



# NMi Certin

## Particulate counters

- Regulation & other documents
  - Instruments



# Contents

- Introduction NMI
- Regulation & other documents
- Instruments
- Improve Proposal



# NMi

Netherlands Measurement institute  
(Nederlands Meetinstituut):

- appointed institute for Regulation vehicles, Metrology law, Directives & more.
- cooperates in OIML, WELMEC, CEN on request of the government (Ministry of Economic affairs, Dutch Authority for Digital Infrastructure) **because of metrological (science of measurement) knowledge**
- privatised in 1989

# Regulation & other documents

## Proposal Particulate Number Counters by N-PTI working group (2017-2019)



# Regulation & other documents

Proposal Particulate Number Counters  
(based on OIML R 99 Exhaust gas analyzers)

implemented in:

- Regulation vehicles (NL) (2019)
- Belgian legislation (2022)
- ...?

(Partly) base for OIML and EU  
Recommendations

# Regulation & other documents

## Proposal Particulate Number Counters (based on OIML R 99 Exhaust gas analyzers)

- Part 1 Requirements
- Part 2 Metrological controls and performance tests
- (future) Part 3 Report format

# OIML

First meeting at PTB Braunschweig 2019  
 Proposal Particulate Number Counters is  
 (partly) base for OIML Recommendation

Next to that there is a need for considering  
 traceability and other metrological aspects  
 during type examination of vehicle emissions.  
 Suggestion to split the working group in 2  
 subgroups ...



# EU recommendation

EU recommendation (2023) based on:

- Proposal (Regulation vehicles) NL
- German legislation
- Swiss legislation



# Instruments

In The Netherlands 10 types of Particulate number counters are type approved

Measurement principles:

- 8 use diffusion charging
- 2 use condensation

First one approved in 2020

The vehicle particle number test is in force since 1 January 2023.

Vehicle test is 15 s measurement at idle.

# Instruments

Measuring instruments used for PTI -

Regime in The Netherlands:

- Type examination by NMI
- Initial verification by Body entitled to perform verifications (supplier) or NMI
- Subsequent verification by Body entitled to perform verifications (supplier) or NMI
- Sample inspection by NMI

# Instruments – type approval

Laboratory examinations:

- Reference CPC ( $U < 1/3 \text{MPE}$ )
- Particle size selector
- Soot generator
- Salt atomizer
- Climate
- Electromagnetic immunity

Practical test:

- Diesel vehicle(s)
- Gasoline vehicle



# Improve Proposal

Experience of type examinations and suggestions of several people show some points should be improved:

## Proposal Part 1:

- Define reference particle size 80 nm
- Particle size: detection efficiency monodisperse vs polydisperse
- Mains harmonics (already in Part 2)
- Alternative for clean air procedure

# Improve Proposal

## Points to improve Proposal Part 2:

- Stability: correct mistake (~~1/2 MPE~~ -> MPE)
- Error curve: 7 instead of 10 concentrations
- Particle size: correction for actual monodisperse concentration
- Mechanical shock: 1 m fall (handheld)
- Atmospheric pressure, Voltage & Frequency : 5 -> 1 concentration of 100 k (equivalent to OIML R 99)
- Uncertainty: possible influences



+ + + + + + +

**TRUE VALUE**

+ + + + + + +

**+ Testing + + + +**

**+ Certification + + +**

**+ Calibration + + +**

**+ Training + + + +**

+ + + + + + +