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State System for Ensuring the Uniformity of Measurements

MEASUREMENT PROCEDURES (METHODS)

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Preface

Standardization purposes and principles in the Russian Federation are governed by Federal Law On Technical Regulation No. 184-FZ[1] dated December 27, 2002, and the application rules for the national standards of the Russian Federation are regulated by GOST R 1.0–2004 "Standardization in the Russian Federation. Basic Provisions."

Information on the Standard

1 DEVELOPED BY the Federal State Unitary Enterprise Russian Research Institute for the Metrological Service (FGUP VNIIMS)

2 REGISTERED BY the Metrology Administration of the Federal Technical Regulation and Metrology Agency

3 APPROVED AND PUT INTO EFFECT BY Order No. 1253-ст of the Federal Technical Regulation and Metrology Agency dated December 15, 2009

4 SUPERSEDES GOST R 8.563—96

Information on amendments to this Standard is published in National Standards annual informational index, and the text of amendments and revisions is published in National Standards monthly informational indices. In case of revision (substitution) or cancellation of this Standard, a corresponding notification will be published in National Standards monthly informational index. Any corresponding information, notifications or texts are also published in the public informational system – on the Federal Technical Regulation and Metrology Agency's official website on the Internet

[1] Hereinafter FZ — from Russian *ФЗ (Федеральный закон)* that means Federal Law – *Translator's note.*

Contents

Introduction

Requirements for measurement procedures (methods) in the Russian Federation are governed by Article 5 of Federal Law On Ensuring the Uniformity of Measurements No. 102-FZ dated June 26, 2008 (hereinafter referred to as the Federal Law On Ensuring the Uniformity of Measurements), which stipulates compulsory verification of measurement procedures (methods) used in state regulation in the area of ensuring the uniformity of measurements.

The state regulation in the area of ensuring the uniformity of measurements shall in accordance with the provisions of Parts 3 and 4, Article 1 of the Federal Law On Ensuring the Uniformity of Measurements cover the measurements, to which special requirements are applied, as well as the measurements stipulated by the legislation of the Russian Federation on technical regulation.

Lists of the measurements with the compulsory requirements applied thereto are formed in accordance with Part 2, Article 27 of the Federal Law On Ensuring the Uniformity of Measurements.

This Standard has been developed to set forth recommendations on implementation of the requirements for the measurement procedures (methods) stipulated by Article 5 of the Federal Law On Ensuring the Uniformity of Measurements.

NATIONAL STANDARD OF THE RUSSIAN FEDERATION

State System for Ensuring the Uniformity of Measurements

MEASUREMENT PROCEDURES (METHODS)

Implementation date — April 1, 2010

1 Scope of Application

This Standard shall cover the procedures and methods of measurement (hereinafter referred to as measurement procedures), including quantitative chemical analysis procedures (hereinafter referred to as QCAP), and shall determine general provisions and requirements related to development, attestation, standardization, implementation of measurement procedures and metrological supervision thereon.

The Standard shall not cover any measurement procedures intended for performance of direct measurements, i.e. such methods, pursuant to which the target value is obtained directly from measurement means. Such measurement procedures shall be entered into measurement means operational documentation. Compliance of such procedures with the compulsory metrological requirements is attested in the process of approval of types of these measurement means.

2 Regulatory References

In this Standard the following regulatory references to the following standards are used:

GOST 1.5—2001 Interstate System for Standardization. Interstate Standards, Rules and Recommendations on Interstate Standardization. General Requirements for Organization, Development, Execution, Content and Designation

GOST R ISO 5725-1—2002 Accuracy (Correctness and Precision) of Measurement Methods and Results. Part 1. Basic Provisions and Definitions.

GOST R ISO 5725-2—2002 Accuracy (Correctness and Precision) of Measurement Methods and Results. Part 2. The Basic Method of Identification of Repeatability and Reproducibility of the Standard Measurement Method

Official publication

GOST R ISO 5725-3—2002 Accuracy (Correctness and Precision) of Measurement Methods and Results. Part 3. The Interim Precision Factor for the Standard Measurement Method

GOST R ISO 5725-4—2002 Accuracy (Correctness and Precision) of Measurement Methods and Results. Part 4. The Basic Methods of Identification of Correctness of the Standard Measurement Method

GOST R ISO 5725-5—2002 Accuracy (Correctness and Precision) of Measurement Methods and Results. Part 5. The Alternative Methods of Identification of Precision of the Standard Measurement Method

GOST R ISO 5725-6—2002 Accuracy (Correctness and Precision) of Measurement Methods and Results. Part 6. Practical Use of the Accuracy Values

GOST R ISO / IEC 17025—2006 General Requirements for the Competency of Testing and Calibration Laboratories

GOST R ISO 9000—2008 Quality Management Systems. Basic Provisions and Definitions

GOST 10160—75 Precision Soft-Magnetic Alloys. Specifications

N O T E – When using this Standard, it is reasonable to verify effectiveness of the reference standards in the public informational system – on the Federal Technical Regulation and Metrology Agency's official website on the Internet or in the National Standards annual informational index, published as of January 1 of the current year, and in the corresponding National Standards monthly informational indices, published for this year. If any reference standard is replaced (amended), then, when using this Standard, such replacing (amended) standard shall be used. If any reference standard is annulled without replacement, then the provision where reference thereto is given, shall apply without such reference.

3 Terms and Definitions

In this Standard the terms in accordance with GOST R ISO 9000, GOST R ISO 5725-1, [1], [2], [3], [4], as well as the following terms with corresponding definitions are used:

3.1.

measurement procedure (method) (measurement procedure): The aggregate of specifically described operations, which performance shall ensure the measurement results with the established accuracy factor.

[Federal Law On Ensuring the Uniformity of Measurements No. 102-FZ dated June 26, 2008 [1], Article 2, Term 11]

3.2 **attestation of measurement procedures:** Research and verification of compliance of measurement procedures with the established metrological requirements applied to measurements.

3.3 **metrological examination of measurement procedures:** Analysis and assessment of selection of measurement methods and means, operations and measurement performance rules, as well as processing of their results for the purposes of determination of compliance of a measurement procedure with the metrological requirements applied thereto.

3.4 **measurement accuracy factor:** The established accuracy factor of any measurement result received in compliance with the requirements and rules of such measurement procedure.

N O T E – Measuring error factors in accordance with [5], measurement uncertainty factors in accordance with [6] and [7], accuracy factors in accordance with GOST R ISO 5725-1 may be used as the measurement procedure accuracy factor.

3.5 **arbitration measurement procedure:** A measurement procedure applied in case of any discrepancy with respect to the measurement results received with use of several attested measurement procedures for one and the same value under one and the same conditions, established by a competent federal executive authority or by agreement of the parties concerned.

4 General Provisions

4.1 Measurement procedures are developed and applied to ensure measurement performance with the certain degree of accuracy.

4.2 Depending on their complexity and scope of application, measurement procedures are set forth:

- in a separate document (legal regulatory document, document on standardization, instruction, etc.)

- in a section or in a part of a document (section of a document on standardization, specification, design or technological document, etc.)

4.3 Any documents to be used in state regulation in the area of ensuring the uniformity of measurements and containing measurement procedures (standards, specifications, design and technological documents, etc.) shall include the information on measurement procedure attestation, as well as information on availability thereof in the Federal Information Fund for Ensuring the Uniformity of Measurements.

Procedures included to draft regulations and documents on standardization shall be subject to compulsory metrological examination carried out by the state scientific metrological institutes.

4.4 Attestation of the measurement procedure applied beyond state regulation in the area of ensuring the uniformity of measurements may be performed voluntary in accordance with this Standard.

5 Development of Measurement Procedures

5.1 Measurement procedures are developed based on initial data which may be stated in a technical assignment, specification and any other documents.

5.1.1 The initial data include:

- scope of application (measurement object, including product name and controlled parameters, as well as scope of application — for one enterprise, for laboratory network, etc.);

- if a measurement procedure may be used for assessment of compliance with the requirements specified in the technical regulations, then the document on such measurement procedure shall contain the name of such technical regulations, No. of the clause establishing the requirements (name of the national standard or set of rules, if necessary), as well as if such document, where the measurement procedure is described, is to be entered into the list of national standards containing rules and methods of research (tests) and measurements [or to become a part thereof], including the rules of sampling necessary for implementation and fulfilment of the technical regulations and compliance assessment;

- name of the measured value in the units approved for use in the Russian Federation;

- requirements for measurement accuracy factors;

- requirements for measurement performance conditions;

- description of the measurement object, if its characteristics may influence the measurement accuracy (output resistance, rigidity at the contact point with the sensor, specimen content, etc.);

- any other requirements for the measurement procedure, if necessary.

5.1.2 Requirements for the measurement accuracy are provided by specifying the accuracy factors and reference to the documents where such values are indicated. When describing requirements for expression of errors and uncertainty of measurements performed using the scale theory, provisions of recommendations [8] shall apply with consideration of specifics of certain measurement scales.

5.1.3 Measurement procedures shall provide the required accuracy of value assessment subject to tolerance control with consideration of tolerance for these values specified by documents on standardization or any other regulatory documents, as well as admissible characteristics of control validity and controlled values allocation pattern.

5.1.4 Measurement conditions are determined in the form of nominal values with admissible deviations and (or) range limits for possible values of influencing factors. If necessary, the maximal volatility and any other characteristics for influencing factors may be indicated, as well as limitations as to duration of such volatility, number of parallel identifications and any other data.

5.1.5 If measurement is to be performed using measurement systems, for which measurement means forming measurement channels are located at a distance from each other, then the measurement conditions shall contain locations of all the measurement means forming the measurement system.

If any software, which may influence the accuracy factor of the measurement results, is used as a part of a measurement procedure, provisions of recommendations [9], [10], [11] shall apply.

5.2 Development of measurement procedures usually includes the following:

- wording of a measurement task and measured value description; pre-selection of possible solution methods for the measurement task;

- selection of a measurement method and means (including standard patterns), auxiliary devices, materials and reagents;

- determination of the sequence and scope of operations during preparation to and performance of measurements, including requirements for ensuring operational and environmental safety and requirements for qualification of operators;

- organization and performance of theoretical and experimental researches on

assessment of accuracy factors of a developed measurement procedure; experimental proving of measurement procedures; compliance analysis of the accuracy factors and the initial requirements;

- processing of interim measurement results and calculation of final results received using this measurement procedure;

- development of procedures and determination of standards of accuracy control over received measurement results;

- development of a draft document on a measurement procedure;

- attestation of measurement procedures;

- approval and registration of a document on a measurement procedure, execution of a attestation certificate;

- submission of information on attested measurement procedures to the Federal Information Fund for Ensuring the Uniformity of Measurements.

5.2.1 The measurement methods and means are selected in accordance with the documents related to selection of the measurement methods and means of a corresponding type, and in case of unavailability thereof – in accordance with general recommendations [12].

If a measurement procedure is to be used in state regulation in the area of ensuring the uniformity of measurements, then the measurement means, standard patterns and test equipment shall be metrologically ensured in the measurement system of the Russian Federation.

Requirements for measurement accuracy shall be established with consideration of all error factors (methodological, instrumental, operator-based, arising in the process of sampling and specimen preparation). Typical measuring error factors are set forth in Appendix A. Means of assessment of measuring error factors for QCAP are specified in recommendations [13].

If the measuring error value received exceeds the established limits, then such measuring error may be decreased in accordance with recommendations [14].

Measurement accuracy factors shall comply with the initial data on measurement procedure development. For assessing error factors, it is necessary to follow recommendations [5], [14], [15], for uncertainty – recommendations [6] and recommendations [7], for attributable characteristics for measurements of composition and characteristics of substances and materials – GOST R ISO 5725-1 — GOST R ISO 5725-6.

Experiments to assess error factors in procedures of measurement of composition and characteristics of substances and materials shall be scheduled and the

means of experimental assessment of these factors shall be selected in accordance with GOST R ISO 5725-1 – GOST R ISO 5725-6, uncertainty — in accordance with guide [7].

5.2.2 A document regulating a measurement procedure shall contain:

- name of a measurement procedure;
- designation of a measurement procedure;
- scope of application;
- measurement performance conditions;
- measurement procedures (methods);
- admissible and (or) attributable measurement uncertainty or the error rate and (or) attributable measuring error factors;
- applicable measurement means, standard patterns, metrological characteristics thereof and information on approval of the types thereof.

If the attested mixtures are used in accordance with recommendations [16], the document on the measuring procedure shall contain preparation procedure thereof, requirements for auxiliary devices, materials and reagents (their specifications and designation of the documents in accordance with which they are issued shall be provided);

- operations during preparation to measurements, including sampling operations;
- operations during measurements;
- measurement results processing operations;
- requirements for documentation of measurement results;
- procedures and periodicity of accuracy control over received measurement results;
- requirements for operators' qualification;
- requirements for provision of operational safety;
- requirements for provision of environmental safety;
- other requirements and operations (if necessary).

N O T E

1 In documents on measurement procedures stipulating the use of particular measurement means and other technical means, serial (inventory, etc.) numbers of such particular measurement means and other technical means shall be additionally specified.

2 A document on measurement procedures may refer to officially published documents containing requirements or information necessary for implementation of the

procedure.

5.2.3 Recommendations on organization and development of documents on measurement procedures are set forth in Appendix B.

6 Attestation of Measurement Procedures

6.1 Measurement procedures applied in state regulation in the area of ensuring the uniformity of measurements and regulated in accordance with clause 5.2.2, shall be liable to compulsory attestation.

6.2 Criteria of measurement procedure attestation:

- completeness of requirements and operations in a document on measurement procedures;

- reference to and sufficiency of accuracy factors;

- compliance with the requirements of the regulatory documents on ensuring the uniformity of measurements.

6.3 Attestation of measurement procedures applied in state regulation in the area of ensuring the uniformity of measurements shall be carried out by legal entities and individual entrepreneurs accredited as applicable for ensuring the uniformity of measurements, including state scientific institutes of metrology and state regional centres of metrology.

Measurement procedure attestation shall include metrological examination of the package of documents in accordance with clause 6.5 with consideration of recommendations [17], [18], as well as theoretical and experimental research certifying compliance of the measuring procedure to be attested with the requirements of the regulatory documents on ensuring the uniformity of measurements.

6.4 To attest a measurement procedure, research shall be conducted and compliance shall be certified as to:

- measurement procedures – with its intended use, i.e. compliance of the proposed procedure to the measurement object attributes and measured value type;

- measurement conditions – with the requirements for the application of such measurement procedure;

- accuracy factors of measurement results and means of ensuring measurement credibility – with the established metrological requirements;

- measurement means and standard specimens used as a part of the measurement procedure – with the terms and conditions of ensuring traceability of

measurements with respect to the state initial reference units, and in case of unavailability of the corresponding state initial reference units – to the national reference units of foreign states;

- registration of measurement results – with the requirements for units approved for use in the Russian Federation;

- presentation forms of measurement results – with the metrological requirements.

6.5 The following documents shall be submitted for attestation of measurement procedures:

- initial data for measurement procedure development;

- a draft document regulating the measurement procedure;

- the program and procedure accuracy factor assessment results, including materials of theoretical and experimental research of the measurement procedure.

6.6 In case of positive attestation results:

- an opinion on compliance of the measurement procedure with the established metrological requirements shall be executed, the results of theoretical and experimental research attached;

- a attestation certificate shall be issued;

- a document regulating the measurement procedure shall be approved;

In case of negative results the attestation organization shall issue an opinion on non-compliance of the measurement procedure with the requirements of the specifications for development of the measurement procedure or regulatory documents on ensuring the uniformity of measurements.

6.7 The measurement procedure attestation certificate shall be signed by the head of the legal entity or individual entrepreneur carrying out the measurement procedure attestation, and sealed and dated. The attestation certificate shall be registered by the issuing legal entity or individual entrepreneur.

The measurement procedure (method) attestation certificate shall contain the following information:

- name and address of the legal entity or individual entrepreneur carrying out the measurement procedure attestation;

- name of the document: "Measurement Procedure (Method) Attestation Certificate";

- registration No. of the certificate, consisting of the serial number of the attested measurement procedure, accreditation certificate No. of the legal entity or individual entrepreneur, and the year of approval;

- name and purpose of the measurement procedure, including indication of the measured value, and, if necessary, name of the measured object and additional parameters thereof, as well as the measurement method implemented;

- name and address of the author of the measurement method;

- designation and name of the document, containing the measurement procedure, the year of approval thereof and the number of pages;

- designation and name of the regulatory document, in accordance with which requirements the measurement procedure was attested (if any);

- indication of the means of confirmation of the compliance of the measurement procedure with the established requirements (theoretical and experimental research);

- conclusion certifying that in the course of the measurement procedure attestation it was established that the measurement procedure complies with the requirements applicable thereto.

The measurement uncertainty budget or total error formation structure of the measurement with assessment of the weight of each element of the error may be attached to the certificate.

6.8 The document regulating the measuring procedure shall be approved after attestation by the engineering manager of the development organization, the approval date shall be indicated, and the manager's signature shall be sealed. The measuring method shall contain the registration date in accordance with clause 6.7 and the attestation certificate No. The pages of the document shall be identified. After the approval, a copy of the document shall be sent to the attestation organization. Amendments to measurement procedures shall be executed in accordance with the requirements of this Standard on development and attestation of measurement procedures.

Measurement procedures shall be registered in the Unified Register of Measurement Procedures. The developer shall submit the information on attested measurement procedures to the Federal Information Fund for Ensuring the Uniformity of Measurements.

6.9 Measurement procedures may be amended. Amendments shall be made by the developer only. Amended measurement procedures shall be submitted to attestation to be conducted in accordance with this Standard.

7 Standardization of Measurement Procedures

7.1 The national standards and other documents on standardization, which

include rules and methods of research (tests) and measurements, as well as rules of sampling for application of technical regulations, shall contain only attested measurement procedures in accordance with the development procedure of the list of national standards [19].

7.2 Standards containing measurement procedures shall be developed in accordance with GOST 1.5 and requirements of Sections 5 and 6 of this Standard.

N O T E – The scope of application of the standards for control methods (tests, determinations, measurements, analysis) shall contain technical regulations, rules and methods of research (tests) and measurements, as well as rules of sampling for application of technical regulations, standards or any other regulatory documents stipulating the requirements for values controlled under the standardized measurement procedure, and the measurement rates for controlled values (measured attributes) in accordance with these requirements.

7.3 The standard for control methods (tests, determinations, measurements, analysis) of one and the same value may stipulate two or more alternative measurement procedures, provided that one of them shall be determined by the author of this standard as the arbitration procedure (see clause 7.9.4 of GOST 1.5). In such case, to confirm the possibility of use of several alternative measurement procedures for determination of this value, the accuracy factors of such measurement procedures shall be assessed and compared in the process of development of the standard. They shall contain the range of admissible shifts (systematic deviations) in the measurement results of the controlled value received using each of the alternative measurement procedures, compared with the measurement results of the same value received using the arbitration procedure.

7.4 The measurement reproducibility factor shall be stipulated by the standards based on the results of inter-laboratory experiments conducted in accordance with GOST R ISO 5725-2, GOST R ISO 5725-3, GOST R ISO 5725-5 and GOST R ISO 5725-6.

7.5 An explanatory note to the package of documents submitted for approval of the standard, by which the measurement procedures are regulated, shall contain conclusions on the results of the research conducted during the measurement procedure attestation, which allow to asses compliance of the measurement procedure with the established metrological requirements.

8 Amendments to Measurement Procedures

8.1 Attested measurement procedures shall be implemented in strict compliance with the document, where such procedures are set forth, including measurement accuracy control.

8.2 In state regulation in the area of ensuring the uniformity of measurements only attested measurement procedures are applied.

8.3 Prior to application of a attested measurement procedure in practice, a feasibility study with the established accuracy factors shall be conducted in each laboratory, where such procedure is proposed to be used.

8.4 Laboratories using attested measurement procedures shall constantly control the measurement quality in accordance with the procedures set forth in the documents for such measurement procedure.

8.5 In case of any disputes if there are two or more attested measurement procedures for one and the same value under one and the same conditions:

- for measurement procedures regulated by officially published documents, the arbitration procedure shall be defined. This measurement procedure shall be established by the federal executive authorities determining within the limits of their competence the list of measurements related to the state regulation in the area of ensuring the uniformity of measurements, and specifying the compulsory metrological requirements for such procedures, including requirements for accuracy factors;

- for procedures not regulated by officially published documents, the arbitration measurement procedure shall be defined subject to agreement of all interested legal entities.

8.6 Any claims of the users with respect to the attested measurement procedures arising in the process of implementation thereof, shall be submitted to the developer of such procedures with sufficient substantiation.

9 Metrological Supervision over the Attested Measurement Procedures

9.1 State metrological supervision is conducted with respect to the availability of and compliance with attested measurement procedures applied in state regulation in the area of ensuring the uniformity of measurements. Measurement procedure attestation certificates, which do not contain the information as stipulated in clause 6.7, shall be

recognized invalid by the supervisory authorities.

9.2 Metrological services of legal entities and individual entrepreneurs shall conduct metrological supervision over the availability of and compliance with attested measurement procedures applied in carrying out their activities. For the purpose of metrological supervision recommendations [20] may be used.

9.3 During state metrological supervision or metrological supervision conducted by metrological services of legal entities or individual entrepreneurs, the following is inspected:

- availability of the list of all measurement procedures applied by a legal entity or individual entrepreneur in carrying out their activities, including standardized procedures, with differentiation of the measurement procedures applied in state regulation in the area of ensuring the uniformity of measurements;

- availability of documents regulating measurement procedures, with attestation certificates (in accordance with the list);

- availability of information on submission of the data on attested measurement procedures to the Federal Information Fund for Ensuring the Uniformity of Measurements;

- compliance of the measurement means and other technical means used, measurement conditions, measurement preparation and performance procedure, measurement results processing and documentation – with the same specified in the document regulating the measuring procedure;

- compliance of the requirements for the control procedure of accuracy factors of measurement results under the measurement procedure;

- compliance of qualification of the operators performing measurements with the requirements stipulated in the document for the measurement procedure;

- compliance with the requirements for ensuring operational and environmental safety regulated by the measurement procedure.

Appendix
(for reference purposes)

Typical Factors of Measuring Errors

A.1 Methodological Measuring Error Factors

A.1.1 Non-compliance of the controlled object with the model, which parameters are taken as the measured values.

A.1.2 Deviations from the assumed values of the arguments of the function attributing the measured value to the input value of the measurement means (initial measurement transformer).

A.1.3 Deviations from the assumed values of the difference between the input measured value of the measurement means and the measured value at the sampling point.

A.1.4 Error due to quantizing effects.

A.1.5 Difference between the calculation algorithm and the function strictly attributing observation results to the measured value.

A.1.6 Errors arising in the process of sampling and preparation of the specimens.

A.1.7 Errors caused by the interfering influence of factors of the specimen (interfering components of the specimen, dispersion, porosity, etc.)

A.2 Instrumental Measuring Error Factors

A.2.1 Main errors and additional statistical errors of measurement means caused by slowly changing external influencing factors.

A.2.2 Errors caused by limited resolving power of measurement means.

A.2.3 Dynamic errors of measurement means (errors caused by inertial characteristics of measurement means).

A.2.4 Errors caused by interaction of measurement means with the measurement object.

A.2.5 Errors of transfer of measurement information.

A.3 Operator-Based Errors (Subjective Errors)

A.3.1 Errors of reading of the measured value from scales and diagrams.

A.3.2 Errors of processing of diagrams without application of technical means (for averaging, summation of the measured values, etc.)

A.3.3 Errors caused by impact of the operator over the measurement object and means (distortion of temperature field, mechanical influence, etc.)

Appendix B
(recommended)

Development and Execution of Documents for Measurement Procedures

B.1 Name of a document on measurement procedures shall comply with the requirement of the national standardization system. It is permitted to reflect the specifics of the measured value in the name. For instance: "State System for Ensuring the Uniformity of Measurements. Railway Cargo Tonnage. Measurement Procedure for Heavy-Load Platform Weighing Machines."

If there is a large number of measured values, than their generalized name shall be used, for instance: "Parameters of Electromagnetic Field in Narrow-Beam Antenna Aperture."

B.2 A document for a measurement procedure shall include the introduction and the following sections:

- requirements for measurement accuracy factors;
- requirements for measurement means, auxiliary devices, materials, reagents;
- measurement procedures (methods);
- requirements for operational and environmental safety;
- requirements for operators' qualification;
- requirements for measurement conditions;
- preparation to measurements, including sampling requirements;
- measurement performance procedure;
- measurement results processing;
- measurement results documentation;
- measurement results accuracy control.

It is permitted to exclude or merge the said sections or change their names, as well as introduce additional sections with consideration of the measurement specifics.

B.3 The introduction shall state the purpose and the scope of application of a document on a measurement procedure.

B.3.1 The introduction shall be set forth as follows: "This document (the type of the developed document to be specified) states the measurement procedure (the name of the measured value, its specifics and specifics of measurement, if necessary, to be specified.)" Then the measurement ranges and scope of application of the measurement procedure shall be specified.

B.3.2 If a measurement procedure may be used for assessment of compliance

with the requirements specified in the technical regulations, than the document on such measurement procedure shall contain the name of such technical regulations, No. of the clause establishing the requirements (name of the national standard or set of rules, if necessary), as well as if such document is to be entered into the list of national standards containing rules and methods of research (tests) and measurements, including the rules of sampling necessary for implementation and fulfilment of the technical regulations and compliance assessment.

B.3.3 Reference to a certain product in the introduction shall contain designation of the regulation covering this product, for instance: "This document (the specific type of the document on the measurement procedure to be specified) states the measurement procedure for determination of characteristics of soft-magnetic alloys under GOST 10160 at any point of the hysteresis loop. The characteristics of soft-magnetic alloys shall include:

- coercive force by induction;
- rectangularity coefficient for the hysteresis loop;
- coercive force by magnetization;
- temperature coefficients of the above mentioned characteristics."

B.4 Section "Requirements for measurement accuracy factors" shall contain numerical values for measurement accuracy factors and reference to the document where they are specified.

B.4.1 The first clause of the section on the requirements for measurement accuracy factors shall be set forth as follows: "The admissible extended measurement uncertainty within this procedure shall be 10 mgk / cub. m (with coverage factor equal to 2)" or "The admissible relative measurement error limits for this procedure shall be ±1.5%" (reference to the regulatory documents shall be provided.)

If attributable measurement uncertainty is indicated, the word "admissible" shall be excluded. If attributable measurement error factors are indicated, the phrase "The admissible error limits..." shall be substituted by "The error limits...", the phrase "The measurement error shall comply with the requirements stipulated by..." shall be substituted by "The measurement error shall comply with the characteristics described in..."

If there is an essential random component in the measurement error, then the word "limits" shall be substituted by the word "boundaries" and followed by the probability value (for instance, $P = 0.95$).

Measurement validity and precision factors shall be expressed in accordance with GOST R ISO 5725-1 – GOST R ISO 5725-5. The measurement reproducibility

factor shall be supported by information on the inter-laboratory experiment, on which basis the value has been determined.

B.4.2 Requirement for accuracy measurement factors of one and the same value may differ for different measurement ranges, different products, different measurement conditions. In this case, and also in case of several measured values, requirements for accuracy measurement factors shall be stated in the form of a table, diagram or equation.

B.5 Section "Requirements for measurement means, auxiliary devices, materials, reagents" shall contain the list of all measurement means, auxiliary devices, materials and reagents used when performing the measurement. The section shall contain metrological characteristics of measurement means and standard specimens, technical characteristics of auxiliary devices and qualitative characteristics of materials and reagents with reference to the documents, in accordance with which they were produced (also for measuring procedures used in state regulation in the area of ensuring the uniformity of measurements, the types of measurement means and standard specimens shall be specified).

If there many metrological, technical and other characteristics, they may be provided in an appendix.

B.5.1 Such appendix may also contain drawings, specifications and descriptions of measurement means and one-off auxiliary devices.

B.5.2 The first clause of the section shall be stated as follows: "For measurement performance the following measurement means, auxiliary devices, materials and reagents shall be used:" or "For measurement performance the measurement means, auxiliary devices, materials and reagents specified in Table B.1 shall be used."

T a b l e B.1

Serial numbers and names of the measurement means, auxiliary devices, materials and reagents	Designations and names of the documents, in accordance with which the measurement means, auxiliary devices, materials and reagents are produced	Metrological and technical characteristic or reference to the drawing. Requirements for the reagents quality

The section may contain indication that it is possible to use other measurement means, auxiliary devices, materials and reagents with the same or better metrological and technical characteristic.

B.6 Section "Measurement Procedures (Methods)" shall contain description of comparison methods for the measured physical value and its unit in accordance with the basic principle of this method.

If for measurement of one single value several methods are applied, or the document establishes measurement procedures for two or more values, then each of the methods shall be described in a separate sub-section.

B.6.1 The first clause of the section (sub-section) shall be stated as follows: "Measurements (the name of the measured value shall be indicated) shall be carried out using the method of (description of the method shall be specified)."

B.7 Section "Requirements for operational and environmental safety" shall contain the requirements, which observance ensures operational safety, compliance with occupational sanitation norms and environmental safety during measurement performance.

B.7.1 If there are any regulatory documents establishing requirements for operational safety, occupational sanitation and environmental safety, the section shall contain references to these documents.

B.7.2 The first clause of the section shall be stated as follows: "During performance of measurements (the name of the measured value shall be indicated) the following requirements shall be complied with: (the requirements for operational safety, occupational sanitation and environmental safety shall be listed)."

B.8 Section "Requirements for operators' qualification" shall contain information on the qualification level (profession, education, practical experience, etc.) of the individuals approved to perform measurements. This section shall be included into the document on the measurement procedure when complex non-automated measurement methods and procedures for processing results are used.

B.8.1 The first clause of the section shall be stated as follows: "The individuals (information on the qualification level shall be specified) shall be approved to perform measurements and (or) process the results."

B.9 Section "Requirements for measurement conditions" shall contain the list of influencing factors, their nominal values and (or) range limits of possible values, as well as any other characteristics of such influencing factors and requirements for the measurement object. The influencing factors shall include parameters of media (specimens), voltage and frequency of supply current, internal impedance of measurement objects and any other characteristics.

The lists of the influencing factors may be provided in the form of a table.

B.9.1 The first clause of the section shall be stated as follows: "During performance of measurements the following conditions shall be complied with:" or "During performance of measurements the conditions stipulated in Table B.2 shall be complied with."

T a b l e B.2

Name of the measured value	Name of the influencing factor	Nominal value	Threshold deviations

B.10 Section "Preparation to measurements» shall contain description of preparatory work to be carried out prior to the measurement itself. Such works shall include preliminary determination of values of the influencing factors, scheme assembly (for this purpose the section or appendix shall contain schemes), preparation and control of operating modes of the measurement means and other technical means (zero adjustment, turn-on trials, tests, etc.), preparation of specimens for measurements.

B.10.1 If during performance of quantitative chemical analysis the calibration characteristics shall be identified, then the section shall contain the means of identification and control thereof, as well as the procedure of preparation and use of specimens for calibration.

B.10.2 If the procedure of preparatory works is specified by documents on the measurement means and other technical means, then the section shall contain references to these documents.

B.10.3 The first clause of the section shall be stated as follows: "During preparation to performance of measurement the following works shall be done: (the list and description of the preparatory works shall be specified)."

B.11 Section "Measurement performance procedure" shall contain the list, scope,

sequence of operations, periodicity and number of measurements, description of operations, tolerance criteria for the results of interim measurements, requirements for presentation of interim and final results (the number of significant digits, etc.)

For QCAP the section shall also contain requirements for weight and number of specimens, and, if necessary, indication on performance of "control (dummy) experiment" and description of the operations on elimination of the influence of interfering components of the specimen.

B.11.1 If the procedure of performance of operations is specified by documents on the measurement means and other technical means used, then the section shall contain references to these documents.

B.11.2 If for measurement of one single value several methods are applied, or the document establishes measurement procedures for two or more values, then each of the operations shall be described in a separate sub-section.

B.11.3 The section (sub-section) shall contain the requirement for compulsory registration of the results of interim measurements and values of the influencing factors. Where necessary, the forms of registration of the interim measurement results and values of the influencing factors shall be provided.

B.11.4 The first clause of the section shall be stated as follows: "During performance of measurements (the name of the measured value shall be indicated) the following operations shall be performed: (description of the operations shall be provided)."

B.12 Section "Measurement results processing" shall contain description of methods of processing and obtaining the measurement results. If the methods for measurement results processing are established in other documents, the section shall contain references to these documents.

B.12.1 The section shall contain, if necessary, data required to obtain measurement results (constants, tables, diagrams, equations, etc.) In case there are large amounts of data thereon, it shall be specified in an appendix.

B.12.2 The section shall contain requirement for compulsory registration of processing of interim measurement results with indication, if necessary, of the form of such registration (in the electronic form or hard-copy form).

B.12.3 The first clause of the section shall be stated as follows: "Measurement results shall be processed by (description of the method shall be provided)."

B.13 Section "Measurement results documentation" shall contain requirements for the form of presentation of measurement results. The section may contain recommendations on rounding of measurement results. The presentation forms of

measurement results provided for in the document on the measurement procedure shall comply with the presentation forms of measurement results specified in the attestation certificate.

B.14 Section "Measurement results accuracy control" shall contain information on the controlled parameters, means, procedures, control standards, as well as instructions (recommendations) on periodicity of the control. Certain procedures, for instance preparation of specimens for accuracy control, may be described in an appendix to the document on the measurement procedure.

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[19] Development procedure for the list of national standards containing rules and methods of research (tests) and measurements, including the rules of sampling, necessary for implementation and fulfilment of the approved technical regulations and compliance assessment, and in case of unavailability of the said national standards with respect to certain requirements of the technical regulations or technical regulation

objects, development procedure for rules and methods of research (tests) and measurements, including the rules of sampling necessary for implementation and fulfilment of the technical regulations and compliance assessment. Approved by Order of the Ministry of Industry and Trade of the Russian Federation No. 119 dated September 3, 2008, registered by the Ministry of Justice of the Russian Federation on October 20, 2008, registration No. 12510

[20] Recommendations on Metrology MI 2304—08	State System for Ensuring the Uniformity of Measurements. Metrological supervision carried out by metrological services of legal entities

UDC (Universal Decimal Classification) 389.14:006.354	OKS (Russian National Classifier of Standards) 17.020
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