SLOVENSKA AKREDITACIJA

S14d4

S14 – ANNEX 4:
SCOPE OF ACCREDITATION IN CALIBRATION

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1 PURPOSE AND GENERAL PROVISIONS

The document provides specific and more concrete provisions as to the way of defining the scope in the field of calibration. General requirements and references applicable to all fields of accreditation are provided in general document S14.

This document is one of SA's internal regulations, which lay down the requirements for accreditation and the rules of accreditation, of which SA shall maintain public record. Its provisions constitute a part of the Contracts on establishing and maintaining accreditation, which SA concludes with its clients. Valid copies of SA's internal regulations governing the requirements for accreditation and the rules of accreditation shall be available at SA's head office and published on SA's website.

2 TECHNICAL FIELDS

Technical fields of calibration are determined by physical quantities or groups of related physical quantities, such as electrical quantities, mechanical quantities, dimensional quantities, and the like. They are classified in accordance with the document D05-11. The classification is based on the International System of Units. D05-11 only indicates the fields considered so far; they can be optionally completed with new derived physical quantities brought by the development of measuring instruments and/or dictated by new needs in metrology. For the sake of integrity of information, in document D05-11 some technical fields which are not covered by SA’s operations are also stated; they are marked with an asterisk »*«.

3 PRESENTING THE SCOPE OF A CALIBRATION LABORATORY

a) According to the definition of types of flexibility of scope (S14), the scope of a calibration laboratory is presented as a fixed scope.

b) When the calibrations are conducted by various (internal) organisational units of conformity assessment body, the scope shall be presented separately for each unit and for each of its sites.

c) In separate tables, the scopes are also indicated according to the location of the calibrations (e.g. in laboratory, on-site / in the field, at a temporary location, in a mobile laboratory).

d) The smallest unit of description of scope of accreditation (hereinafter "unit of scope") relates to calibration of a measuring instrument or a measuring system, which is carried out either:
   1) at a specified point of the chosen physical quantity (e.g. calibration of thermometer at the triple-point temperature of water (0.01 °C), or
   2) at a specified interval of the chosen physical quantity (e.g. calibration of voltmeter at the voltage interval 0–100 V).

The unit of scope shall be written down in such a way that the user can obtain all the technical information on the chosen calibration needed (without having to combine information with other units of scope).

e) The scope of accreditation of each unit is defined by the following parameters and information:
   1) **field** of calibration or physical quantity,
   2) **range** (fixed point or interval) to which the calibration applies,

3) **limits** (e.g. frequency limits, boundary conditions, other influence quantities, and the like),
4) description of calibration **capability** (CMC),
5) type of calibration **method** (direct, indirect, calibration using simulation),
6) reference to internal calibration procedure, and reference to standard procedure, when applicable,
7) calibrated measuring **instruments**, and
8) any other **notes** needed for understanding.

Explanations and notes to individual items:

NOTE 1 **Field** of calibration is defined by the physical quantity. This can be a base quantity or a derived quantity. The highest level of classification is represented by a group of related quantities in the field (e.g. dimensional quantities). Follow sub-fields consisting of individual base or derived physical quantities; possible are also more precise descriptions of derived quantities or quantities grouped according to certain boundary conditions or limits. There can be several levels of descriptions, although they are not strictly determined (as this depends on the diversification of individual fields). (Example: electrical quantities – voltage – DC voltage.) At least one (top) level of the definition of the field shall always be indicated in the scope.

NOTE 2 Information on **measuring instruments** (or types of instruments), for which the calibration is intended, has been joined to the description of the field (or sub-field). This information can also be provided under a common heading with data on type, calibration procedure and notes, if any. The level of detail of such description cannot be generally defined, as it can range from a generic form to a quite specific indication of a certain type of measuring instrument. It all highly depends on the relevant fields, the methods used, and the laboratory's principles and limitations. In certain metrology fields, such information can be derived from the classification scheme itself. In such cases no additional description is needed under the heading "Measuring instruments". (Example: temperature, humidity and thermophysical properties – temperature – liquid thermometers.)

NOTE 3 The description of calibration **capability** is presented for each unit of scope by the parameter "Calibration and Measurement Capability", **CMC**.
In presenting CMC, ILAC P14 (Calibration and Measurement Capability (CMC) Expressed as an Expanded Uncertainty) shall be complied with. Expanded uncertainty is obtained by multiplying combined standard uncertainty by such coverage factor *k* that defines the confidence interval of approximately 95%.
The ILAC P14 Guide needs to be fully complied with also as concerns all other systemic provisions, such as the policy of taking into account contributions to the uncertainty of the calibrated instrument (the principle of "*best existing device*"), of rounding up, presenting and reporting of uncertainty, etc.

Estimation of measurement uncertainty shall be made following the principles set out in GUM or in EA-4/02.

NOTE 4 The **CMC** parameter can be ascribed to a unit of scope in several ways, e.g. by:

a) a constant value, which applies to the whole range, or
b) an interval with defined lower and upper values (in this case it needs to be clear from additional notes as to how CMC for the values inside the interval are defined), or
c) explicit function of measured quantity and/or other parameters, or
d) an array of CMC values, or

e) a graph (provided that resolution is such that at least two significant digits of the CMC value can be read).

Presenting the CMC parameter by an open interval (e.g. "U < x") is not permitted!

The manner of presenting is always adapted to the actual use of calibration results. When, for example, the maximum uncertainty value on an interval is acceptable for the purpose of use, this value can be indicated in the CMC box, depending on the laboratory's decision, in the form of constant value, not in the form of function, which applies in the interval. The opposite case – i.e. when only the minimum CMC value is indicated for the complete interval – is not permitted.

NOTE 5 When a description of the boundary conditions or other **limits** is required for an unequivocal interpretation, it shall be provided. (Examples: frequency dependence of quantities, boundary validity conditions for certain calibration – calibration at a certain value of some other influence quantity (temperature, electric current, voltage, etc.).)

NOTE 6 Through the definition of the **type** of calibration method it is defined whether it involves:

a) a direct method,
b) an indirect method, or
c) calibration with simulation.

The relevance of defining the type of a method differs considerably between individual fields. In certain fields, the information that it is about, for example, "calibration using simulation" could tell a great deal about the method used and the capabilities. Simulation of a measured quantity (usually in an environment of electrical signals), in terms of method and from the point of view of equipment used and its capability, is not the same as "direct" comparison of measurements between a standard and a calibrated meter for the same physical quantity. The same applies – in certain fields – to the information that an "indirect" method is involved (e.g. through the use of reference materials, and not through comparison (or indication) of two meters).

Information on the type of calibration method shall be stated, *mutatis mutandis,* with regard to the field or physical quantity. In fields where the definition is not used, it may be omitted, or a technical note may be added, *mutatis mutandis* (e.g. in accordance with the definitions in VIM, 2.5 or similar).

NOTE 7 **Reference to internal calibration procedure** shall be indicated in the scope of accreditation. Reference to standardized calibration procedure shall be made, where relevant and applicable. **Reference to standard procedure** may only be used when such reference does not have a misleading effect (the method must fully comply with the standard method, or the description must make it clear as to what can refer to the given standard).

NOTE 8 In **notes**, all other possible, urgently needed, additional information is given that cannot be deduced from the general description. This involves in particular the limitations serving potential customer to seek and select calibration capability.

The accreditation scope shall be presented in the form of a table which includes at least the following information. In terms of illustration, see below an example of presenting the scope of a calibration laboratory in two tables:

EXAMPLE:

Tabela/*Table* 1: Kalibracije v laboratoriju. / *Calibration in laboratory*.

Št. No	**Merjena veličina, (pod)področje, oz. merilni instrumenti in/ali območje (merjene veličine).** *Measured quantity, (sub-) field, and/or instruments, and/or range (of measured quantity).*	**Območje (merjene veličine) ali Omejitve, pogoji, vplivne veličine.***** *Range (of measured quantity) or Limitations, conditions, influence quantity.****	**Kalibracijska in merilna zmogljivost (CMC) izražena kot razširjena negotovost.*** *Calibration and measurement Capability (CMC) Expressed as an Expanded Uncertainty.**	**- Tip kalibracijske metode (opcija)** **- Kalibracijski postopek** **- Merilni instrumenti (opcija)**** **- Opombe** *- Type of calibration method (option)* *- Internal calibration procedure* *- Measuring instruments (option)*** *- Remarks*
	ELEKTRIČNE VELIČINE / *Electrical quantities*			
	ENOSMERNE IN NF VELIČINE / *DC/LF Quantities*			
	Napetost / *Voltage U*			
	Izmenična napetost (v območju) *AC Voltage (in the range)*	**Pogoj:** pri frekvenci *f* *Condition: @ frequency f*		
1.	30 V do/*to* 480 V	45 Hz do/*to* 65 Hz	$1{,}1 \cdot 10^{-4} \cdot U$	- Neposredna kalibracija po internem kalibracijskem postopku XYZ-1. - Merilni instrumenti: etalonski števci električne energije razreda 0.01 in 0.02. - Opomba: merjenje na sistemu za komparacijo energije. - *Direct calibration according to internal calibration procedure XYZ-1.* - *Measuring instruments: reference electrical energy metersclass 0.01 and 0.02.* - *Remark: measured on the system for energy comparison.*
	Tok / *Current I*			
	Izmenični tok (v območju) *AC Current (in the range)*	**Pogoj:** pri frekvenci *f* *Condition: @ frequency f*		
2.	5 mA do/*to* 10 mA	45 Hz do/*to* 65 Hz	$3{,}5 \cdot 10^{-4} \cdot I$	- Neposredna kalibracija po internem kalibracijskem postopku XYZ-2. - Merilni instrumenti: etalonski števci električne energije razreda 0.01 in 0.02. - Opomba: merjenje na sistemu za komparacijo energije. - *Direct calibration according to internal calibration procedure XYZ-2.* - *Measuring instruments: reference electrical energy metersclass 0.01 and 0.02.* - *Remark: measured on the system for energy comparison.*
3.	10 mA do/*to* 50 mA	45 Hz do/*to* 65 Hz	$2{,}1 \cdot 10^{-4} \cdot I$	
4.	50 mA do/*to* 160 A	45 Hz do/*to* 65 Hz	$1{,}4 \cdot 10^{-4} \cdot I$	

Tabela/*Table* 2: Kalibracije na terenu. / *On-site calibration.*

Št. No	**Merjena veličina, (pod)področje, oz. merilni instrumenti in/ali območje (merjene veličine).** *Measured quantity, (sub-) field, and/or instruments, and/or range (of measured quantity).*	**Območje (merjene veličine) ali Omejitve, pogoji, vplivne veličine.***** *Range (of measured quantity) or Limitations, conditions, influence quantity.****	**Kalibracijska in merilna zmogljivost (CMC) izražena kot razširjena negotovost.*** *Calibration and measurement Capability (CMC) Expressed as an Expanded Uncertainty.**	**- Tip kalibracijske metode (opcija)** **- Kalibracijski postopek** **- Merilni instrumenti (opcija)**** **- Opombe** *- Type of calibration method (option),* *- Internal calibration procedure* *- Measuring instruments (option)*** *- Remarks*
	KEMIJSKA ANALIZA, REFERENČNI MATERIALI / *Chemical analysis, reference materials*			
	Merilniki pH *pH measuring equipment*	**Območje** *Range*		- Kalibracija s simulacijo brez sonde po internem postopku XYZ-3. - Merilniki proizvajalca WTW in taki z enakim priključkom kot pri WTW. - *Calibration with simulation according to internal calibration procedure XYZ-3.* - *Meters manufactured by WTW and those with the same connection as WTW.*
1.		0 do/*to* 14 pH	0,02 pH	

* CMC opomba / *CMC Note*
Razširjena negotovost je podana kot kombinirana standardna negotovost pomnožena s takšnim faktorjem pokritja *k*, da določa interval zaupanja približno 95 %. / *Expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95 %.*

** Navedba informacije o merilnih instrumentih se v tej koloni uporabi le v tistih primerih, kjer to ne izhaja že iz opredelitve veličine, opisa (pod)področja in instrumentov v drugi koloni tabele. / *Information on measuring instruments are specified in this column only if it is not clear from the description of quantity, (sub-) field, and/or instruments in the second column of this table.*

*** Kadar je za enoumno razumevanje zmogljivosti potreben opis robnih pogojev, vplivnih veličin ali drugih omejitev se ti navajajo v tej koloni (z enoumno oznako kolone), območje merjene veličine pa je v takem primeru določeno že v drugi koloni te tabele. / *When a description of the boundary conditions, influence quantity or other limits is required for an unequivocal understanding of capabilities it is specified in this column (clearly indicated), providing that the range of measured quantity is defined in the second column of this table.*

4 CONSIDERING CHANGES TO SCOPES

Calibration laboratories have a fixed type of scope (see also ILAC G18). Hence, any changes may only be implemented subject to prior assessment by SA. Normally during surveillance assessments, but also during the procedure of extraordinary assessment for the purpose of extending the scope of accreditation. Any changes of the scope whatsoever shall always be announced before the assessment and documented with (at least) calibration procedures and evaluations of changed estimations of uncertainty (or all expected systemic changes of the laboratory).

5 CHANGES WITH REGARD TO PREVIOUS REVISION

In Chapter 2, an explanation regarding the technical fields of calibration in which SA does not carry out accreditation has been added.

In Chapter 3, a provision as to how the scope is given if calibrations are performed by different organizational units/locations of the body, and how according to the place where the calibrations are performed has been added. In both tables, examples of accreditation scope of the calibration laboratory have been updated.

In Chapter 8 references to the latest edition of EA-4/02 and ILAC G18 have been updated.

6 TRANSITORY AND FINAL PROVISIONS

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7 CONTROL OF THE DOCUMENT

The document is adopted by the SA Board after its content has been considered and adopted by the Accreditation Committee. If the SA Board disagrees with the proposal which was approved by the Accreditation Committee, it shall be referred back to the Accreditation Committee for consideration. Changes that do not affect the content can be adopted by the SA Board without the involvement of the Accreditation Committee.

A valid copy of this document shall be located in i4 (SA's information system). A clean copy shall be published on SA's website, and available in printed form at SA's head office.

Individual copies may be controlled in physical form. The recipients or places of storage shall be shown in records on issuance of the document.

Other printouts and copies hereof shall have informative nature and shall not be considered as controlled copies. The validity of these documents should be checked in i4 or on SA's website.

8 REFERENCE DOCUMENTS

- ILAC P14:09/2020, ILAC Policy for Measurement Uncertainty in Calibration
- EA-4/02 M: 2022, Evaluation of the Uncertainty of Measurement in Calibration
- JCGM 100:2008, GUM 1995 with minor corrections, Evaluation of measurement data — Guide to the expression of uncertainty in measurement (accessible at www.bipm.org)
- ILAC G18:01/2024, Guideline for descibing Scopes of Accreditation
- JCGM 200:2012, International vocabulary of metrology – Basic and general concepts and associated terms (VIM). 3rd edition, 2008 version with minor corrections (accessible at www.bipm.org)
- SIST EN ISO/IEC 17011:2018, Conformity assessment - Requirements for accreditation bodies accrediting conformity assessment bodies (ISO/IEC 17011:2017)