acceptance and performance.

### **2.1.3 Stakeholders**

#### **a. Industry**

Manufacturers and users of noisy machines, noise reducing devices, acoustical materials, have a vital interest in the specification of harmonized and practice-oriented test methods and in other related guidance to meet regulatory requirements and consumer expectations when designing new products and to achieve transparency in noise declarations and establishment of noise control performance. Also, manufacturers of sound measuring instruments and software have an interest in the application of their products. The framework of ISO/TC 43 has been found ideal for manufacturers to communicate information on possibilities created by the latest technical developments in instrumentation and measurement techniques and to obtain information on likely developments in measurement requirements.

#### **b. Community**

No global values are available but it is estimated that in the EU 10 million people are exposed to damaging levels of noise at work, most of whom are at risk because of the use and operation of noisy machinery. 20% of the European population suffer from noise levels that scientists and health experts consider to be unacceptable with respect to annoyance, sleep disturbance and adverse health effects.

It is of general interest to the community to reduce noise and protect against noise in all its aspects, outdoors (including noise inside vehicles), indoors (at the work place) and where people are in public and in private places in order to improve the quality of life. Acoustic standardization can provide guidance on all aspects of the measurement and reduction of noise and information on noise generated by products and, therefore, serves this global interest.

#### **c. Public authorities**

Public authorities deal with the development and application of legislation in the areas of occupational and environmental noise. A convenient way to separate technical discussions of measurement methods and political discussion of the setting of limits is to use standardized measurement and rating methods for the setting of limits. Standards can provide requirements and guidance on measurement, on assessment of risk, on acoustic performance and on low-noise design and planning.

#### **d. Test laboratories and consulting engineers**

There are an increasing number of requests for standardized methods of measurement of noise, including measurement uncertainties, for use by accredited test laboratories as well as by private consulting acoustical engineers, companies making their own noise measurements, etc. In addition, guidance documents are sometimes needed to assist the parties concerned in selecting the most appropriate measurement standard and/or suitable noise reduction measures.

e. Research institutes

Over the years, international standardization has become an ideal framework for experts to work together on the development of measurement methods and other types of research, notably related to noise problems. In many cases it has been found that international standards provide the most convenient way of collating and communicating results from research studies to the international community.

f. Health and safety experts and inspectors

In many industrialized countries, noise-induced hearing loss is at present the most widely recognized occupational disease. Noise reduction at the work place, selecting low-noise machines, hearing protection and hearing conservation programmes are of major concern improving working conditions and reducing the compensations to be paid.

g. Physiologists and audiologists

Their work includes, for example, definition of normal hearing, measurement of main hearing functions, hearing rehabilitation, effects of noise on man, calibration and proper use of audiometers, and hearing conservation programmes.

h. Communication engineers

Their work includes, for example, telecommunications, radio and television, and sound studios, as well as acoustical warning signals and related equipment.

j. Trade and consumer groups

Standardized test methods and specifications provide a convenient way of regulating the communication between buyers and sellers.

#### **2.1.4 Regulatory and legal issues**

A number of EU directives, notably concerning the safety of machinery, noise emission in the environment by equipment used outdoors, personal protective equipment and construction products have, over recent years, significantly affected the work and the priorities of ISO/TC 43 and its sub-committees, notably through the preparation of joint ISO and CEN standards by parallel procedures according to the Vienna Agreement with the related CEN committees on acoustics and building acoustics. A number of the standards prepared by ISO/TC 43 in support of these directives help to remove technical barriers to trade and to improve social conditions.

Major factors which will have an impact on the development of the markets are:

- The demands for noise control grow with increasing wealth and with the increase of population density
- In the next decade the European Union and Japan will further strengthen their legislation on noise control. This will strongly influence the world wide market and the related standardization in ISO/TC43.

## **2.2 Quantitative Indicators of the Business Environment**

The following list of quantitative indicators describes the business environment in order to provide adequate information to support actions of the ISO/TC:

It has not been possible to get global figures for the value of the complete work of ISO/TC 43, notably since this committee does not prepare product standards, but fragmental figures for various parts of the work are:

- The social and economical cost of occupational deafness is very high, 100 kUS\$ as an order of magnitude for one single person. The yearly direct cost of occupational deafness is 60 MUS\$ in France and believed to be around 200 MUS\$ in Germany. Noise at work is also a cause of accidents due to the disturbed perception of speech and danger signals.
- The value of trade in machinery within Europe is several hundred billion US\$. Since safety aspects are now better dealt with, "less noise" has become a sales argument for the machinery put on the market for sale in the EU and for export as well. One reason is that the use of quieter machines improves the working conditions and therefore increases productivity.
- The yearly world wide damage due to noise can be estimated to be between 100 and 1000 billion US\$. It consists of medical costs, costs of lost labour days, reduced housing prices, reduced land prices, reduced productivity, reduced safety and other factors. The available data is weak, but the order of magnitude is clear.
- The present world wide business in noise control is probably a factor 10 smaller than the present damage, which means that there is room for growth.
- The products for noise control consists of two major parts:
  - Explicit products like measurement equipment, software, consulting services, noise control devices.
  - An implicit part, which only partly overlaps with the first part: 1) many buildings and nearly every modern machine contains noise control elements; the related costs are often low, but the enormous number of systems will nevertheless generate very large figures); 2) in developed countries the costs of traffic infrastructure contain significant parts related to noise control (in Europe between 100 and 1000 million US\$/year is spent for noise barriers, special road surfaces, insulation of buildings and other measures related to the reduction of road traffic noise). Altogether the present world wide business related to noise control probably lies between 10 and 100 billion US\$.
- The European market for sound isolating glass is 70 million US\$.

### **3 BENEFITS EXPECTED FROM THE WORK OF THE ISO/TC**

A great number of the standards prepared by ISO/TC 43 are basic standards directed to sector specific CEN and ISO product TCs enabling them to draft noise test codes and sound insulation performance standards on the basis of the 'B-Standards'.

The work of TC43 will contribute strongly to an improvement of health. It is also important for the reduction of trade barriers and for a cost-effective approach in the field (at a macro level the use of many different methods is not cost-effective).

Technical standards produced under the auspices of TC 43 and its subcommittees directly impact public and private environments. These standards also provide guidance as to the acoustic adequacy of the basic design of machines, vehicles and buildings. The results of the TC 43 standards will help pave the way to a higher quality of life resulting from lower noise exposure levels by reduction of the risk for hearing damage and annoyance due to noise for all humans in public, working and private environments.

## 4 REPRESENTATION AND PARTICIPATION IN THE ISO/TC

### 4.1 [Countries/ISO members bodies that are P and O members of the ISO committee](#)

### 4.2 *Analysis of the participation*

The major groups represented in ISO/TC 43 are described under 2.1.3 above. At present the most important groups represented in ISO/TC 43 are test laboratories, research institutes, universities, health and safety organizations, consultants and some specific industries (automotive, measurement equipment).

Governments, consumer organisations and certain industries (as for example the aviation industry and the industries for acoustic materials and devices) are poorly represented. It is the aim to improve the balance.

In general the TC is strongly influenced by parties that offer standards and too little by parties that ask for them.

Of the approximately 450 experts who participate in the working groups 71% are from Europe, 14% from North America, 8 % from Asia, and 7% from other continents.

## 5 OBJECTIVES OF THE ISO/TC AND STRATEGIES FOR THEIR ACHIEVEMENT

### 5.1 *Defined objectives of the ISO/TC*

Based on the considerations above, the ISO/TC proposes the following objectives and strategic directions for its future work:

The main objective of the TC is to improve the market oriented approach and to produce standards which fully satisfy the needs of the market (the users).

A basic philosophy is not to set noise limits in standards but to specify methods of measurement and evaluation so that, for example, all noise measurements carried out in accordance with International Standards yield noise data which are comparable for noise exposure, immission and emission.

ISO Council has accepted the role of TC 43 in taking ISO Council Resolution 43/1972:

Council confirms that ISO/TC 43 is solely responsible for formulating methods of measurement and systems of assessment of noise emitted by different sources and also their effect on man. Other ISO technical committees dealing with problems related to acoustics measurement will establish direct contact with ISO/TC 43 in order to decide mutually the appropriate method for the establishment of the International Standard concerned. The IEC should be requested to continue the close relationship which already exists on this subject.

This does not mean that all noise or sound insulation measurement methods are necessarily to be prepared within ISO/TC 43. Basic acoustical measurement standards ("type B standards") are prepared within ISO/TC 43, but cooperation (the form of which is decided upon from case to case) must be established with other pertinent ISO or IEC technical committees in the preparation of international standards on noise from particular products and noise test codes ("type C standards") in order to fulfil the intent of the Council resolution. Thus, in addition to the major parties listed in 2, manufacturers of particular types of machinery or building products may also participate in ISO/TC 43 on particular items or these may be prepared jointly under the auspices of relevant ISO product committees in close cooperation with ISO/TC 43.

Much of this work concerning machinery noise is based on ISO/IEC guide 51 and ISO 12100-1, -2 (ISO version of EN 292-1, -2) and thus complies with EC Directives, too.

The most effective and economical method for noise control is the noise reduction at the source by means of special measures in the process of designing and constructing equipment. For this purpose, generally accepted methods for the evaluation and prediction of noise emission values of the equipment, under actual operating conditions and in the intended working environment, and the noise control performance, are needed to assist manufacturers and consulting engineers.

Specification of instrumentation requirements is essential for the specification of a measurement method. In the standards of ISO/TC 43, this is done by strict reference to specifications prepared by IEC/TC 29 "Electroacoustics". ISO/TC 43 maintains a very close liaison with IEC/TC 29, and in some areas participants in working groups are the same.

To avoid ambiguities, standards prepared by ISO/TC 43 and its two SCs traditionally contain mandatory requirements with respect to test methods, test conditions, measurement equipment, etc. In some areas, however, guidance documents are needed, for example, to select an appropriate measurement standard from a family of related standards, to provide general information on a variety of noise reduction measures for the benefit of non-expert users, etc. Even if these documents are less stringent, it is the policy of ISO/TC 43 to issue them as International Standards rather than as Technical Reports or Technical specifications.

Due to the great diversity of major stakeholders (see 2.1.3) and their specific requests, as expressed by New Work Item Proposals from member bodies, ISO/TC 43 feels unable to give priority to a specific field but elaborates a great number of standards for different groups in parallel.

There are no strict borderlines between the following groups:

#### **Expanding work areas**

- application of basic machinery noise standards in the preparation of noise test codes in cooperation with other TCs
- machinery noise emission, validation of measurement methods
- recommended practice in machinery noise control
- environmental noise measurement and evaluation
- measurement and evaluation of occupational noise
- building acoustic measurements of specific room and building acoustical properties
- short test method for the evaluation of sound insulation
- calculation methods for the estimation of acoustic performance of buildings
- noise prediction methods
- improvement in dealing with uncertainty in noise measurement standards

**Completed areas of work**

- basic standards on the measurement, description and declaration of machinery noise
- basic standards for the measurement of hearing protector attenuation
- basic standards for audiometry
- acoustic quantities, units and reference quantities
- basic standards for the measurement and rating of sound insulation between rooms and of building products
- basic standards for the measurement of room acoustic properties
- basic standards for the measurement of acoustic properties of building products

**Areas nearing completion at the present stage**

- measurement of noise from service equipment in buildings

**Areas under steady progress**

- transport noise, indoors and outdoors
- noise reduction, noise control performance
- sound propagation, indoors and outdoors
- methods of evaluating sound fields in rooms and structures
- measurement and evaluation of walking noise in relation to open offices

**Areas where research is needed**

- structureborne noise emission
- measurement and evaluation of emission of sound sources
- measurement and evaluation of environmental noise
- measurement and evaluation of human hearing characteristics
- measurement and evaluation of impulsive noise, immission and emission
- advanced methods of measurement of hearing protector attenuation
- measurement uncertainty
- measurement of noise from rail bound vehicles
- sound quality of communication systems
- description of acoustic comfort in transport vehicles (road, rail, air, water)
- low frequency sound insulation
- active noise control

**Potential future possibilities**

- speech and voice communication with computers
- automatic speech recognition
- psychoacoustics in relation to product sound quality
- new types of test methods, new measuring techniques made possible by modern technology

**5.2 Identified strategies to achieve the ISO/TC's defined objectives**

Formally, the result of voting of the member bodies on new work item proposals and not the TC itself decides on the acceptance of new work items. Therefore, the only strategic element left is the discussion of new work item proposals at plenary meetings which can guide the member bodies but this is not decisive.

Due to the need for European Standards as a basis for the implementation of the machinery directive 98/37/EC and the construction products directive 89/106/EEC of the EU, priority has, over recent years, been given to the preparation of machinery noise standards and standards for the measurement and rating of sound insulation in buildings and of building products. In order to avoid duplication of work and the creation of technical barriers to trade, close liaisons with the European Technical Committees CEN/TC 211 for acoustics and noise, and CEN/TC 126 for building acoustics, have been established. As a result, no special technical European Standards

are prepared, but the ISO standards are implemented directly or by parallel voting procedures. It is hoped that this way of operating will help to open the market and permit member bodies from outside Europe to participate. Contact has also been established with CEN/TC 159, which is preparing standards, notably on speech communication, acoustical signals, sound quality of communication systems, communication with computers, in support of the personal protection equipment directive (ref. 89/686/EEC).

The present number of work items is the maximum that the available resources can handle. In order to maintain the activities at this level, the following priorities are suggested:

Priority areas for noise:

- application of basic standards for noise emission in the preparation of C-standards (e.g. by providing technical assistance to other ISO and/or IEC TCs)
- environmental noise
- transport noise
- noise prediction

Priority areas for building acoustics:

- additions concerning modern measurement methods to existing standards
- simplified measurement methods
- special building acoustic situations

In the programme of work of ISO/TC 43, 9% of the items are dealt with by the main TC 43, 62% by SC 1 and 29% by SC 2

Close cooperation between ISO/TC 43 and IEC/TC 29 "Electroacoustics" is maintained particularly in the field of audiology.

It should be noted that in many fields of the work of ISO/TC 43, the cooperation and contacts established by the process of preparing the standards is just as important as the publication of the final International Standards, so over the past years ISO/TC 43 has found itself bridging all aspects of the many interested parties in the standardization work, ranging from science to politics. It is expected that the increasing use of modern technology will both open and speed up the standards work, the end result being an efficient and cost-effective process for the preparation of International Standards in the area of acoustics.

## **6 FACTORS AFFECTING COMPLETION AND IMPLEMENTATION OF THE ISO/TC WORK PROGRAMME**

The key objectives mentioned above can be met with a reasonable probability of success only if the intellectual assets currently available to the TC and SCs are fully and efficiently utilized. The key to future progress is the ability of the member bodies to staff the key working groups with knowledgeable experts from a wide range of their national constituencies so that diverse views will insure a well-formulated technical standard fully accounting for the views of all prospective standards users.

For many items validation of a test method is dependent upon funding being available to undertake the necessary prenormative research, see notably those referred to in the "objectives of ISO/TC 43" section.

Problems have been identified related to the lack of acoustical expertise in many product TCs concerning noise and building acoustics which makes cooperation difficult, notably due to the limited number of experts of ISO/TC 43 and its sub-committees with the resources to do such work.

It must be noted that i.a. because of the many non-commercial aspects of the work of TC 43, many experts participate on a voluntary and at times even self-paid basis. This obviously sets a limit to the available resources and creates problems and resignation in meeting the increasingly stricter progress requirements of the ISO/TMB.

Finally, it must be noted that the maintenance of the existing standards requires a considerable amount of work (updating, technical amendments (e.g. to cover the uncertainty issue which is becoming increasingly important) and complete revisions) to keep the standards technically sound and up to date and this already takes up an important amount of the available resources.

## **7 STRUCTURE, CURRENT PROJECTS AND PUBLICATIONS OF THE ISO/TC**

This section gives an overview of the ISO/TC's structure, scopes of the ISO/TCs and any existing subcommittees and information on existing and planned standardization projects, publication of the ISO/TC and its subcommittees.

### **7.1 [Structure of the ISO committee](#)**

### **7.2 [Current projects of the ISO technical committee and its subcommittees](#)**

### **7.3 [Publications of the ISO technical committee and its subcommittees](#)**

## **Reference information**

**[Glossary of terms and abbreviations used in ISO/TC Business Plans](#)**

**[General information on the principles of ISO's technical work](#)**