

Plan of the intercomparison of distributed calibration objects (piston-operated volumetric apparatus)		Page 1 (4)
Approved by Håkan Källgren	2026-03-27	Issue 2



Piston-operated volumetric apparatus

Part 3 - Different types of volumetric piston operated apparatus; manual - dispenser and syringe and electronic - bottle-top burette and multi-channel pipette.

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Intercomparison ILC volume 2025:2 piston-operated volumetric apparatus (pipettes)

The calibration objects will be transported between participating laboratories.

Intercomparison provider

Swedish Metrology and Quality AB (SMQ) is organizing this intercomparison on calibration of the following objects. The calibration points are 20 % and 100 % of max volume of the pipette.

1. Manual bottle-top dispenser max 10 ml – tested at 2 ml and 10 µl (max)
2. Manually operated syringe max 500 µl – tested at 100 µl and 500 µl (max)
3. Electronic bottle-top burette max 50 ml – tested at 10 and 50 ml (max)
4. Manual multi-channel (8 channels) pipette max 100 µl – tested at 20 µl and 100 µl (max)

The participants can select the objects they want to calibrate. The above concept of intercomparison was decided by an advisory group related to volume calibration. No subcontractors are involved in the intercomparison.

Participants welcome to this intercomparison

Participation is open for three categories of laboratories:

- Accredited laboratories
- Laboratories that will apply for accreditation.
- Laboratories that want to evaluate their Calibration and Measurement Capability (CMC).

Due to practical reasons the number of participants is limited to minimum 8 and maximum 20.

Description of the values included in the intercomparison

The intercomparison will start and end with all objects calibrated at a reference laboratory which also will define the reference values. The CMC levels for uncertainty on the reference laboratory are given in the tables below as well as the possibly reference uncertainty when calibrating the objects.

Table 1 Calibration points and uncertainties for
1) the reference laboratory and 2) the calibration objects

Volumetric apparatus	Calibration point	Reference laboratory CMC values *	Possible expanded reference uncertainty **
		%	%
Manul bottle top dispenser	2 ml	0,1	0,2
	10 ml	0,1	0,2
Manually operated syringe	100 µl	0,1	0,2
	500 µl	0,1	0,2
Electronic bottle-top burette	10 ml	0,1	0,2
	50 ml	0,1	0,2
Manual multi-channel pipette	20 µl	0,1	0,2
	100 µl	0,1	0,2
*CMC values from the KCDB database at bimp.org			
**The values are expressed as expanded uncertainty, U with 95 % confidence level and include possible drift during circulation of the objects among the participating laboratories.			

The reference values and respective uncertainties concerning these intercomparison objects will be based on the calibration in the reference laboratory before and after the distribution. Reference laboratory will be IPQ, Instituto Portugues da Qualidade, Portugal.

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Detailed documented instructions

Detailed technical instructions will be sent to the participants who have registered to the intercomparison together with the reporting form as an excel document.

Time schedule and quality check

After registration of interested laboratories a plan for circulating of the calibration objects and a time schedule will be worked out and sent to all of them.

The calibration objects will eventually be transported by different means in participating countries. Immediately at receiving and sending the objects each participant shall inform the organizer (SMQ) by e-mail about the status of the objects. If there are any signs of impact (for example marks or scratches) a photograph shall be sent to the organizer to decide how to proceed and to inform the next participant.

Each participant will have access to the object for maximum 4 working days and should use its own method for calibration.

Laboratories freely decide which uncertainty they want to state in the protocol. Accredited laboratories can declare their CMC-values, or a value estimated for the actual measurement condition.

After finishing calibration, the objects shall be sent to the following participant on the transportation list using the same parcel they arrived in.

Original data from the calibration shall be sent to the organizer immediately after finishing the calibrations. This is preferably done by e-mailing the filled excel-reporting file. The organizer gets control of that everything is as expected including stability. It also helps to detect eventual arising problems in time.

Statistical analyses that will be used

The organiser will calculate reference values that will be used in the calculations as described in ISO/IEC 17043:2023 annex B presenting En-values (formula B6)

Reporting

Participants shall send their final calibration certificate by e-mail to the organizer within one week after the calibrations are finished in form of a pdf-file.

The excel-reporting document that will be sent to all laboratories shall indicate important environment conditions.

For background information participants should inform on the following:

- Metrological traceability
- Temperature
- Air humidity
- Pressure

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At the end of the intercomparison a draft report will be returned to the participants within 2 weeks from the time when the last participant has reported its results in a calibration certificate.

The participants are encouraged to comment on the draft report within two weeks after receiving it.

If a participant does not follow the described reporting rules without giving reasonable explanations the organizer tries to extract the relevant content for the comparison. If this is not possible the results will be excluded from the report.

A participant may decide to withdraw from the exercise. This might be caused by problems detected during or after having performed the measurements. However, the withdrawal in this case must be announced to the organizer before the draft report is distributed to all participants.

The participant may appeal to the full report if there should be major faults in the report.

The intercomparison report will list up all participating laboratories. However, each will be treated anonymously, and its result will only be identified by a code that is sent to each participant in a separate e-mail.

Damaged apparatus

The participant shall immediately inform the organizer in case of any anomalies or other detected problem to allow for appropriate actions.

Price for participation

- Laboratories having maximum 3 calibration technicians –basic price 750 EUR.
- Laboratories having more than 3 calibration technicians –basic price 980 EUR.
- In addition, 390 EUR per calibration object

The laboratories shall pay the transport costs to next laboratory.

If the laboratory decides not to fulfil its part of the agreement after they have registered, they shall still pay the registration price.