



Accreditation

4th Training in Rio de Janeiro, BRA

6th-9th of May 2019

Michael



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3. Measurement Traceability
4. University Test Facilities



1. Introduction





Die Nationale Akkreditierungsstelle / The National Accreditation Body

AKKREDITIERUNG AUSTRIA

bestätigt die Akkreditierung der Rechtsperson / confirms the accreditation of

FH JOANNEUM Gesellschaft mbH

Alte Poststraße 149, A-8020 Graz

Identifikationsnummer / ID-number: **0222**

als / as
Prüfstelle / Testing Laboratory

gemäß / according to
EN ISO/IEC 17025:2005


Datum der Erstakkreditierung / Initial date of accreditation: **17.02.2004**

Standort/Organisationseinheit / site/unit:
Institut Fahrzeugtechnik / Automotive Engineering, Alte Poststraße 149, A-8020 Graz

Informationen zum Akkreditierungsumfang und zu Akkreditierung Austria / Information about the accreditation scope
and Accreditation Austria <http://www.bmdw.gv.at/akkreditierung>

Die Akkreditierung wurde mittels Bescheid erteilt und damit bestätigt, dass die Konformitätsbewertungsstelle
die angeführten Anforderungen erfüllt. Diese Bestätigung darf nur unverändert weiterverbreitet werden.
The accreditation was granted by a decree which confirms, that the Conformity Assessment Body fulfills the given
requirements. This confirmation of accreditation may not be reproduced other than in full.

21.02.2019
Datum / Date


Dipl.-Ing. Dr. Norman Brunner
Leiter Akkreditierung Austria / Head Accreditation Austria



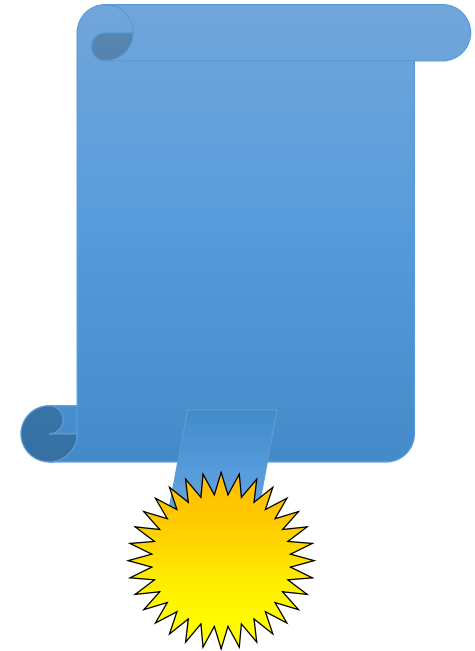
Introduction

- Need for being certified to ISO 9001 or equivalent quality standard?
Difference: OEM – academic organization
- Independent confirmation obtained from
third party,
national or
international certification bodies



Introduction

- What is basically required?
 - Quality policy
 - Quality manual
- You will have to:
 - Create and maintain documented processes
 - Establish organizational positions accordingly.



2. Requirements



Requirements

Quality manual:

1. Control of documents
2. Control of records, including test results, calibration, etc.
3. Internal audits, including risk analysis, calibration certification, etc.
4. Control of nonconforming product/service, including customer contract, feedback, etc.
5. Corrective action
6. Preventive action, including training.



Manual

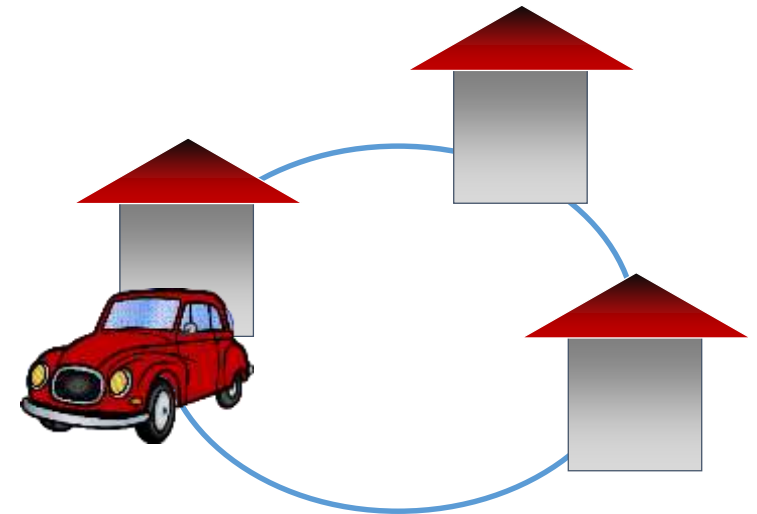


Requirements

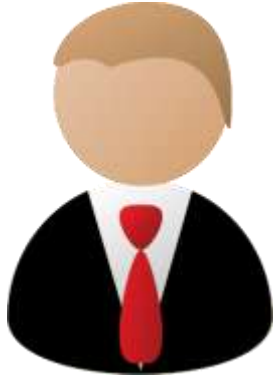
Cell-to-cell correlation:

- atmospheric conditions
- variations in fuel, lubrication oil, cooling fluid temperature
- ventilation air louvres
- data correction factors: drive control system, dynamometers, data acquisition system
- calibration of sensors and machines

→ Round robin Experiment



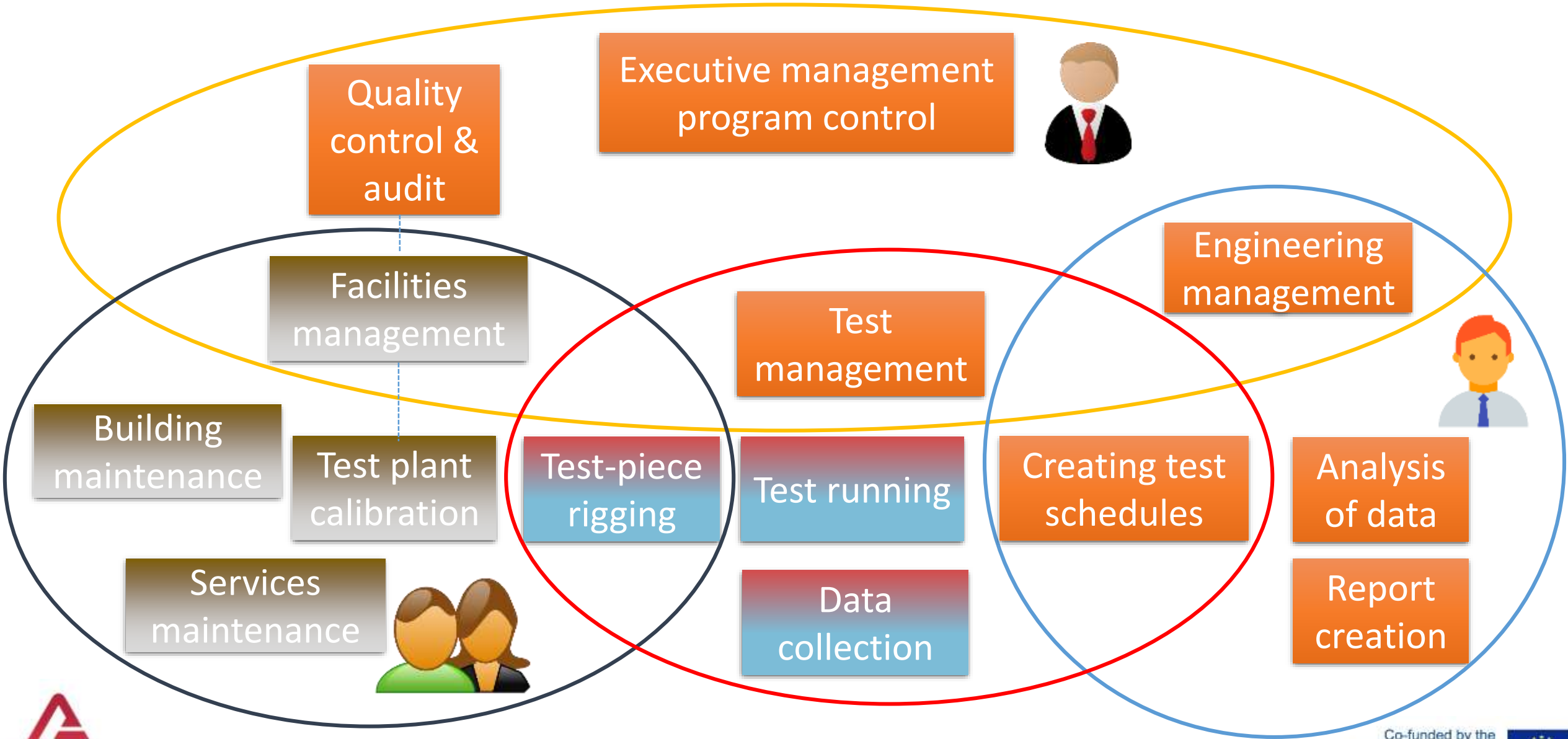
Management Roles



- Facility staff and **management** charged with building, maintaining, and developing the installed plant, its support services, and the building fabric.
- The internal **user group** charged with designing and conducting tests, collecting data, and disseminating information.
- A **quality group** charged with ISO 9001 certification, if applicable, internal audit, and management of instrument calibration system.



Allocation of Tasks



3. Measurement Traceability



Measurement Traceability

- Standards:

- ISO EN 17025
- ILAC P10

<https://www.beuth.de>

<https://ilac.org/>



- ILAC – International Laboratory Accreditation Cooperation
- ILAC P10 - ILAC Policy on the Traceability of Measurement Results



Measurement Traceability

Measurement traceability: Why is that so important?

- To ensure that comparable measurement results are achieved in all parts of the world.
- For testing centres that selling measurement results → This is a core competence!

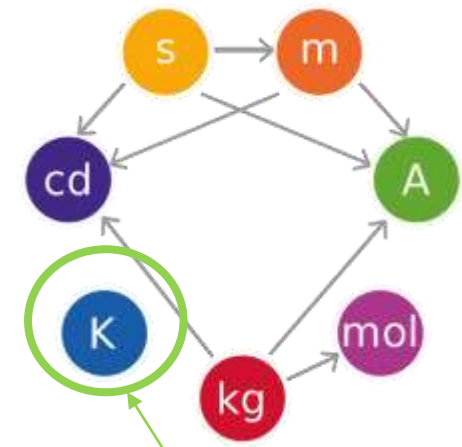
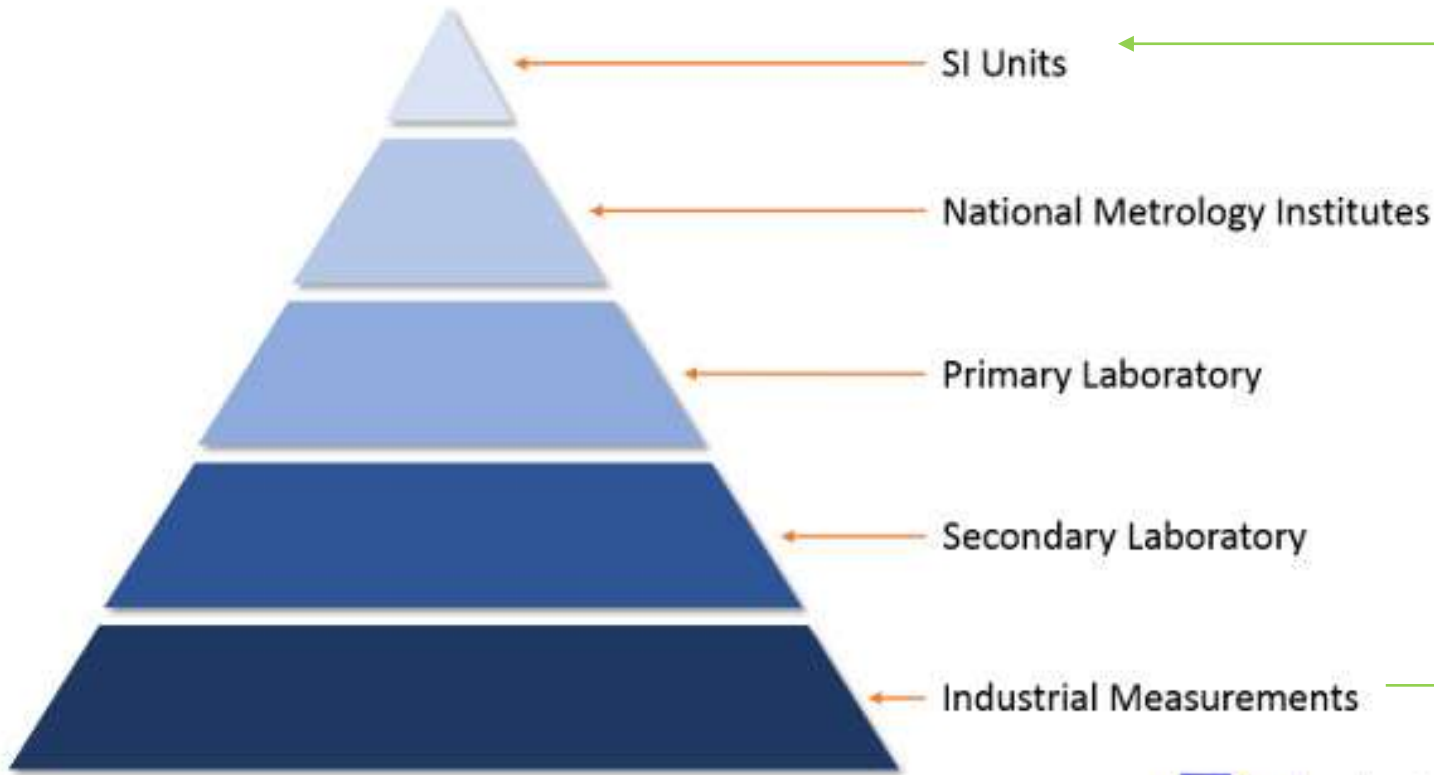
ISO EN 17025 § 5.6.1

All equipment used for tests and/or calibrations, including equipment for subsidiary measurements (e.g. for environmental conditions) having a significant effect on the accuracy or validity of the result of the test, calibration or sampling shall be calibrated before being put into service.



Measurement Traceability

MEASUREMENT TRACEABILITY PYRAMID



The seven SI base units

Each measurement result must be traceable to an SI-Unit.

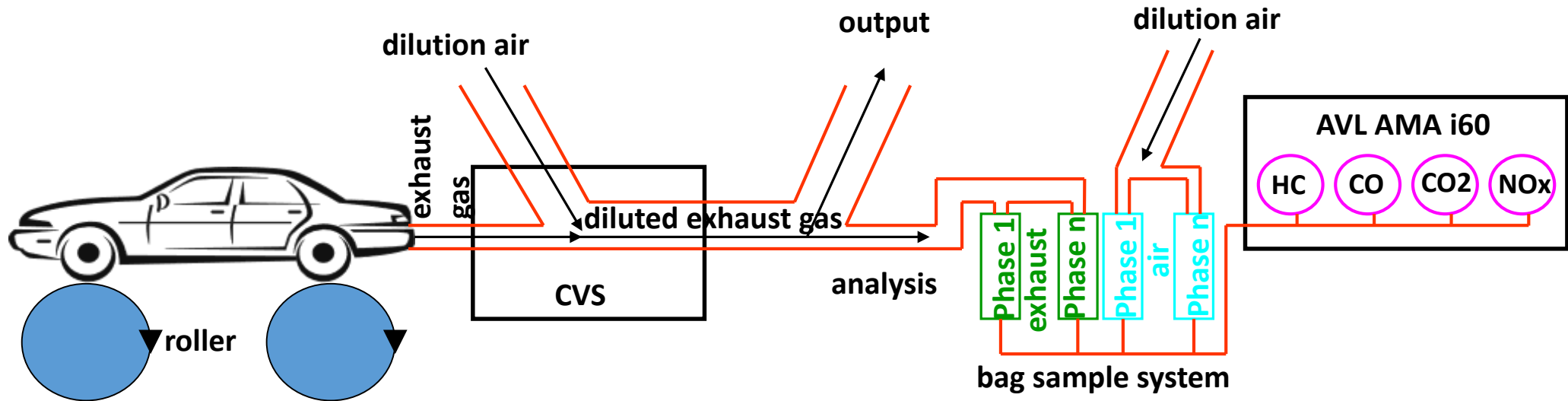
E.g.: RTD sensor for temperature measurements



Accreditation



Measurement Traceability

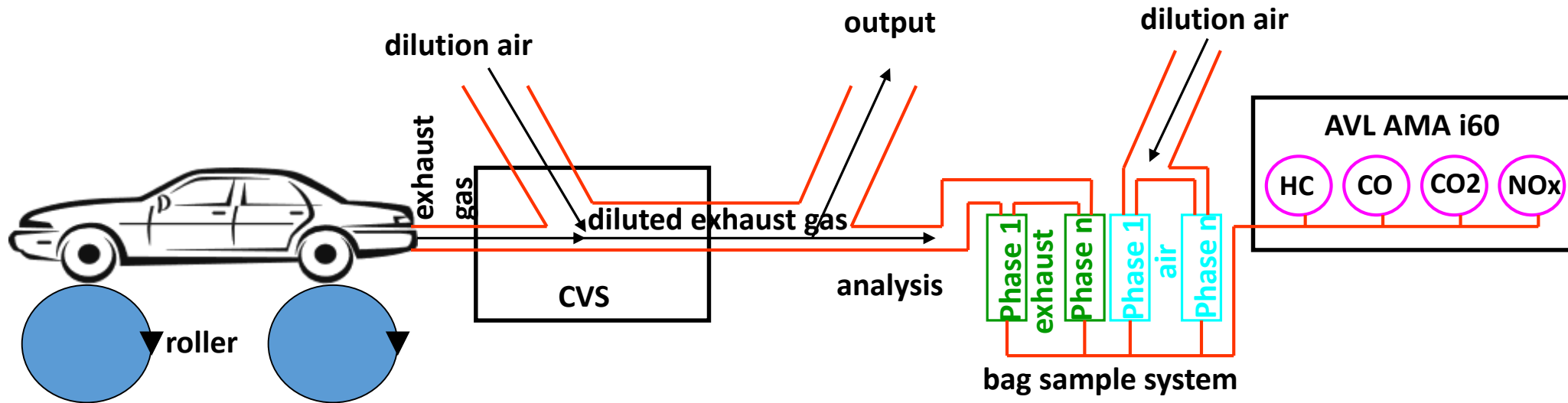


Example: Chassis Dynamometer

- The main objective is to **measure the mass emissions M in g/km**.
- Many individual measurement values influences the result.
- Each of these measured values must be traceable to an SI base unit via a national standard.
- We must calibrate each sensor to guarantee this.
- The calibration devices must also be calibrated!



Measurement Traceability



Some measurement values with influence on the result (pollutant given in g/km)

- Specific volume (given in m³)
- Pollutant concentration (given in ppm)
- Atmospheric pressure (given in kPa)
- Ambient temperature (given in K)

- Specific humidity H (given in g/kg)
addition



Is a calculated value, based on

measurement results



Measurement Traceability

Example: Specific humidity H - calculation according to EU Regulation 2017/1151

$$H = \frac{6,211 \cdot R_a \cdot P_d}{P_B - P_d \cdot R_a \cdot 10^{-2}}$$

R_a

Relative humidity of the ambient in %

P_B

Atmospheric pressure in kPa

P_d

Saturation vapour pressure in kPa

Measurement device for P_d , R_a and P_B : Vaisala PTU303

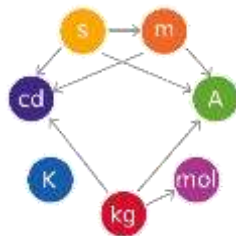
$$P_d = f(T)$$

T

Ambient temperature in K

$T \rightarrow$ must be traceable to an SI base unit

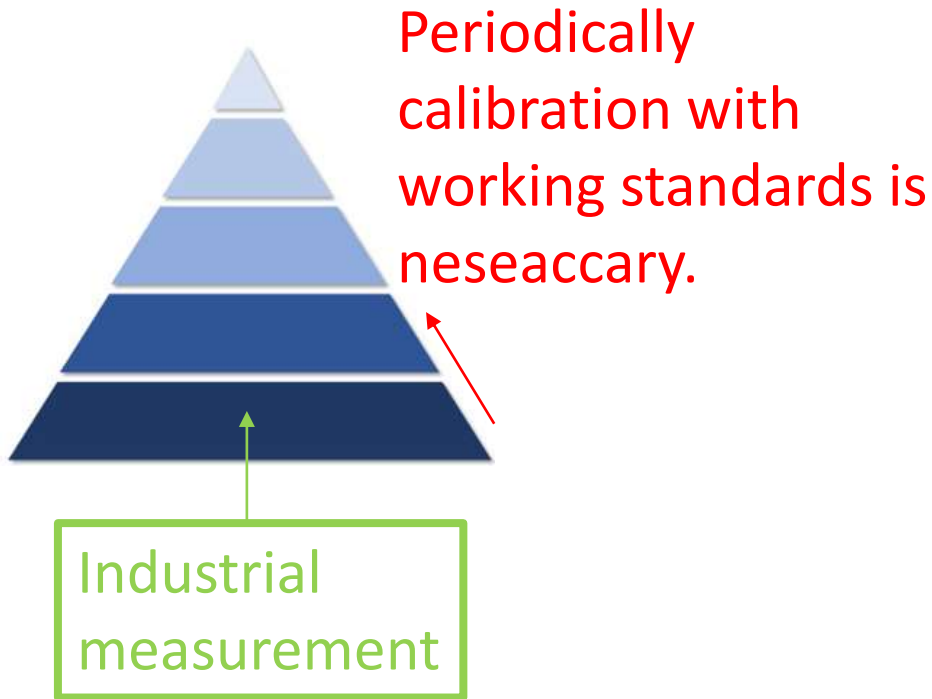
T has (via H) a direct impact on the final result (mass emissions in g/km).



Measurement Traceability

Example: Absolute humidity H – Impact of ambient temperature

Acquired at each exhaust gas measurement.

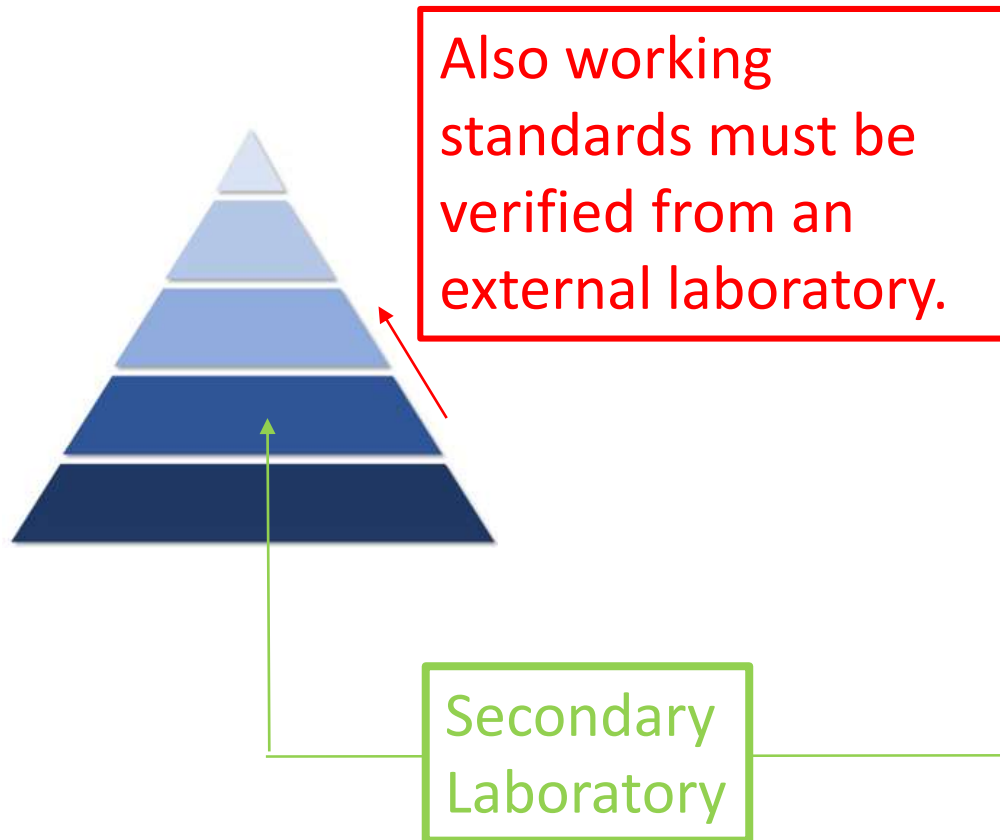


Sensor Vaisala PTU303
Probe for T



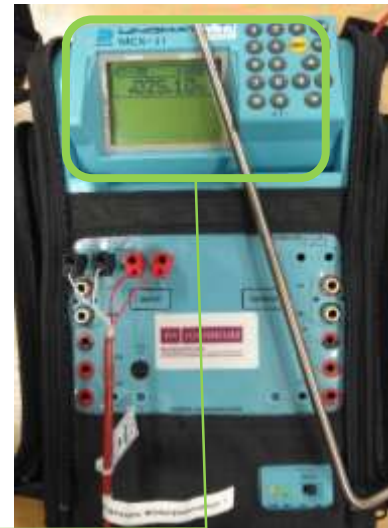
Measurement Traceability

Example: Absolute humidity H – Impact of ambient temperature



Our working standards:

- Gauge: Druck MCX II
- Pt100 Resistance temperature detector (RTD)



Used to calibrate the temperature probe once a year



Measurement Traceability

Pt100 Calibration Certificate:

Requirements to the external laboratory (according to ILAC P10):

Calibrations can be done by

- a NMI
- a ISO EN 17025 accredited laboratory (1)

A calibration certificate documents the results and the traceability to a SI base unit.

(2) Unique ID to assign certificate and device.

Trescal
Kalibrierlaboratorium für Elektrizität, Frequenz, Temperatur und Druck.
Calibration laboratory for electrical quantities, frequency, temperature and pressure.

akkreditiert durch / accredited by
AKKREDITIERTUNG AUSTRIA

Kalibrierschein nach ISO/IEC 17025
Calibration Certificate according to ISO/IEC 17025

Gegenstand <i>Object</i>	Temperaturfühler PT100	<p>Dieser Kalibrierschein dokumentiert die Rückführbarkeit auf nationale Normale zur Darstellung der physikalischen Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).</p> <p>Akkreditierung Austria ist Unterzeichner der multilateralen Übereinkommen der European Co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.</p> <p>This calibration certificate documents the traceability to national standards, which realize the physical units of measurements according to the International system of</p>
Hersteller <i>Manufacturer</i>	—	
Typ <i>Type</i>	Widerstandstemperaturfühler	
Prüfmittelnummer <i>Asset number</i>	Präzisions Winkelplatinensensor 1	
Herstellernummer <i>Serial number</i>	—	
Auftraggeber <i>Customer</i>	FH Joanneum Gesellschaft m.b.H. Alte Poststraße 149, A-8020 Graz	

(1)

(2)

Abstract from the calibration certificate (cover sheet).



Measurement Traceability

Pt100 Calibration Certificate:

Documentation of the Results with deviation.

Important: The uncertainty of measurement must be specified!

MESSERGEBNISSE:

Results:

Referenz- messwert <i>reference measured value</i>	am Prüfling angezeigter Messwert <i>measured value</i>	Abweichung <i>deviation</i>	Messun- sicherheit <i>measurement uncertainty</i>	
-0,02 °C	0,06 °C	0,08 °C	± 0,17 °C	*
200,01 °C	200,00 °C	-0,01 °C	± 0,23 °C	
100,06 °C	100,28 °C	0,22 °C	± 0,24 °C	
-0,01 °C	0,12 °C	0,13 °C	± 0,17 °C	
-30,08 °C	-30,12 °C	-0,04 °C	± 0,18 °C	
0,00 °C	0,10 °C	0,10 °C	± 0,17 °C	**

* Eingangsprüfung vor Kalibrierung

** Kontrolle der Stabilität nach Kalibrierung

* *Measurement before start calibration*

** *Check stability after calibration*

Eine positive Abweichung bedeutet, dass der Prüfling mehr anzeigt, als der tatsächliche Referenzwert.

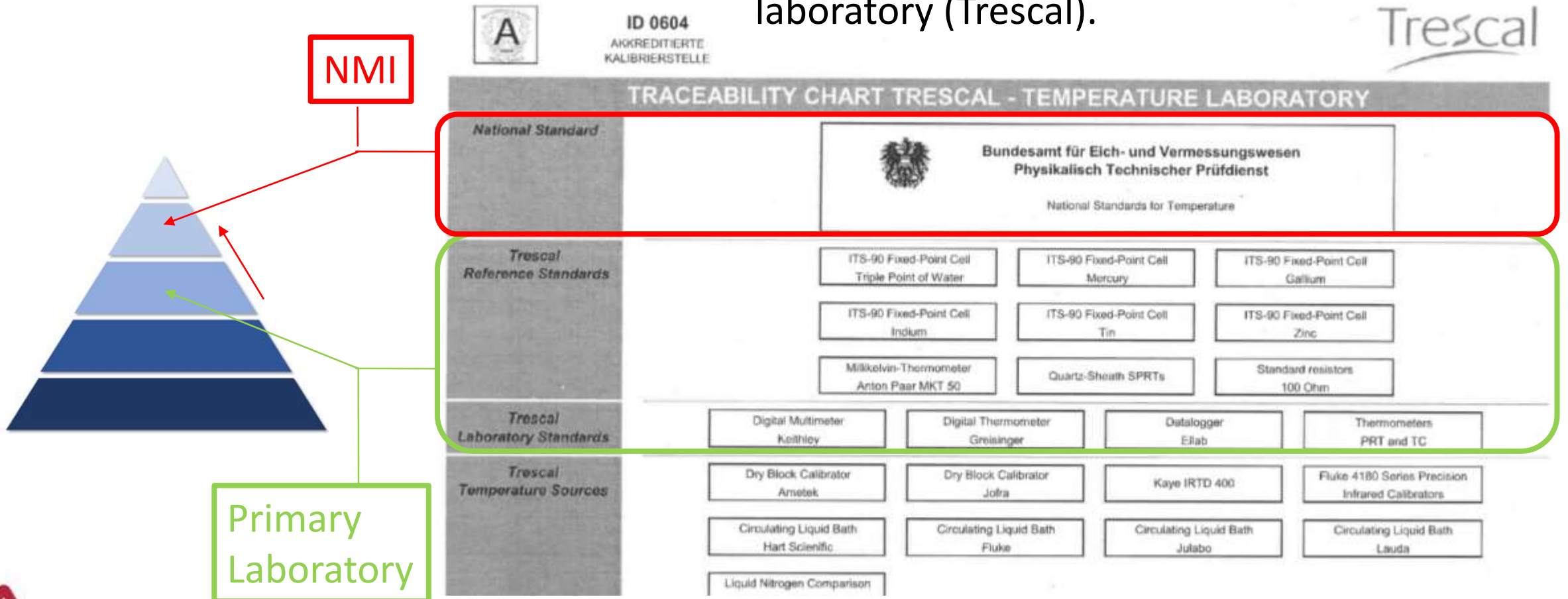
A positive deviation indicates that the unit under test appear more than the actual reference measured value.



Measurement Traceability

Pt100 Calibration Certificate:

A traceability chart documents the laboratory standards from the external laboratory (Trescal).





Measurement Traceability

Name	Economy	Scope	Original Signing Date	Website & Accredited Facilities
 <p>OAA Organismo Argentino de Acreditacion</p>	ARGENTINA	Calibration: ISO/IEC 17025 Testing: ISO/IEC 17025 Medical Testing: ISO 15189 Inspection: ISO/IEC 17020	11 Aug 2005 11 Aug 2005 11 Aug 2005 26 Oct 2013	Website
 <p>CGCRE Coordenacao Geral de Acreditacao, General Coordination for Accreditation</p>	BRAZIL	Calibration: ISO/IEC 17025 Testing: ISO/IEC 17025 Medical Testing: ISO 15189 Inspection: ISO/IEC 17020	02 Nov 2000 02 Nov 2000 02 Nov 2000 27 Feb 2013	Website Accredited Facilities



Measurement Traceability

Name	Economy	Scope	Original Signing Date	Website & Accredited Facilities
	<p>ema</p> <p>entidad mexicana de acreditación a.c.</p>	MEXICO	<p>Calibration: ISO/IEC 17025 17 Nov 2005</p> <p>Testing: ISO/IEC 17025 17 Nov 2005</p> <p>Medical Testing: ISO 15189 17 Nov 2005</p> <p>Inspection: ISO/IEC 17020 24 Oct 2012</p>	Website
	AUSTRIA	<p>Calibration: ISO/IEC 17025 22 Sep 2002</p> <p>Testing: ISO/IEC 17025 22 Sep 2002</p> <p>Medical Testing: ISO 15189 22 Sep 2002</p> <p>Inspection: ISO/IEC 17020 24 Oct 2012</p>	Website Accredited Facilities	



4. University Test Facilities



University Test Facilities

- Formal facility safety briefing and NDA
- Typical: Too risk averse
- Frequent changing student body
- Organizational fracture between laboratory user and facility maintenance group
- Students should be prepared for industrial test work!



References

- A. J. Martyr A. J., Plint M. A.: Engine Testing, The Design, Building, Modification and Use of Powertrain Test Facilities. 4. Edit. Oxford: Elsevier, 2012.

<https://www.isobudgets.com/measurement-traceability-complying-iso-17025-requirements/>

<https://ilac.org/>

<https://www.beuth.de>





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