CONTENT

ILC Angle 2023:1

Interlaboratory comparison (ILC) of measuring devices that will be transported.
Proficiency testing provider (PT) Swedish Metrology and Quality AB (SMQ) is organizing this intercomparison on calibration off the following objects.

Object

Digital precision level Protractor/Inclinometer 0-360°

The concept for this intercomparison was suggested by an advisory group related to this calibration area.
No subcontractors are involved in the intercomparison.

Participants welcome in this intercomparison.
The participation is open for three categories of laboratories:

- Accredited laboratories
- Laboratories that will apply for accreditation.
- Laboratories that want to evaluate their calibration quality.

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 providing the corresponding inter-comparison reference values. The following uncertainties in table below are expected by the reference laboratory.

Measurand

The measurand of the comparison is error of the inclination angle reading of the device under test (DUT). For the comparison clockwise direction is selected as increasing direction of the reference angle scale.

Note: The DUT indicates difference to horizontal level with maximum reading of 90°. There is no sign mark used but an arrow to show shortest rotational direction to level or plumb.

Table 1. Measuring points and reference uncertainties.

Measuring point, deg	Reference laboratory CMC values, deg	Expected Uncertainty (U) by reference calibrations*, deg
-10	0,000056	0,040
-8	0,000056	0,040
-6	0,000056	0,040
-4	0,000056	0,040
-2	0,000056	0,040
0	0,000056	0,040
2	0,000056	0,040
4	0,000056	0,040
6	0,000056	0,040
8	0,000056	0,040
10	0,000056	0,040
-180	0,000056	0,040
-150	0,000056	0,040
-120	0,000056	0,040
-90	0,000056	0,040
-60	0,000056	0,040
-30	0,000056	0,040
0	0,000056	0,040
30	0,000056	0,040
60	0,000056	0,040
90	0,000056	0,040
120	0,000056	0,040
150	0,000056	0,040
180	0,000056	0,040

*Including possible drift during the circulation.

The values are expressed as expanded uncertainty, U on the 95 % confidence level.

As reference laboratory the VTT MIKES, the National Metrology Institute of Finland is selected.

Time schedule and quality check

The equipment for calibration will eventually be transported by different means in participating countries.

Participants shall inform the organizer (SMQ) by e-mail immediately at receiving and when sending the objects. The status of the object shall be reported in both situations. If there are any signs of impact for example 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 objects during maximum 5 days.

Participants shall use their own methods for calibration. The advised measuring points in the technical protocol are recommended. You can calibrate less calibration points if you have technical limitations.

After finishing calibration, the objects shall be sent to the next participant on the transportation list in the same parcel they arrived. The transport of the parcel to next laboratory shall be arranged by the participant.

Original data from the calibration shall be sent to the organizer directly when the measurements are completed. Preferably this is done by e-mailing the reporting protocol in excel sent out in advance. A fast delivery will help the organizer to have control that everything is as expected.

Environment

Temperature during the calibration shall be documented.

Values for the found errors shall be given for a reference temperature of 20°C.

Statistical analyses that will be used

The organizer will arrange reference values to be used in the calculations as described in ISO/IEC 17043:2010 annex B presenting En-values (formula B5).

Reporting

Participants shall send their calibration certificate to the organizer within one week after the calibrations are finished. This shall be done as a pdf-file in a mail message. Example of the results table is presented in table 2 and 3.

The calibration can be chosen according to table 2 or table 3 or both of the tables.

Table 2. Example of results table

Measuring point / °	Reference angle / °	Direction from level	Measured inclination angle, DUT / °	Deviation from reference / °	Expanded Uncertainty / °
-10		-	*10.0*		
-8		-	*8.0*		
-6		-	*6.0*		
-4		-	*4.0*		
-2		-	*2.0*		
0			*0.0*		
2		+	*2.0*		
4		+	*4.0*		
6		+	*6.0*		
8		+	*8.0*		
10		+	*10.0*		

Table 3. Example of results table

Measuring point / °	Reference angle / °	Direction from 0	Measured angle, DUT / °	Deviation from reference / °	Expanded Uncertainty / °
-180		-	*0.0 (180)*		
-150		-	*30.0 (150)*		
-120		-	*60.0 (120)*		
-90		-	*90.0*		
-60		-	*60.0*		
-30		-	*30.0*		
0			*0.0*		
30.0		+	*30.0*		
60.0		+	*60.0*		
90.0		+	*90.0*		
120.0		+	*60.0 (120)*		
150.0		+	*30.0 (150)*		
180.0		+	*0.0 (180)*		

At the end of the intercomparison a draft report will be sent to the participants within 4 weeks after receiving the last calibration certificate. The participants are encouraged to comment on the draft report within 2 weeks after receiving it.

The final report will be published within 3 weeks after receiving the last comments on the draft report.

If a participant does not follow the described reporting rules without giving reasonable explanations the organizer tries to extract the relevant content. 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 are major faults in the report.

In the report each participant will be anonymous and identified by a code related to the results which is sent in a separate e-mail to each of them.

Damaged PT/ILC item

The participant shall immediately inform the organizer in case of a damage of any PT/ILC item or other detected problem to allow him to take appropriate actions.

Price for participation

Price for laboratories:

- Laboratories having maximum 3 calibration technicians –basic price 750 EUR.
- Laboratories having more than 3 calibration technicians –basic price 980 EUR.
- In addition, 350 EUR on calibration of the object according to table 2
- In addition, 350 EUR on calibration of the object according to table 3

The basic price will be invoiced when the laboratory has registered for the ILC.

Each laboratory will cover the costs for transport to next laboratory.

If the laboratory decides not to fulfil their part of the agreement after they have applied, they shall still pay the basic price.