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Federal Department of the Environment, Transport,
Energy and Communications DETEC
Federal Office for the Environment FOEN
Air Pollution Control and Chemicals Division

NPTI introduction in Switzerland, critical review and plans

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20 March, 2026



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1. PN-PTI in Switzerland: Passenger cars, delivery vans, trucks, buses, **non-road mobile machinery**



Switzerland-wide introduction on 1.1.2023.

- Legal base: [§](#)
- As part of the official periodic inspection / motor vehicle inspection
- Federal structure, no uniform database
→ no overall-statistics available
- Residues in inspections
(Corona, increase in vehicle stock,
increase in older and used vehicles)





2. PN-PTI for gasoline vehicles

FOEN founded a 2-year-pilotstudy of METAS (2024-2025)



→ See today's **Key-Lecture from Una Trivanovic, METAS:**
«10 years of PN-PTI in Switzerland from Diesel to Petrol Engines»



Results:

- Existing devices able to respond to GDI exhaust.
- Devices may need modification to cope with the high humidity and small particle sizes.

A suitable nanoparticle measuring device for gasoline engines is lacking (prototype instrument).

Gasoline vehicles may require a new test protocol (<https://doi.org/10.3390/s24206509>)



3. PN for non-road mobile machinery



Introduced in Switzerland during exhaust maintenance
Legal base: [§](#)



Introduction data:

- 1.1.2026: for new machinery and equipment placed on the market that complies with emission stage V
- 1.1.2027: for machinery and equipment already on the market that complies with emission stage V, at the next scheduled exhaust maintenance

Affected machines:

- Machines of emission stage V (“Non-road mobile machinery” in accordance with Regulation (EU) 2016/1628))
- With self-ignition engine
- Not approved for road use, i.e. without number plate
- With engine power ≥ 19 to ≤ 560 kW (e.g. with DPF)



PN measurement in dusty environment



A comparison study with 9 PN-instruments in a gravel pit



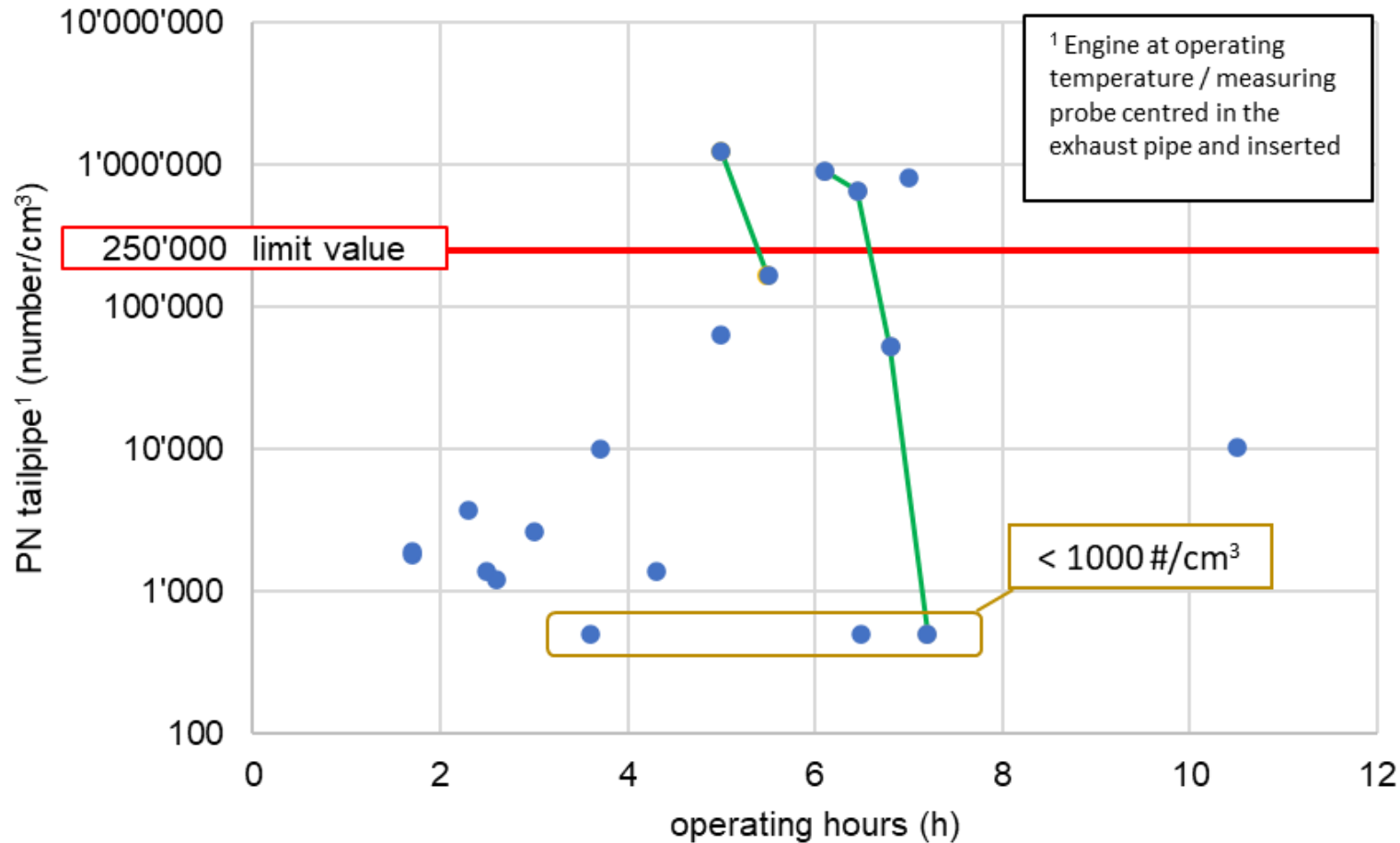
- Machines with suitable particle number concentrations for comparison are rare (only ~0.5% of machines near PN-limit)
- Some machines dilute exhaust (ejector) → measure undiluted gas
- Ambient dust levels ($\approx 1 \times 10^4$ PN/cm⁻³, peaks $< 5 \times 10^4$ PN/cm⁻³) do not significantly affect measurements.
- All nanoparticle instruments show agreement within expected tolerances.
- Suitability for harsh field conditions depends on instrument design and manufacturer specifications (sloping or strongly vibrating parking areas, wireless use, ambient temperatures < 5 °C, use in rainy weather). Manufacturer's specifications must be taken into account.



Source: METAS, FOEN 2025



PN measurement on brand new machinery



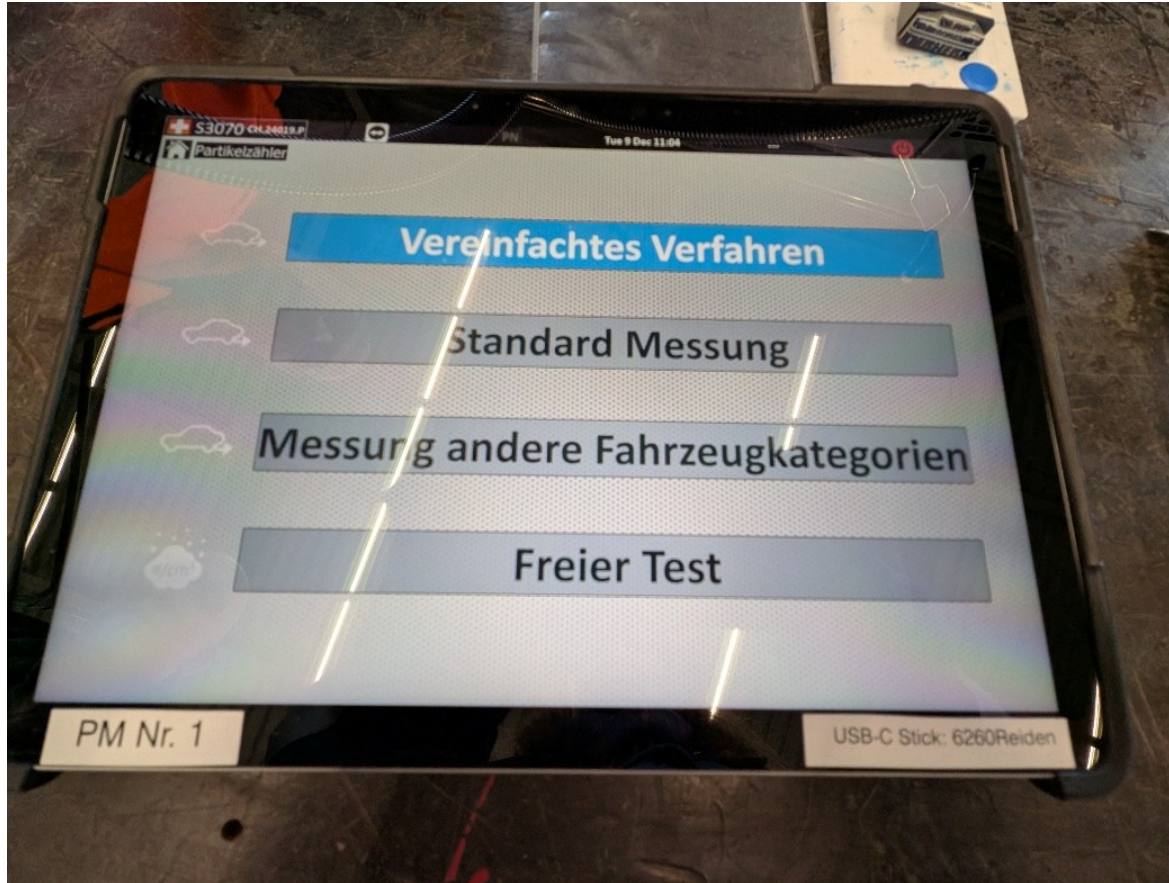
Most cases: no problems
Few cases: forced degreening:
👉 Operating the engine under (increased) load
👉 Repeated engine starts

Source: [FOEN](#) 2023



Note to instrument manufacturers:

Mode: Simplified measurement



⚠ This menu item should not be offered in the context of construction machinery, as it may only be used by road traffic authorities!



Online information about PN and NRMM

Enforcement guide (D, F, I):

[BAFU-Vollzugshilfe Abgaswartung an Maschinen und Geräten.pdf](#)

Wartungsanforderungen für Verbrennungsmotoren von Maschinen und Geräten ohne Strassenzulassung ab der Abgasstufe V.

3 fact sheets (D, F, I):

- [Das Wichtigste in Kürze.pdf](#)
- [Wie wird gemessen und was gehört dazu.pdf](#)
- [Partikelanzahl-Messung an fabrikneuen Maschinen.pdf](#)



Video [Deutsch](#) / [Italienisch](#) / [Französisch](#) on  YouTube^{CH}





4. PN introduction in Switzerland – overview

Diesel Engines with DPF in Switzerland:

	Periodical technical inspection Responsibility: official body	Exhaust maintenance Responsibility: owner or operator
Ships		2016
Passenger cars	2023	
Delivery vans	2023	
Trucks	2023	
Busses	2023	
non-road mobile machinery (NRMM)	2023 with number plates	2026/2027 without number plates, Stage V
<i>Stationary engines (emergency power generator)</i>	-	? <i>Periodic inspection</i>



Thank you for your attention!



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