

Quality manual		
Intercomparisons on calibration objects in car inspection	Issue 1	
Approved by Håkan Källgren	Date 2021-09-03	Page 1 (7)

Content

Planning of a calibration intercomparison with the calibration object in the car inspection area.

Participation is in the first place for Norwegian and Swedish laboratories	2
Proficiency testing provider (PT).....	2
Participants in the intercomparison.....	2
Description of the values included in the intercomparison.....	3
Exhaust gas meter and opacity meters (% and k-value m ⁻¹)	3
Time schedule and detailed documented instructions.....	3
Calibration points.....	5
Additional measurement on exhaust gas meters and opacity meters	6
Statistical analyses that will be used	6
Reporting	6
Damaged PT item	7
Price for participation	7

Quality manual		
Intercomparisons on calibration objects in car inspection	Issue 1	
Approved by Håkan Källgren	Date 2021-09-03	Page 2 (7)

Planning of a calibration intercomparison with the calibration object in the car inspection area. Participation is in the first place for Norwegian and Swedish laboratories

Proficiency testing provider (PT)

Swedish Metrology and Quality AB (SMQ) is organising this intercomparison on calibrations of:

1. Analog retardation meter
2. Digital retardation meter
3. Roller brake tester for trucks
4. Manometer for truck brake tester
5. Roller brake tester for passenger cars
6. Exhaust gas meter
7. Opacimeter
8. Digital light control equipment
9. Analog light control equipment

Participants may choose which of the objects they want to calibrate.

This concept of the intercomparison on calibration has been decided by the advisory group related to these calibration areas. No subcontractors are involved in the intercomparison.

Participants in the intercomparison

There are three categories of laboratories that may participate in this comparison:

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

The result of the intercomparison will establish a base for the CMC values in calibrations for the laboratories.

The number of participants is minimum 8 and maximum 15.

Quality manual		
Intercomparisons on calibration objects in car inspection	Issue 1	
Approved by Håkan Källgren	Date 2021-09-03	Page 3 (7)

Description of the values included in the intercomparison.

The following objects will be calibrated by a reference laboratory and will have a CMC level of:

- Analog retardation meter (Bowmonk): $\leq \pm 1,0 \%$ g
- Digital retardation meter (Bowmonk): $\pm 0,01$ g
- Manometers for trucks: $\pm 0,02$ bar,

The objects calibrated by a reference laboratory will get their intercomparison reference value and its belonging uncertainty based on the calibration in the reference laboratory with a calibration performed before and after the distribution of the objects.

The inclination angle on the retardation equipment will be arranged and determined by a reference laboratory and SMQ will arrange the factors to give reference values related to retardation.

For the following objects no reference laboratory can be used and the intercomparison reference value will be made up by a consensus value among the participants calibration results:

- 2 Roller break testers (with load cell and weight)
- Light adjustment equipment

Exhaust gas meter and opacity meters (% and k-value m^{-1})

These instruments will be calibrated by the participants in the usual way. And with the found error/correction a supplied reference gas and reference filter with known uncertainty will be measured by the participants. The found and corrected values will be compared with the reference values of the three gas components and the reference opacity filter.

For the other objects (roller brake testers and light adjustment equipment) where a consensus value will be used as reference value the value and the uncertainty will be based on the requirements in the standard ISO 13528.

Observe: The laboratories shall deliver calibration certificates on their equipment for the calibrations where the consensus value will be used (brake testers and light adjustment equipment).

Time schedule and detailed documented instructions

A detailed time schedule and technical instructions together with the reporting protocol in form of an excel document will be sent to the participants who have registered to the ILC.

The retardation instruments will be sent in a box to each participant for calibration at their place. For all other objects the participants need to do the calibrations in the Oslo-area to perform the calibration at two selected sites. Details about the sites and models of the instruments will be given latest 2 weeks in advance of the calibrations

Quality manual		
Intercomparisons on calibration objects in car inspection	Issue 1	
Approved by Håkan Källgren	Date 2021-09-03	Page 4 (7)

For calibration at home, you shall inform the organiser (SMQ) immediately when the calibration objects arrive and inform by e-mail about their status. In case you detect a problem, you should send a photograph to the organizer by mail to decide what to do.

Each participant will have access to the retardation meters for maximum 2 days and use its own method for calibration.

After finishing the calibration, the objects should be sent or transported to the next participant on the transportation list using the original parcel.

Preliminary data from the calibration at home shall be sent to the organiser by e-mail directly after finishing the measurements. Preferably you can use the prepared excel protocol form directly or send it in pdf-format. The final calibration certificate should exactly have the form you are used to and shall be sent as pdf-file one week after finalizing the work.

Calibration at two sites in the Oslo area

Most of the measurement equipment needs to be calibrated at place. Due to logistic conditions two locations close to Oslo are selected for calibration during week 42.

Site 1 close to Oslo in Grorud week 42

Roller brake tester for trucks model **Cartec BDE 4504** (40000 N). Reading of break force via PC belonging to brake tester. (can be calibrated by using load cells or weights)

Separate manometer **ZEEBRGB314A – Version 2.0 20 bar** used in combination with brake tester calibration. Its pressure value can also be registered by the connected PC.

Site 2 close to Oslo in Holumskog week 42

Roller Brake tester for personal cars (can be calibrated by using load cells or weights) **Cartec RP204 (8000N)**. A PC for force reading is included in this instrument.

Head light adjusting unit including:

- Digital light control equipment **Technolux HL 300**
- Analog light control equipment. **Technolux 2400**

Exhaust gas meters Opus 40 with $P_{ef} = 0,487$ (HC) using a reference gas including the following components and concentrations near the suggested values

- CO - (1 or 2 different concentrations)
- CO₂ - (1 or 2 different concentrations)
- HC (propane) - (1 or 2 different concentrations)

Quality manual		
Intercomparisons on calibration objects in car inspection	Issue 1	
Approved by Håkan Källgren	Date 2021-09-03	Page 5 (7)

Opacimeters (absorption in % and k value m^{-1}) Opus 100 optical path length 0,215 mm – corrected for standard length 430 mm.

Calibration points

The participants shall calibrate according to their own method and use their normal reference equipment. This implies that they are limited in the number of calibration points. For the comparison it is recommended to use all points that are available, and all will be evaluated.

The detailed scheme and technical instructions that will be sent to the participants that have registered could have some changes in the values indicated below.

Retardation meters – minimum number

- Analog instrument - Minimum 3, but optionally as many angles as available 10 measurement angles
- Digital instrument - Minimum 3, but optionally as many angles as available 10 measurements angles.

Manometers

- 4,6, 8 and 14 bar

Opacimeters – minimum number

- Opacimeters - 2 optional filters

Roller break testers – minimum number

- 4 forces - 20, 50, 70 and 100% of full scale

Exhaust gas meters

- CO – (low value 0,3 to 0,9 %; high value 4,2 to 5 %)
- CO₂ - (low value 3,5 to 6 %; high value 14 to 15 %)
- HC (propane) - (low value 200 to 700 ppm; high value 1900 to 3400 ppm)

Shall be given by vol% for Norwegian laboratories (based on legislation)

Laboratories normally using only one gas concentration can choose high or low value

Quality manual		
Intercomparisons on calibration objects in car inspection	Issue 1	
Approved by Håkan Källgren	Date 2021-09-03	Page 6 (7)

Head light adjusting device – minimum number

4 inclination levels- 0 %, 1,2 %, 2 % and 3 %

The participant may record other points as described in their method and issue calibration certificates according to their method.

Additional measurement on exhaust gas meters and opacity meters

After the gas meter calibration each participant should perform an additional measurement with the calibrated instrument. Two unknown gases will be provided by the organizer and the participant shall declare these two gas concentrations with respect to the found error/correction in the preceding calibration and specify the measurement uncertainty.

After the opacity calibration each participant should perform an additional measurement with the calibrated instrument. Two unknown reference filters will be provided by the organizer and the participant shall declare the values with respect to the found error/correction in the preceding calibration and specify the measurement uncertainty.

Statistical analyses that will be used

The organiser is arranging to have a reference value that will be used in the calculations as described in ISO/IEC 17043:2010 annex B5 which gives En-values on retardation and pressure objects.

The objects where a consensus value will apply for reference the evaluation will be based on the requirements in the standard ISO 13528.

Reporting

Participants shall send the calibration certificate to the organiser within one week after the calibrations are finished.

A draft report will be given to the participants within 2 weeks from the time when the last participant has reported the results in a calibrate certificate.

The participant shall comment on the draft report within two weeks after receiving the draft report.

A participant not following the described reporting rules without giving reasons will be excluded from the report.

A participant may decide to leave the work before the draft report is distributed to the participants.

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

The report will be anonymously, and the participants will get an identification code related to the results in a separate e-mail.

Quality manual		
Intercomparisons on calibration objects in car inspection	Issue 1	
Approved by Håkan Källgren	Date 2021-09-03	Page 7 (7)

Damaged PT item

The participant shall immediately inform the organiser about any damages on the PT item and the organiser will take appropriate actions.

Price for participation

Price for laboratories:

- Basic price 10 000 NOK
- In addition, 1 600 NOK on each calibration object as defined in the listed 9 objects above.

If the laboratory decides not to fulfil their part of the agreement the basic price shall be paid.