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Air Pollution Control and Chemicals Division

The Swiss experience with reducing diesel soot from construction machinery

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DPF retrofit requirements for tunnel construction sites (2000)



Tunnel workers at the Gotthard construction site of the new transalpine rail link.



Federal Guideline: DPF retrofit requirements for large construction sites (2002)



- Increasing number of retrofit projects and policies on a local level on major construction sites (Zurich airport, motorways)
- Federal Guideline: DPF retrofit requirements for large construction sites (2002)



Federal regulation for machinery used on construction sites (2009)

1. Construction machines must meet the requirements of Directive 97/68/EC.
2. Additionally, emissions may not exceed the particle number of 1×10^{12} particles / kWh
3. This requirement is deemed to be met if the machine is operated with a certified DPF fulfilling specified criteria (i.a. 97% abatement efficiency for particles 20-300 nm)



Testing of Conformity

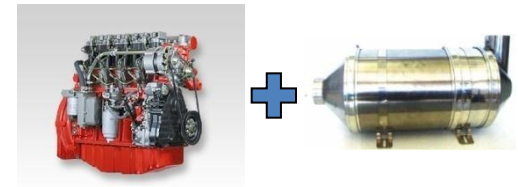
2 options for testing of conformity :

- testing of PN limit value on original equipment (OEM engine) in NRSC and NRTC test cycles according to UNECE PMP test protocol



or

- testing of retrofit DPF system according to Swiss test protocol





PN limit value: Type approval testing

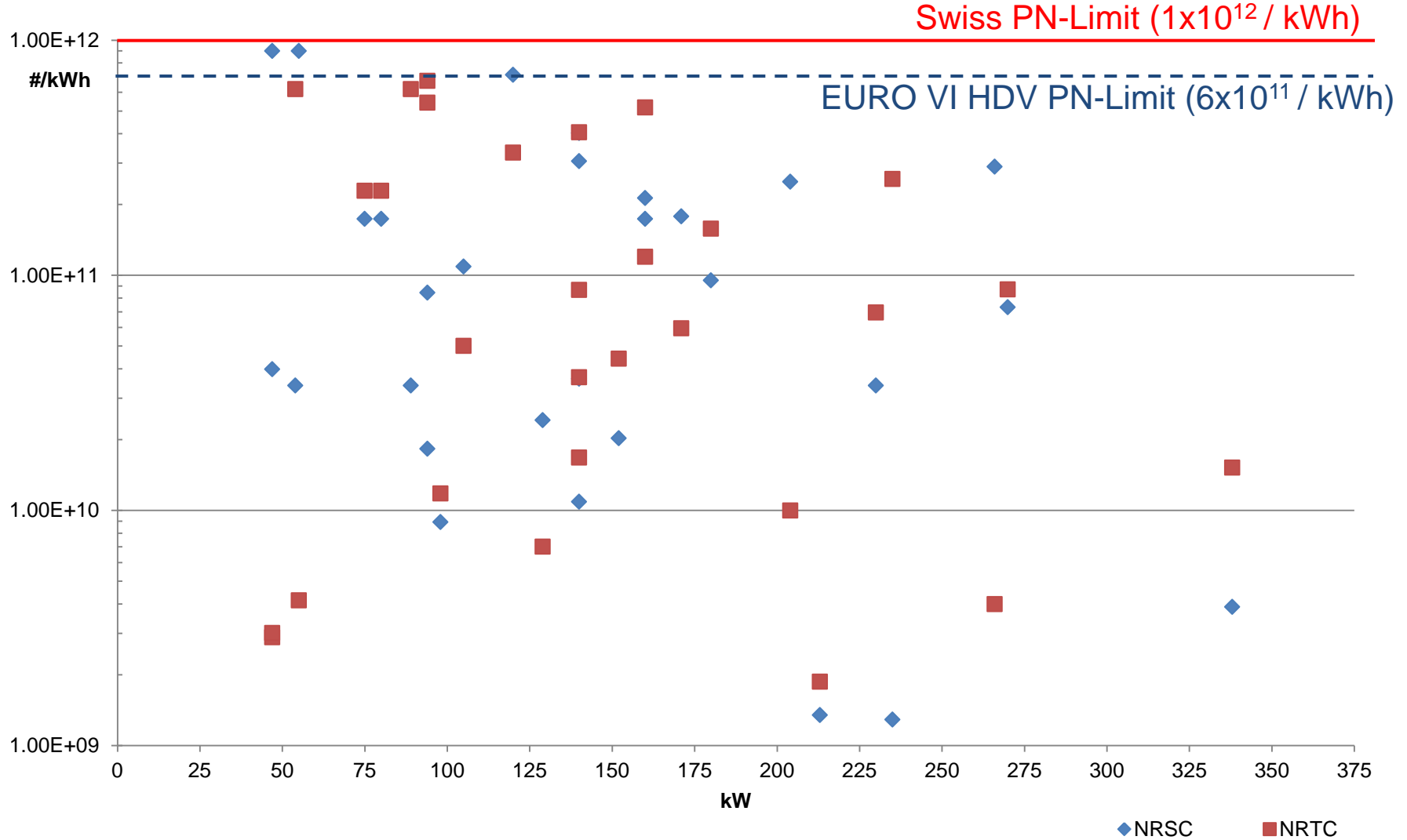
- Accredited (ISO/IEC 17025) testing laboratories recognized by FOEN:
 - Bern University of Applied Science (**AFHB**, CH),
 - AVL-MTC Motortestcenter AB (**AVL-MTC**, S)
 - Southwest Research Institute (**SwRI**, USA)
 - Japan Automobile Research Institute (**JARI**, JP)
 - TÜV NORD Mobilität GmbH & Co. KG (D)

- 36 engine families covering 306 engine types:





Test results





Conclusions

- **DPF are a proven technology for carcinogenic diesel soot removal from construction machinery emissions.**
- **Particle number emission limit value assures equipment with high efficiency DPF.**
- **Several currently available EU stage IIIB engine types can meet a particle number limit value similar to EURO VI for HDV without modification.**
- **To avoid adverse effects on human health, further regulation for all diesel powered non-road mobile machinery and vehicles should include a particle number limit value.**