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STANDARDIZATION IN NOISE MEASUREMENT

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International standards for noise measurement cover more than sixty standard measured values of acoustics concerned the noise. Measurement methods for these values are described in more than hundred of International standards [1]. A new generation of these standards adopted also by Russia is being introduced into GOST's. Difficulties of technical character arising in these cases, and differences of new standards from the valid GOST's are considered in this communication.

The English and French speaking countries introduce International standards by means of "cover changing" method without translation and changing of the texts, in other countries and Russia these standards are introduced through authentic translations. An original standard is worked out only when the analogous International standard is not available. By the introduction into practice of International standards in Russia the following difficulties arise:

- Absence of many terms in the Russian language corresponding to the basic english terms. The working-out of standard terms according to the procedure taking into account linguistic rules is time-consuming [2].
- The working-out of an authentic translation requires as a rule the combination of a skilled translator and acoustician all in one, but it is not always realizable.
- Nonconformity of International standards basic GOST's on metrology in the part of measurement accuracy estimation. The concept of "measurement error" adopted in GOST's and associated with it concepts and analytical expressions do not correspond to the concept of "measurement uncertainty", and, accordingly, to concept for measurement accuracy estimation. D.I Mendelejev Institute for Metrology has prepared a translation of a Guidance [3] and a Recommendation for removal of these non-conformities and transition to a new system of concepts based on a "measurement uncertainty".
- Difficulties connected with the absence in this country of the measurement uniformity of a number of standardized acoustic values: sound intensity, equivalent sound levels, noise dose, peak sound levels etc. Methods and means for verification of measuring instruments for these values are absent in Russia.
- An last, difficulties connected with the absence of new measuring instruments in the technical documents for which contain not only all the necessary metrological parameters of these instruments but also their tolerances derivations in the case of exceeding of which the instrument is to be rejected at verification. These tolerances form a basis for the working-out of verification installations and definition of their required accuracy and accordingly, of the required accuracy of primary standards. All above mentioned prevents from ensuring of measurement uniformity according to new GOST's.
- As for the conformity of new and acting GOST's, the world practice shows that the introduction of a new standard not necessarily brings the annulment of the old one. In these cases it is advisable only to use the last edition of the old standard. As for GOST's, the withdrawal of the old standard is mandatory. This makes problems when a new GOST does not substitute the old one completely, and the withdrawal of the old GOST is undesirable, and when measuring instruments corresponding to the requirements of the new standard might be yet not being produced. Narrow-departmental interests prevent often from withdrawal of old GOST's as that leads to revision of a great number of documents for products.

The certification system for goods and services adopted in Russia requires, as in the other countries, for its function identical standards, and those are International standards. Additional requirements for products and their test methods can be worked out in additional standards outside of this system, as for example measurement and normalization of percentage sound levels in some

countries. TC 358 “Noise of machines” by Gosstandart of, and a number of other Gosstandart institutes and departments deal with problems of standardization, they are being investigated in dissertations and discussed at international conferences.

GOST’s for measurement methods of sound intensity and emitted noise at working places and others worked out by TC 358 will rise questions from users of these GOST’s. There are no answers for these questions in the home technical literature and the necessity for publication of reference literature arises. Also the necessity for publication of authentic translations of International standards arises.

Industry development is impossible without training of specialists knowing how to carry out acoustical measurements by test of machines, means of transport, civil and defense technique according to new GOST’s with application of new measurement methods and instruments. It is necessary organize personnel training.

Main differences of the new system of standards for noise measurement from valid GOST’s.

- New measurement methods and new measured values are introduced: sound intensity level, sound level in dB(C), peak sound level, second sound level and others.
- New concepts considered in various series of standards are introduced: “sound emission” and “sound emission”.
- Measurement methods are introduced allowing to derive sound power levels from measured sound intensity levels and sound level at a working place from the known sound power level.
- Instead of permissible errors, checked experimentally by the certification of measuring setups, limiting values of measurement uncertainty that will not be exceeded by observance of all the measurement conditions, are determined systems.
- New types of measuring surfaces and corresponding analytical expressions are introduced.
- Degrees of measurement accuracy are introduced 1, 2, 3 corresponding to precise, engineering and survey measurement methods.
- The analytical expression for the directivity for hemispherical radiation has been changed and this will lead to the relaxation of requirements for standard noise sources.
- Technical requirements for frequency correction of a noise meter by measurement of infrasound noises are introduced.
- The concept of certificate data characterizing the noise level of a product in changed. Now they are levels declared by the manufacturer.

Problem of instrument ensuring in new standards.

At present, noise measuring instruments are practically not being produced in Russia Imported from abroad instruments have high degree of automation and functional possibilities but they has no sufficient normalized metrological parameters, and that does not allow to ensure the uniformity of noise measurement by means of these instruments.

Some defects of the new standard system for noise measurements.

- A technical measurement method by spherical sound radiation is absent that doesn’t allow to carry, out standard measurements with means of a technical method in a great number of industrial anechoic chambers with sound absorbing floor.
- In International standards there are no clear instructions relating to measurement methods and accuracy degrees which are to be applied by certification test of products. This defect has been taken into account in new GOST’s where only a precise and technical methods [4] are adopted for certification tests.

About application of GOST’s.

Despite the widespread opinion, the noise measurements of machines are to be carried out not according to GOST’s but according to “Procedures for carrying out of measurements” worked out in accordance with the GOST’s for measurement methods and confirmed by the GOST R 8.563-96 [5].

Components of measuring, systems rules for work at these systems, rules for calibration of instruments are described in these procedures, forms for protocols of measurements and presentation of measuring results are given. The procedures for carrying out of measurements for serial products shall be confirmed by Gosstandart, while other by managers of organizations or enterprises.

A noise “test code” should be worked out for a certain group of noise sources to be tested. In the noise test-code there also shown a method of mounting and operating of machines under test. The working-out of noise test-codes is an important task in the field of noise measurements in the next future.

By delivery of machines to foreign customers it is allowed to carry out measurements according to “Procedures for carrying out of measurements” directly worked out on the basis of International standards or standards of other countries.

Recognition of a conformity certificate the manufacturing country - in the receiving country – helps to avoid repeated tests by crossing of frontiers, makes commodity circulation more quick and cheap. A net of laboratories has been established accredited with the right to carry out acoustic certification tests. The laboratories have mainly to survey the conformity to GOST’s of certificates issue by other countries and only in few cases they carry out tests for products of home industry.

The ensuring of acoustic measurement uniformity between countries is monitored by means of periodical comparisons of national standards, standard noise sources, standard samples of sound absorption. Corresponding standard and initial measurement methods should be worked out in specialized laboratories and maintained at sufficient high accuracy level, and modified in a due time by changing of International measurement standards. All the measuring systems are to be provided with “Procedures for carrying out of measurements” [5].

Problems of acoustic measurements of noise connected with the production control, the solution of ecological and daily life problems as well as with problems in defense are always actual.

R E F E R E N C E S

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5. GOST R 8563-96 Procedures for carrying out of measurements. (In Russian).