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NOISE MEASUREMENT - INTERNATIONAL STANDARDIZATION

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GENERAL INFORMATION ABOUT ISO

Aim and Scope

The International Organization for Standardization - ISO - is a non-profit organization whose aim is 'to promote the development of standards in the world with a view to facilitating international exchange of goods and services, and to developing mutual cooperation in the sphere of intellectual, scientific, technological, and economic activity'.

Membership and procedure

A member body of ISO is the national body 'most representative of standardization in its country'. The number of member bodies are 72. More than 70% of the member bodies are governmental institutions or organizations incorporated by public law. The remainder have close links with public administration in their own countries.

The technical work of ISO is carried out through Technical Committees (TC), Sub-Committees (SC), and Working Groups (WG). An International Standard is the result of an agreement between the member bodies of ISO. An International Standard may be used as such, or may be implemented through incorporation in national standards of different countries.

STANDARDIZATION IN THE FIELD OF ACOUSTICS

International Standards in the field of Acoustics are developed by Technical Committee TC 43 'Acoustics'. TC 43 set up in 1968 two Sub-Committees TC 43/SC 1 'Noise' and TC 43/SC 2 'Building Acoustics'.

The scope of TC 43:

'Standardization in the field of acoustics, including methods of measuring acoustical phenomena, their generation, transmission and reception, and all aspects for their effects on man and his environment

The scope of TC 43/SC 1:

'Standardization in the field of noise in all aspects, including me-

thods of measurement of noise produced by diverse sources in diverse environments and the assessment of the effects of sound on man'.

The scope of TC 43/SC 2:
'Standardization in the field of building acoustics, including architectural acoustics, acoustical properties of building materials and constructions, and sound propagation in buildings'.

International Electrotechnical Commission (IEC)
The implementation of specifications of the characteristics of measuring instruments for acoustic purposes is the responsibility of IEC.

INTERNATIONAL NOISE STANDARDS

Classification of International Noise Standards
International Noise Standards can be divided into four main groups:

1. Standards on measuring instruments
2. Standards on noise measurements
3. Standards (or guidelines) on evaluation of the effects of noise on man
4. Various other standards related to noise

The purpose of noise measurements can be:

1. Determination of the character and amount (sound power) emitted by one or more noise sources
2. Determination of quantities to be used in connection with the evaluation of prediction of the different effects of noise on human beings
3. Determination of sound attenuation

Three classes of noise measurement methods exist:

1. The precision method (grade 1)
2. The engineering method (grade 2)
3. The survey method (grade 3)

The three classes are broadly defined in terms of the facilities and labour required.
Standards on noise emission measurements can be divided into two groups:

1. Basic Standards
2. Test Codes

Basic Standards specify only the acoustical requirements for measurements appropriate for different test environment.
Test Codes are developed for particular kinds of machines. A test code includes two main parts, one part specifying the method prescribed for the acoustical measurements - preferably one of the methods specified in a Basic Standard - and another part specifying the operating conditions of the machine during the noise measurement. The development of a test code requires collaboration between TC 43/SC 1 and the Technical Committee within ISO or IEC responsible for standardization related to the particular machines.

Limitation of the subject matter of an International Standard
It is important to note that it is a well-established principle in the

work of TC 43/SC 1 to deal only with purely technical problems relating to methods of measurements and the assessment of the effects of noise on man. Limit values must be fixed by national or regional authorities. Limit values usually cannot be established uniformly all over the world, but will vary from country to country depending on economic and political conditions.

Examples of International Noise Standards (ISO), Draft International Standards (DIS) and Draft Proposals (DP)
It is only possible to mention a few of the most important International Noise Standards (ISO - DIS - DP) within the compass of this paper.

Instrumentation Standards on measuring instruments. Two standards on measuring instruments shall be mentioned:

1) Sound Level Meters (Publication 651, 1979) - 2) Integrating - Averaging Sound Level Meters (Draft, 1982). These two publications are developed by IEC.

Standards on Sound Power Measurements. TC 43/SC 1 has developed a series of basic standards on measurement of Sound Power emitted by a machine (ISO 3740-3746, issued between 1975 and 1981 and 3747-3748, which are at the draft stage). Sound power level data are among other things used for:

a) calculating the approximate sound pressure level at a given distance from a machine
b) comparing the noise radiated by machines of the same type
c) determining whether a machine complies with a specified upper limit of sound emission
d) planning in order to determine the amount of transmission loss or noise control required under certain circumstances.

Test Codes. Test Codes are standards specifying methods of measurement of noise emitted by various types of machines. Test Codes are frequently used for checking compliance with noise limits. ISO-DP 1680/1 and ISO-DP 1680/2 are revisions of ISO 1680 - 1. edition 1970: 'Test Code for the Measurement of Noise Emitted by Rotating Electrical Machinery'. Part 1 is an Engineering Method and part 2 is a Survey Method.

Standards of Measurements of Noise Emitted by Machine and Equipment, etc. The results of such measurements are often used in connection with evaluation or prediction of the effects of the noise on human beings. The following ISO Standards can be mentioned. ISO 3095-1975 'Measurement of Noise Emitted by Railbound Vehicles'. DIS 6190 'Measurement of Airborne Noise Emitted by Gas Turbine Installations'.

Standards on Measurement of Noise Inside Motor Vehicles, Aircraft, etc. Examples. ISO 3381-1976. 'Measurement of Noise Inside Railbound Vehicles'. ISO 5128-1980 'Measurement of Noise Inside Motor Vehicles'.

Standards on Noise Measurement in the Environment. ISO 1996, part 1-1982 defines the 'Basic Quantities and Procedures' to be used for the description of noise in community and working environments and de-

scribes basic procedures for the determination of these quantities.

Standards (or guidelines) on evaluation of the effects of noise on man. ISO 1999, 1st edition 1975 is at present under revision. DIS 1999 'Determination of Occupational Noise Exposure and Estimation of Noise-induced Hearing Impairment' is available. This International Standard specifies a method for calculating the expected noise-induced permanent threshold shift in the hearing threshold levels of adult populations due to various levels and durations of noise exposure; it provides the basis for calculating handicap according to various formulae when hearing threshold levels at commonly measured audiometric frequencies, or combination of such frequencies, exceed a certain value.
Another important standard is ISO 2204, 2nd edition 1979: 'Guide to International Standard on the Measurement of Airborne Acoustical Noise and Evaluation of its Effects on Human Beings'.

Standards on Noise Transmission Measurement. ISO 140, part 1 to part 8 issued 1978 - developed by TC 43/SC 2 - describes 'Measurement of Sound Insulation in Buildings and of Building Elements'.
ISO-DP 7235: 'Measurement Procedures for Ducted Silencers' contains two methods to determine the insertion loss of ducted silencers.

Various Noise Standards. As examples of other International Standards the following are mentioned. ISO 3891-1978 'Procedure for describing aircraft noise heard on ground'. DIS 4871 'Noise Classification and Labelling of Equipment and Machinery'. DIS 6081 'Noise Emitted by Machinery and Equipment - Guidelines for the Preparation of Test Codes of Engineering Grade Requiring Noise Measurements at the Operator's Position'. DIS 6290 'Simplified Method for Measurement of Insertion Loss of Hearing Protectors of Ear-muff Type for Quality Control Purposes'. ISO-DP 7574 'Statistical Methods for Varifying Stated Noise Emission Values of Machinery and Equipment'. ISO-DP 8201 'Audible Emergency Evacuation Signals'.

RELATIONSHIP WITH NATIONAL STANDARDS

ISO is not a treaty organization, and its standards are voluntary. Therefore, Member Bodies are not under the obligation to adopt ISO Standards as their National Standards; but nevertheless, there is an increasing trend towards using ISO Standards as National Standards. If there is a need for standardization on national level, ISO should be asked to undertake the work, as this would be better than starting a national project. It is far better to use the very limited number of acoustical specialists on an international level instead of using them to prepare a number of national, and probably different, standards.

REFERENCES

[1] ISO STANDARDS HANDBOOK 4: 'Acoustics, vibration and shock' (1980).
[2] ISO CATALOGUE. Annual edition.
[3] ISO Technical Programme. Annual edition.