SLOVENSKA AKREDITACIJA

OA04

MEASUREMENTS OF WASTE WATER FLOWS

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1 GENERAL

This document shall be considered an expert explanation of the requirements of the standard SIST EN ISO/IEC 17025 for use in laboratories performing the measurements of waste water flows in open channels. It provides explanations of the selected points of the standard, which are the most important for assuring correct performance of these measurements.

It is intended for laboratories, as a guide in the preparations for fulfilling the requirements for accreditation, and for assessors in the procedures of the accreditation of the laboratories performing wastewater flow measurements and/or wastewater sampling.

2 EXPLANATIONS FOR THE USE OF CERTAIN TECHNICAL REQUIREMENTS OF SIST EN ISO/IEC 17025

2.1 Personnel

- The laboratory personnel responsible for flow measurements shall have corresponding education in the field of hydraulics (e.g., a civil engineer specialising in hydrotechnical or municipal engineering, mechanical engineer or physicist specialising in the relevant field). If the personnel have inadequate basic education, the laboratory shall pay special attention to appropriate additional education and training of such personnel so as to make them acquainted with all technical contents of relevance for flow measurements.
- If necessary, the laboratory shall provide expert support by engaging external associates. In such a case, their relationship with the laboratory as well as their tasks and responsibilities shall be made clear.
- All personnel performing the flow measurements (including wastewater sampling) shall be constantly provided with additional training or education (through participation in relevant courses, seminars, workshops ….).
- The Assessor Team of the accreditation body shall establish adequate competence of the personnel performing the flow measurements (including wastewater sampling).

2.2 Measuring equipment

- **Measuring range**

The flow range stated by the manufacturer shall be observed taking into account the condition that the measuring system range shall be within the measuring ranges of individual system elements.

- **Properties of liquids to be measured**

The properties of waste water shall be established, and it shall be checked whether the measuring equipment used is appropriate with respect to these properties.

- **Rated climatic and technical operating conditions**

The laboratory shall know and observe the operating conditions of the measuring equipment used.

The manufacturer shall determine the climatic, mechanical, and electromagnetic environment for which the measuring system is designed, and shall also take into account the requirements concerning operating conditions. They shall determine the rated operating conditions for the measuring systems used independently, particularly:

- climatic and mechanical environment,
- power supply voltage: rated AC voltage or/and DC voltage limits,
- normal conversion.

- **Uncertainty of measurement**

The laboratory shall assess the uncertainty of their measurement results taking into account all influencing factors.

Recommended values for accuracy of individual sensors (all having a 95 percent statistical level of confidence) are stated in *Table 1* below.

Table 1

Sensor type		**Recommended accuracy**
Temperature sensor		± 1.0 °C
Pressure sensor	≤ 20 kPa	± 0.1 kPa
	≥ 20 kPa	± 0.5 %
Water depth sensor	≤ 200 mm	± 1 mm
	≥ 200 mm	± 0.5 %
Density sensor		± 5 kg/m^3
Speed sensor		± 0.1 %

When the stated values of the maximum error for a particular quantity are exceeded, the laboratory shall use a calculation to prove that this error has no significant impact on the total uncertainty of measurement of the measuring system, i.e., that the higher total uncertainty of measurement suits the purpose of using the test method and/or its results.

ISO 5168 (*Measurement of fluid flow – Procedures for the evaluation of uncertainties*) also deals with the calculation of the measurement uncertainty.

- **Reference point**

As a rule, the measuring system shall include only one reference point. If several reference points are present, the division of the measured liquid shall not be permitted under any circumstances.

- **Protection against unauthorized interference**

When the equipment is not under the control of the laboratory all the time, physical measures or protective seals should be used to protect the measuring system against interferences having impact on the accuracy of measurement.

2.3 Measurement sites

- A measurement site including all built-in measuring equipment shall be considered a uniform measuring system to which the provisions of sub-clause 2.2 shall apply.
- The laboratory shall keep records of all measurement sites where measurements are performed, and these records shall include a description of the measurement site and all data to be taken into account when performing the measurements and presenting the results.
- All limiting conditions to be met by an impeccable measurement site shall be observed in full, so that the correlation between the measured quantities and the calculated water flow is defined in a completely uniform manner.
- Both the design and the execution of the measurement site shall be checked in an appropriate way.
- General arrangement of the measurement site shall comply with all technical conditions and safety-at-work conditions at least to the extent enabling correct execution of measurements.

2.4 Assuring measurement traceability

- The flow measurement can be considered a direct measurement only when the calibration refers to the entire measuring system. A relevant calibration certificate issued by a competent laboratory shall be deemed as evidence of assured measurement traceability.
- When only individual flow meters and/or parts of the measuring system are calibrated, and the measurement site calls for the use of an appropriate flow measurement method, the validation of this method shall be of vital significance for the correctness of the measurements performed.
- Whenever possible, the laboratory should check the flow measurements through inter-laboratory comparison (it may also be a bilateral comparison).

2.5 Flow measurement methods

- The method (i.e. reference document referred to by the laboratory) shall define the principle and the procedure of performing the flow measurement, the form and other requirements for the measurement site, as well as limitations regarding the measuring ranges, if any, etc.
- A laboratory seeking accreditation for the performance of flow measurements irrespective of the measurement site, shall prove an adequately higher level of competence, since, for that purpose, it shall have to modify its flow measurement method, where appropriate.

The lists of all currently valid ISO standards for flow measurements in open channels are available at: https://www.iso.org/ics/17.120.20/x/; and for flow measurements in closed pipes at: https://www.iso.org/ics/17.120.10/x/.

3 CHANGES WITH REGARD TO PREVIOUS REVISION

In 2.2, the provision concerning the observation of flow ranges in the measuring range has been changed.

In 2.2, the sentence under "Uncertainty of measurement" regarding the attainable uncertainty of measurement for flow has been deleted; the table has been redesigned and numbered; and the title of ISO 5168 has been updated.

In 2.2, the provisions concerning the impact of air and other gases have been deleted.

In 2.5, the website addresses at which a list of all currently valid ISO standards for flow measurement in open channels and in closed pipes is available, have been updated.

Reference to the clauses of SIST EN ISO/IEC 17025 have been deleted.

Some terminology changes have been made throughout the translation.

4 TRANSITORY PROVISIONS

N/A

5 CONTROL OF THE DOCUMENT

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