SNAS SLOVENSKÁ NÁRODNÁ AKREDITAČNÁ SLUŽBA

METHODICAL GUIDELINE FOR ACCREDITATION

DETERMINATION OF THE LEVEL AND FREQUENCY OF THE PARTICIPATION IN PROFICIENCY TESTING

MSA–L/14

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1 INTRODUCTION

The purpose of this MSA is to provide the instruction for the laboratories how to determine the level and frequency of participation in proficiency testing or other types of interlaboratory comparisons that can be used for the purpose of proficiency testing.

2 ABBREVIATIONS USED

APLAC	Asia Pacific Laboratory Accreditation Cooperation
CAB	Conformity assessment body
EA	European Co-operation for Accreditation
EHK	External quality assessment
ILAC	International Laboratory Accreditation Cooperation
IRMM	The Institute for Reference Materials and Measurements
ILC	Interlaboratory comparison
MLMP	Interlaboratory comparison measurement
MP	Interlaboratory comparison
MPS	Interlaboratory comparative tests
MSA	Methodical guideline for accreditation
QA	Providing of quality of results from testing and/or calibrations
PT	Proficiency testing (skúška spôsobilosti)
SM	Management system

3 TERMINOLOGY

Proficiency testing (PT= accredited MLPM, EHK, MPS)
evaluation of the performance of participant of testing against the set-in advance criteria by means of interlaboratory comparisons (ISO / IEC 17043: 2010, 3.7). It is organized by a competent PT provider, which is accredited to the requirements of the ISO / IEC 17043 standard

Interlaboratory comparisons (ILC= not accredited MLPM, MP, EHK):
Organizing, carrying out and evaluation of measurements or testing of the identical or very similar objects by two or more laboratories according to conditions set in advance (ISO / IEC 17043: 2010, 3.4). It is organized by an ILC organization that is not accredited and meets the relevant requirements of ISO / IEC 17043.

Scope of participation
The number of sub-areas identified by the laboratory within its scope of accreditation (specification of activities) and the resulting number of specific proficiency tests in which the laboratory would have to consider its participation.

Frequency of participation
is a time interval during which the organization takes part in the proficiency testing in one subarea (e.g. once a year, once within the accreditation cycle, etc.). The frequency can be different for various subareas within the laboratory and also among the laboratories within the same subareas.

Subarea
Part of the scope of accreditation, defined at least:

- in the field of testing: measuring principle, property, object
- in the field of medical examination: principle of examination, indicator, system / biological material,
- in the field of calibration: quantity, type of measuring instrument, measuring range, method

Area of professional activity
A part from the scope of accreditation, usually defined by one professional competence. The professional competence is usually identified by the need for relevant qualification, training and the use of relevant equipments, knowledge and skills (e.g. microbiology, analytic chemistry, non-destructive testing, measuring of physical factors of the environment, calibration or volume measurement, calibration or resistance measurement etc.).

4 RELATED DOCUMENTS

ISO/IEC 17025	General requirements on the competence of testing and calibration laboratories
ISO 15189	Medical laboratories – Requirements on the quality and competence
ISO/IEC 17020	Conformity assessment — Requirements for the operation of various types of bodies performing inspection
ISO/IEC 17043	Conformity assessment - General requirements for proficiency testing
EA-4/18	Instructions to determine the level and frequency of participation in proficiency testing
PL- 23	SNAS policy for participation in proficiency testing
MSA-L/01	Field and scope of accreditation of laboratories and proficiency testing providers

5 GENERAL

Proficiency tests are an important tool for monitoring laboratory performance. The responsibility of the laboratory for the produced results is undeniable and the proficiency tests of different levels also correspond to the different levels of this monitoring.

When evaluating the suitability of the level and frequency of participation in proficiency testing, SNAS takes into account certain aspects below:

1. A laboratory must monitor its performance by comparison with the results of other laboratories, where possible and appropriate. Such monitoring must be planned and reviewed and must include at least one or both of the following activities:

   a) participation in PT; NOTE standard ISO/IEC 17043 provides additional information on proficiency testing and proficiency testing providers. Proficiency testing providers that meet the requirements of standard ISO/IEC 17043 are considered competent.
   b) participation in inter-laboratory comparisons other than proficiency tests.

2. The competence of the PT organizer is proven by impartial evaluation by a third party (accreditation).

3. CABs must participate in PT programs organised by competent (accredited) PT organizers, if they are available in given sub-area.

4. If the accredited PT organizer does not organize the required PT in the area, or if PTs are not available, the CAB must participate in the ILC. An ILC is considered acceptable if it meets all the essential requirements regarding the independence and confidentiality of the laboratory performance evaluation as well as other requirements of standard ISO/IEC 17043. The CAB is obliged to document that the PT organizer did not organize the required PT or they were not available in the given sub-area.

5. The laboratory must take into account the risks and opportunities associated with laboratory activities and participation in the PT, the level of risk of the presented laboratory, the sector in which they operate or the methodology they use, factors affecting laboratory activities such as:

   - number of carried out tests / calibrations / measurements / examinations,
   - fluctuation of professional workers,
   - skills and knowledge of the professional workers,
   - sources of traceability (e.g., accessibility of reference materials, national etalons, etc.),
   - knowledge of stability or instability of the measuring technique used,
   - significance and end use of test/calibration data (e.g., forensic science represents the area requiring a high level of trust).

6. SNAS accepts the participation of the laboratory in various types of PT / ILC in accordance with the valid ISO / IEC 17025 as follows:

- Art. 7.7.2 a):
  - PT organized by competent PT organizers,
  - PTs organized by other competent independent organizations such as ILAC, EA, APLAC and IRMM,

- If a competent PT organizer is not available in accordance with Art. 7.7.1a The CAB must participate in the ILC in accordance with Art. 7.7.2 b):
  - ILCs organized with at least two participants,
    - the organizer must comply with the conditions of independence and confidentiality of laboratory performance evaluation as well as other requirements of ISO / IEC 17043.

7. SNAS accepts the participation of the laboratory in various types of PT / ILC in accordance with ISO 15 189: 2012 as follows:
  - Art. 5.6.3.1 Note: The laboratory must participate in an interlaboratory comparison program that meets the relevant requirements of ISO / IEC 17043.
  - Art. 5.6.3.2 - In the absence of an interlaboratory comparison, the laboratory must develop other approaches and provide objective evidence to determine the acceptability of the examination results.

8. Competent providers of PT programs are available in the online directory SNAS (http://snas.sk/index.php?l=sk&p=16), in the database Eptis (http://www.eptis.org/) and those which organized by EA, BIPM, ILAC, APLAC, or accreditation bodies of other countries in accordance with EA regulations.

9. SNAS is aware that for some sub-areas of activities, participation in PT / ILC can be problematic due to the technical characteristics of the measurement, the type (character) of the subjects, the unavailability of PT programs, the small number of laboratories in the relevant sector, etc. In such cases, other quality assurance and management procedures are more important.

10. In the case when the requirements on the level and frequency of participation in PT are determined by legislation, SNAS keeps to them.

6 LEVEL AND FREQUENCY OF PARTICIPATION

The first step to determine the level and frequency of calibration, testing and medical laboratories is to identify the sub-areas covered by the scope of accreditation, with the CAB taking into account risks and opportunities.

Ideally, the laboratory should participate in specific PTs for each item of the scope of accreditation. However, SNAS accepts that such an approach could be inefficient in various respects. Due to this reason the laboratories have to define the subareas in which it is possible

to apply the quality of the results obtained by participating in one PT to other techniques, properties and objects within one subarea.

The first consideration of the laboratory should be that this subarea will not contain any different professional competences (areas of professional activities). Different professional competences are usually identified by the need for different qualification, training and use of different equipments, knowledge and skills.

When defining the subarea, it is appropriate to use a sequence system due to the higher probability of grouping activities that are linked to one principle, namely

- in the field of testing: measuring principle, property, object,
- in the field of medical examination: principle of examination, indicator, system / biological material,
- in the field of calibration: quantity, kind of measuring instruments, measuring range, method

If the laboratory establishes more than one principle / type of instrument under one subarea, SNAS evaluates whether the laboratory is able to prove satisfactorily their equivalency. It can be done by mean of:

- outputs from method validation/verification, or
- using of the same standard method.

By defining the subareas, the laboratory determined the “level of participation”. SNAS evaluates also the suitability of the “frequency” of participation with regard to the risks, opportunities and aspects described in the part 5 General. Based on the risk and opportunity assessment, the CAB defines the minimum requirements on the frequency of participation for all subarea; however, these can´t be more benevolent than the minimum requirements determined for the participation in PT in PL-23.

In accordance with requirement 7.7.2 of standard ISO/IEC 17025: 2017 and requirement 5.6.3 of standard ISO 15 189: 2012, the laboratory must monitor its performance by the participation of PT / ILC. This activity must be planned and reviewed. Therefore, when the level and frequency of participation are defined, the laboratory must prepare a participation strategy in the PT that includes the aspects listed in section 6 Level and frequency of participation. The level and content of this strategy depends on the circumstances and scope of accreditation of individual laboratories.

The strategy of participation in PT/ILC must be prepared for each accreditation cycle. The strategy shall be verified and reviewed once a year and it is recommended to do so during the management review.

Part of the PT participation strategy is a table (relevant TL71), which contains the participation plan as well as an evaluated participation of already performed PT / ILCs.

The CAB is responsible for dividing its scope of accreditation into sub-areas (if possible) and for defining the level and frequency of participation in the PT / ILC, which will be detailed in the Annex to the PT Participation Strategy. The strategy of participation in PT with Annex no. 1 (TL71) is reviewed by SNAS at each assessment and the CAB is obliged to insert the current

version of the fulfilment of the participation strategy in the completed form Tl 71 into the supporting documentation in AIS before each on-site assessment.

With regard to the fact that the division of the scope of accreditation into individual subareas and frequency of participation can differ from subject to subject, the laboratories shall have documented the professional arguments to explain the decisions in relation to the participation in PT. These arguments shall be documented.

The testing laboratory may combine related subjects into one sub-area for each principle in terms of competence. However, this does not mean that they are equivalent in terms of method and activity of laboratory. For this reason, the laboratory must participate in such PT / ILCs that cover all subjects and the full scope of accreditation, which must be detailed in the PT participation strategy.

7 CASE STUDIES

The following text are some case studies that illustrate how CABs can divide the scope of accreditations into sub-areas. However, this is only an example and not a strict and definitive solution.

Case study 1 -
Chemical testing laboratory in the area of environment

Accredited activities carried out by the laboratory:

- Polychlorinated biphenyls (PCB) carried out GC-MS in soils and sludge,
- Polyaromatic hydrocarbons (PAU) carried out GC-MS in soils and sludge,
- Volatile organic substances (VOC) carried out „Purge and Trap“ GC-MS in water,
- Metals carried out ICP-MS in soils, sludge and water,
- pH in the soil, sludge and water.

Factors to be taken into consideration when determining the subareas:

In the case of measuring of pH, the laboratory states that it uses the same method according to the ISO standard for all three matrixes (soil, water and sludge). This ISO method is validated against all three matrixes and therefore it is indicated as one subarea.

For the analysis of metals, the laboratory indicates that it uses the same measuring technique (ICP-MS) for all three matrixes (soils, water and sludge). Despite this fact, the preparation of testing samples of water is significantly different from the preparation of samples of soil and sludge. In such case the laboratory can’t declare this activity as one subarea although the methodology of soils and sludge is demonstrably similar and therefore included into one subarea. For this reason, the laboratory has to determine two subareas.

For the analysis PAU and PCB, the laboratory indicates the use of the same measuring technique (GC-MS) and the extraction of matrixes is identical (soils and sludge). However, according to the primary validation of the method it is obvious that PCB and PAU are influenced in different ways when the methodology is changed. Therefore, the acceptable or

problematic proficiency for PCB doesn´t necessarily mean the same for PAU (or vice versa). For this reason, the laboratory identifies two further subareas.

For the methods for VOC the laboratory takes into consideration only one matrix, namely the water. The laboratory is conscious that the methods of analysis of various properties of water may potentially react differently. By validating its method of analysis, the laboratory demonstrates that when changing the given method, various properties react in comparable way. For this reason, the laboratory considers one subarea.

The resulting subareas from the above procedure are as follows:

- Polychlorinated biphenyls (PCB) carried out GC-MS in soils and sludge,
- Polyaromatic carbohydrates (PAU) carried out GC-MS in sols and sludge,
- Volatile organic substances (VOC) „Purge and Trap“ GC-MS in water,
- Metals carried out ICP-MS in soils and sludge,
- Metals carried out ICP-MS in water,
- pH in soils, sludge and water.

Case study 2 -
Microbiology testing laboratory

Accredited activities carried out by the laboratory:

- Detection of *Escherichia coli* in meat,
- Detection of salmonella in meat,
- Detection of *Escherichia coli* in vegetables,
- Detection of salmonella in vegetables,
- Detection of *Escherichia coli* v dairy products,
- Detection of *Escherichia coli* in drinking water,
- Detection of *Escherichia coli* in swimming pool water.

Factors to be taken into consideration when determining the subareas:

When determining the number of *Escherichia coli* the laboratory identifies that it uses the same method to analyse the samples of meat and vegetables. This method was validated for both these matrixes and therefore the laboratory identifies these cases as one subarea only. As this was not validated for dairy products, the laboratory uses a different method for these sample types. For this reason there is another subarea determined for this case.

The method the laboratory uses to determine the number of salmonellas is different from the one used for *Escherichia coli*. However, this method was validated for meat and vegetables and for this reason the laboratory determines this case as another subarea.

Although various methods of sampling and processing of samples are used to detect the *Escherichia coli* in water, the method used (different from the method used for foodstuff) was validated for both drinking and swimming pool water and therefore this case is determined as another subarea.

The subareas resulting from the above procedure are the following:

- Detection of *Escherichia coli* in meat and vegetables,
- Detection of *Escherichia coli* in dairy products,
- Detection of salmonella in vegetables and meat,
- Detection of *Escherichia coli* in drinking and swimming pool water.

Case study 3 -
Testing laboratory (physical tests)

Accredited activities carried out by the laboratory:

- Fracture toughness and increase of fatigue failure in metals and metal alloys (ASTM E 399),
- Tensile and pressure tests of materials from metals and metal alloys (e.g. EN 10002 part 1),
- Tensile and pressure tests of plastic materials (ISO 527-1),
- Hardness test according to Brinell (ISO 6506), according to Vickers (ISO 6507) and Rockwell (ISO 6508),
- Charpy's impact test according to ISO 148-1,
- Determination of grain size (thickness) (ISO643),
- Optical emission spectrometry (quantification of chemical elements in the steel matrixes; own procedure of the laboratory).

Factors to be taken into consideration when determining the subareas:

Many laboratories carry out the above activities in the area of mechanical tests. The methods are described in the ISO, EN or ASTM Standards. The standard usually specifies the equipment necessary as well as other relevant and related parameters. The featured testing activities are carried out with the equipment of either same or different type requiring a specific calibration and specific knowledge of the staff to be able to perform the above tests.

The tests of fracture toughness and increase of fatigue failure are carried out with the same testing device and the method (ASTM E 399) was validated for metals and metal alloys. Therefore, the laboratory identifies this activity as one subarea.

Tensile and pressure tests of materials from metals and metal alloys are based on one testing method. As the test for the increase of fatigue failure involves the capabilities of tensile and pressure tests, the laboratory identified that it didn't need to participate further in the additional tests of capability for metals and alloys (note: participation in the tests of capability in tensile and pressure tests doesn't need to be sufficient for testing of the increase of fatigue failure). Usually, specific testing equipment is used with application of different loading on either flat or round testing samples. The basic requirements are on the measuring of load, class 1 (±1%) and measuring of elongation (±1%). The calculation of the result of this testing method is in reality done by means of computer system adjusted either by the device producer or by the user

who has an access to the software. In principle the given test of steel sample determines the strength and elongation. For specific materials, their behaviour and relevant results it is critical to work the sample.

Similar testing systems are used for pressure and tensile tests of plastic materials; however the power load is smaller. The complementary testing device is different with regard to higher tensibility of plastic materials. In addition to this, according to ISO 527 the definitions of parameters determined by testing differ. Testing device must be calibrated once a year, the use of reference materials is limited to a small number of laboratories. For this reason the laboratory identifies such test as further subarea, because it uses a different method.

The hardness tests according to Brinell (ISO 6506), Vickers (ISO 6507) are using as intrusive body the ball or pyramid in order to create a hole in the surface of metallic material. The dimensions are measured after this step of the diagonal of this hole and the hardness of the material is calculated. In the relevant standards from the range ISO 6506-1 a 6507-1 there is a description of the requirements on the direct calibration state of loading (load, intrusive body, device to measure the length). The calibration must be repeated once a year and the use is mandatory before testing of the certified reference materials from whence it follows that the laboratory defines another subarea for these two methods.

When determining the Rockwell hardness (ISO 6508-1) the measuring procedure is different from the one of Brinell or Vickers. According to ISO 6508 it is possible to use different intrusive bodies to create a hole in the measured material surface under the pre-defined loading conditions. By this test the depth of the intrusion is measured in a specific procedure. The ISO standard requires the calibration and use of the certified reference material. Due to this reason the laboratory identifies one more subarea.

The Charpy's impact test according to ISO 148-1 prescribes the sample dimensions. The testing device must be calibrated once a year and the standard requires a specific reference material for the indirect control of the adjustment of the whole equipment. The size is measured of the impact energy. The laboratory identifies it as other subarea.

The grain size determination (ISO 643) is done on the surface of steel sample prepared in a specific way, such as grinding, polishing, etching in order to show off the edge of grains in the tested material. The following step is to measure the grain dimensions under the microscope with calibrated magnification from which it is possible to calculate the relevant parameters in accordance with the procedure specified in the standard. The laboratory identifies this test as the next subarea.

The optical emission spectrometry is used in many laboratories to determine the steel alloys. To calibrate the equipment it is necessary to use the certified reference materials and secondary own standards. The laboratory identifies this activity as another subarea.

The subareas resulting from the above are as follows:

- Fracture toughness and increase of fatigue failure in metals and metal alloys,
- Tensile and pressure tests of plastic materials,
- Hardness test by Brinell or Vickers,
- Rockwell's hardness test,

- Charpy's impact test,
- Grain size determination,
- Optical emission spectrometry.

Case study 4 -
Medical examination - taking into account the matrix

Accredited activities carried out by the laboratory:

- FSH by means of chemiluminiscence in blood,
- LH by means of chemiluminiscence in blood,
- Folic acid by means of chemiluminiscence in blood,
- Calcium electrochemically in urine and blood,
- Potassium electrochemically in blood and urine,
- Cryoglobulins by means of electrophoresis in blood,
- Carbamazepine immunologically in blood,
- Cyclosporine immunologically in blood,
- Transferine nephelometrically in blood and urine,
- α2 macroglobulin nephelometrically in blood and urine,
- ALAT UV- by means of visible spectroscopy in blood,
- ASAT UV – by means of visible spectroscopy in blood,
- Magnesium UV – by means of visible spectroscopy in blood and urine.

Factors to be taken into consideration when determining the subareas:

The laboratory shall prepare the list of all its measuring techniques it uses within its scope of accreditation, list of all properties representing the individual parameters or groups of equivalent parameters and the list of all materials (matrixes) as mentioned below.

Measuring techniques:
Chemiluminiscence
Elektrochemistry
Electrophoresis
Immunology test
Nephelometry
UV-visible spectroscopy

Properties:
Medicaments (carbamazepine, cyclosporine)
Electrolytes (calcium, kalium, magnesium)
Enzymes (ALAT, ASAT)
Hormones (FSH, LH)
Specific proteins (cryoglobuline, transferine, α2 macroglobuline)
Vitamins (folic acid)

Materials
Blood
Urine

List of analysis:
The laboratory should link each parameter from the above list with one measuring technique, one property and object (material).

Parameter	Measuring technique	Property	Material
FSH	Chemiluminiscence	Hormons	Blood
LH	Chemiluminiscence	Hormons	Blood
Folic acid	Chemiluminiscence	Vitamins	Blood
Calcium	Electrochemistry	Electrolytes	Blood
Calcium	Electrochemistry	Electrolytes	Urine
Kalium	Electrochemistry	Electrolytes	Blood
Kalium	Electrochemistry	Electrolytes	Urine
Cryoglobulines	Electrochemistry	Specific proteins	Blood
Carbamazepine	Immunology test	Medicaments	Blood
Cyclosporine	Immunology test	Medicaments	Blood
Transferine	Nephelometry	Specific proteins	Blood
Transferine	Nephelometry	Specific proteins	Urine
α2 macroglobuline	Nephelometry	Specific proteins	Blood
α2 macroglobuline	Nephelometry	Specific proteins	Urone
ALAT	UV-visible spectroscopy	Enzymes	Blood
ASAT	UV-visible spectroscopy	Enzymes	Blood
Magnesium	UV-visible spectroscopy	Electrolytes	Blood
Magnesium	UV-visible spectroscopy	Electrolytes	Urine

Resulting matrix:

Based on the list of analysis the laboratory can specify the matrix that will clarify the subarea as mentioned below. If the number of materials (objects) is limited, they can be set into the matrix. If not, the evaluation of materials can be carried out separately.

Property Measuring technique	**Medicaments**		**Electrolytes**		**Enzymes**		**Hormones**		**Specific proteins**		**Vitamins**	
Material	K	M	K	M	K	M	K	M	K	M	K	M
Chemiluminiscence							x				x	
Electrochemistry			x	x								
Electrophoresis									x			
Immunology test	X											
Nephelometry									x	x		
UV-visible spectroscopy			x	x	x							

K - blood, M- urine

The resulting subareas from the above are as follows:

- Hormones by means of chemiluminiscence in blood,
- Vitamins by means of chemiluminiscence in blood,

- Electrolytes electrochemically in blood and urine,
- Specific proteins by means of electrophoresis in blood,
- Medicaments by means of immunology test in blood,
- Specific proteins nephelometrically in blood and urine,
- Electrolytes UV – visible spectroscopy in blood and urine,
- Enzymes UV – visible spectroscopy in blood.

Note:
Although various materials were linked as equivalent into one subarea for each detection system from competence point of view, it doesn't mean that they are equivalent from both method and activity of laboratory point of view. Due to the above it is expected from the laboratory to participate in such PT that cover especially all the objects (materials) and scope of accreditation. This fact must be stated in detail in the strategy of participation.

Case study 4 -
Calibration laboratory

Accredited activities performed by the laboratory:

- Calibration of balances with non-automatic operation of 2nd, 3rd and 4th accuracy classes and calibration of weights and calibration of weights 5 of accuracy class.
- Calibration of direct pointing manometers (deformation and digital) and calibration of pressure transducers.
- Calibration of length and plane angle gauges - materialized length meters - parallel gauge blocks, limit smooth calibers and control rings, threaded mandrels and threaded rings, measuring wires, control rollers, feeler gauges, control gauges for micrometers; calibration of gauges and measuring devices - sliding gauges, micrometric gauges, internal micrometric calipers, pasameters and micropasameters, micrometric taps, internal micrometers with dial indicator, fixed and flexible rules, tape measures, measuring tapes, microscopes and profile projectors, universal length meters, layer thickness gauges, angles, angle gauges, knife rulers, rulers, control boards and sine rulers.
- Calibration of voltage meters, current meters, electrical resistance meters, AC power meters, electricity meters and voltage and current transformers.
- Calibration of thermoelectric temperature sensors, resistance temperature sensors, radiation infrared thermometers.
- Calibration of relative humidity meters - direct pointing hygrometers.

Factors to be considered in determining sub-areas:

In the case of weight meters, the laboratory states that it performs calibration of balances with non-automatic operation of 2nd, 3rd and 4th accuracy classes, which are performed by direct loading with standard weights and calibration of weights 5 of accuracy class by direct comparison with standard load, therefore KL lists 2 sub-areas.
In the case of pressure gauges, the laboratory states that it performs the calibration of direct pointing manometers (deformation and digital) and the calibration of pressure transducers by the same method, by direct comparison with a piston pressure gauge, therefore the laboratory reports 1 subarea.

In the case of length-end gauges, the laboratory states that it calibrates them by direct comparison with a standard. Limit smooth calibers and control rings, threaded mandrels and threaded rings, measuring wires, control rollers, feeler gauges, control gauges for micrometers, micrometric taps are calibrated by direct measurement using a universal length gauge. Slide gauges, micrometer gauges, pasameters and micropasameters, universal length gauges are calibrated by direct comparison with standard gauge blocks. internal micrometers with dial indicator, internal micrometer calipers are calibrated by direct comparison with standard control rings. Microscopes and profile projectors, devices for measuring the thickness of the layer are calibrated by direct comparison with a standard. Fixed and flexible rules, tape measures, measuring tapes are calibrated by direct comparison with a standard. Control scale for touch profilometers is calibrated with standard profilometers or by comparison with roughness standards. It calibrates angles, angle gauges, knife rulers, attachment rulers, control boards and sine rulers by direct measurement using standard devices. Based on the different methods of calibration and the type of gauges, the laboratory has defined 9 sub-areas.

In the case of electrical quantities, the calibration of digital voltmeters, ammeters, wattmeters and ohmmeters is a traceability of different physical quantities, therefore the laboratory considers each of these accredited activities as a separate sub-area, similarly as the calibration of AC power meters, electrical meters and voltage transformers and voltage transformers, therefore for that the laboratory created 7 sub - areas for electrical quantities.
Thermoelectric temperature sensors are calibrated by a comparative method with a standard thermoelectric temperature sensor, the output signal is measured in units of electrical voltage. Resistance temperature sensors are calibrated by a comparative method with a standard resistance temperature sensor and the output signal is measured in units of electrical resistance. For this reason, these are two separate sub-areas.
Infrared thermometers form a separate subarea, as their calibration is performed by direct comparison with a standard infrared thermometer. This is a completely different calibration method than in the first two cases. For this reason, the laboratory has defined 3 sub-areas for temperature meters.
Calibration of direct pointing hygrometers forms another sub-area, calibration is performed with a standard hygrometer in a climatic chamber.

The resulting sub-areas of the above procedure are as follows:

- quantity - mass, measuring instrument - balances with non-automatic operation of 2nd, 3rd and 4th accuracy classes, method - direct weighting with etalon weight unit
- quantity - mass, measuring instrument - weights 5th accuracy classes, method - direct comparison with standard weights
- quantity - pressure, measuring instrument - direct indicating manometer (deformation and digital) and pressure transducers, method - direct comparison with piston pressure gauge
- quantity - length, measuring instrument – gauge blocks, method - direct comparison with the standard,
- quantity - length, measuring instrument - limit smooth calibers, threaded mandrels, wire thread measuring, control cylinders, feeler gauges, control meters for micrometers, extention tube inside micrometers, method - direct measurement using a universal length meter (for external measurement)

- quantity - length, measuring instrument - setting rings and thread rings, method - direct measurement using a universal length meter (traceable to internal measurement linked to internal measurement)
- quantity - length, measuring instrument – slide gauge, micrometer gauges, pasameters and micropasameters, universal length gauges, method - direct comparison with standard gauge blocks
- quantity - length, measuring instrument – internal micrometers with dial indicator, internal micrometer calipers, method - direct comparison with standard control rings
- quantity - length, measuring instrument - microscopes and profile projectors, devices for measuring layer thickness, method - direct comparison with a standard
- quantity - length, - measuring instrument - fixed and flexible rules, roll up tape, measuring tapes, method - direct comparison with a standard
- quantity - length, measuring instrument - control scales for touch profilometers method – direct comparison with standard profilometers or by comparison with roughness standards.
- quantity - plane angle, measuring instrument - angles, angle gauges, knife rulers, attachment rulers, control boards and sine rulers, method - by direct measurement using standard devices (divided according to the method and methods of calibration to be comparable)
- quantity - electrical voltage, measuring instrument - voltmeter, method - direct measurement
- quantity - electric current, measuring instrument - ammeter, method - direct measurement
- quantity - electrical resistance, measuring instrument - ohmmeter, method - direct measurement
- quantity - electrical power, measuring instrument - wattmeter, method - direct comparison
- quantity - electricity, meter - electricity meter, method - direct comparison
- quantity - voltage ratio, measuring instrument - instrument voltage transformer, method - direct comparison
- quantity - current ratio, measuring instrument - instrument current transformer, method - direct comparison
- quantity - temperature, measuring instrument - thermoelectric temperature sensors (without display unit), method - comparative method with standard thermoelectric temperature sensor
- quantity - temperature, measuring instrument - resistance temperature sensors (without display unit), method - comparison method with standard resistance temperature sensor
- quantity - temperature, measuring instrument - infrared thermometers, method - direct comparison with standard infrared thermometer

- quantity - humidity, measuring instrument - direct indicating hygrometers, method - direct calibration with a standard hygrometer

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