

## **NMi Certin**

#### Particulate counters

- Regulation & other documents
  - Instruments





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#### **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

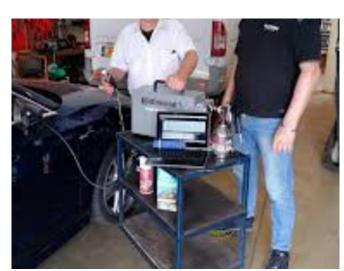
#### Laboratory examinations:

- Reference CPC (U<1/3MPE)</li>
- 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 + +