Calibration services for ozone standards at METAS
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Agenda

History
- Legitimation
- Procurement of the NIST SRPs

Changes
- Alternative temperature and pressure
- LabVIEW based OzoneLab Software
- Upgrade cells and isolation (2007)

Outcome
- Stability #14 to #18
- International comparison BIPM-QM.K1
- National round robin of 20 stations
- Conclusions for Swiss activities
Action plans in Switzerland were based on the exceedances of air quality limit values.

The quality of the measured values was challenged by traffic associations.

METAS started to build up a national ozone standard and calibration service in 1993.
History / Procurement of NIST SRPs

- SRP#14 installed in May 1993, SRP#18 in March 1996
Changes
Alternative **Temperature** and Pressure Sensors

- **Temperature gradients** and therefore lack of representative measurement site were detected and corrected by *4 NTC thermistors* on cells.
- Individual pressure measurement per cell was implemented (RPT 301)

These changes and automatic data acquisition for new devices asked for a **flexible software** based on LabVIEW™ V 7.1
Changes
LabVIEW™ based OzoneLab Software 2003

- From
- To

Advantages:
- **Configurable** hardware.
- **Drivers** for data acquisition of new DUT
- **Flexibility**
Changes
Upgrade of cells and isolation (2007)

<table>
<thead>
<tr>
<th>Station</th>
<th>Effect of Upgrade 1</th>
<th>Effect of Upgrade 2</th>
<th>Total effect</th>
<th>Deviation to SRP0 after Upgrades</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRP14 (METAS)</td>
<td>-0.63 %</td>
<td>+0.50 %</td>
<td>-0.13 %</td>
<td>+0.05 %</td>
</tr>
<tr>
<td>SRP15 (EMPA)</td>
<td>-0.60 %</td>
<td>+0.45 %</td>
<td>-0.15 %</td>
<td>+0.03 %</td>
</tr>
<tr>
<td>SRP18 (METAS)</td>
<td>-0.85 %</td>
<td>+0.12 %</td>
<td>-0.73 %</td>
<td>-0.06 %</td>
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<tr>
<td>SRP23 (EMPA)</td>
<td>-0.68 %</td>
<td>+0.58 %</td>
<td>-0.10 %</td>
<td>+0.06 %</td>
</tr>
<tr>
<td>SRP26 (UBA)</td>
<td>-0.53 %</td>
<td>+0.46 %</td>
<td>-0.07 %</td>
<td>-0.02 %</td>
</tr>
</tbody>
</table>
Outcome
Stability #14 to #18
Outcome

International comparison BIPM-QM.K1

![Graph showing comparison between different methods over time]

Figure 2: Results of previous comparisons between SRP27, SRP28 and METAS-SRP14 realised at the BIPM. Uncertainties are calculated at $k=2$, with the uncertainty budget in use at the time of each comparison.

Joëlle Viallon, Philippe Moussay¹, Faraz Idrees¹, Robert Wielgosz¹, Bernhard Nierderhauser²: Draft A report, Ongoing Key Comparison BIPM.QM-K1, Ozone at ambient level, comparison with METAS, (July 2020)
Outcome
National round robin of 20 stations (2019)

Fig.1: Slopes and uncertainty of the slopes of regression line per station

Fig.2: Relative comparison standard deviations from 1998 to 2019

Outcome
Conclusions for CH activities

• Established **Traceability** (chain, network)
• Flexibility, independence and sustainable instrumentation through METAS software
• Station **results far within** EU **DQOs** (MU rel. < 15%)
• **Ready** for implementing the revised cross section value

\[ \alpha_x = 304.39 \text{ cm}^{-1} \]
Outcome
Conclusions for CH activities (II)

- ≈ 900 calibrations since 1993
- > 50 satisfied clients
Thank you very much for your attention