

VdePN

Verification Procedures for SCR and (DPF+SCR) Systems

May, 24th, 2011

Swiss Experience with SCR and Combined Systems

- SCR-Retrofit HUG with large Diesels since 1988
NO_x-conversion up to 98,6 %; high S-content
- SCR-Research PSI since 1986
- Combined Mobile Systems (UMTEC) since 1998)
- Field Tests with Urea and NH₃-water (NO_xOff)
- Retrofit Euro IV with active VERT- DPF since 2006 by MAN and Mercedes (>150 systems) – with official ASTRA permission

Project VERTdePN (2006-2011)

- Exchange platform: industry, authorities, research
- Experimental research projects: lab and onroad
- Periodical meetings & knowledge exchange
- Sponsors: BAFU, ASTRA, SUVA,INDUSTRY
- Participants:
 - 4 associations of manufacturers
 - 13 analytical laboratories
 - 4 active industrial partners
 - 40 informal partners
- Publications: 2 SAE-Papers:
 - SAE 2009-01-0284
 - SAE 2011-01-1139

Steering Committee

BAFU	Swiss Federal Office of Environment
ASTRA	Swiss Federal office of Roads
EMPA	Federal Analytical Laboratories (traces)
PSI	deNO _x Division (catalysis)
MA	measurement & physics of nanoaerosols
TTM	industrial objectives & coordination
AFHB	engine- & chassis-dynamometers, onroad measurements

Information Exchange with:

AECC (B)

ADEME (F)

CNR Naples (I)

CARB (US)

DG JRC (EC, I)

FAD Dresden, (D)

KATECH (Korea)

RIVM (NL)

SWRI (US)

TNO (NL)

TÜV Nord (D)

VERT Association (CH)

VITO (B)

VROM (NL)

5 private consultants

Objectives & Criteria of OAPC / VERT Verification for HD-Retrofitting with DPF+SCR)

For DPF

- Filtration quality > 97 %
size specific 20-300 nm
- Durability Test > 2000 hrs
- No Secondary Emissions
- OB-Control-System
- Retrofit « *best practice* »
- SN 277206

For SCR

- NO_x reduction > TBD
- NO₂- and NH₃-slip < TBD
- temperature window: city
- dynamic operation
- Retrofit « *best practice* »
- Durability test > 1000 h
- OBC
- Secondary emissions

Investigated Systems:

SCR + cDPF

cDPF + SCR

cDPF + SCR + NH₃ slip cat

DPF / FBC + SCR

SCR Cu / Fe – Zeolites

SCR
V-based

To be measured 2011:

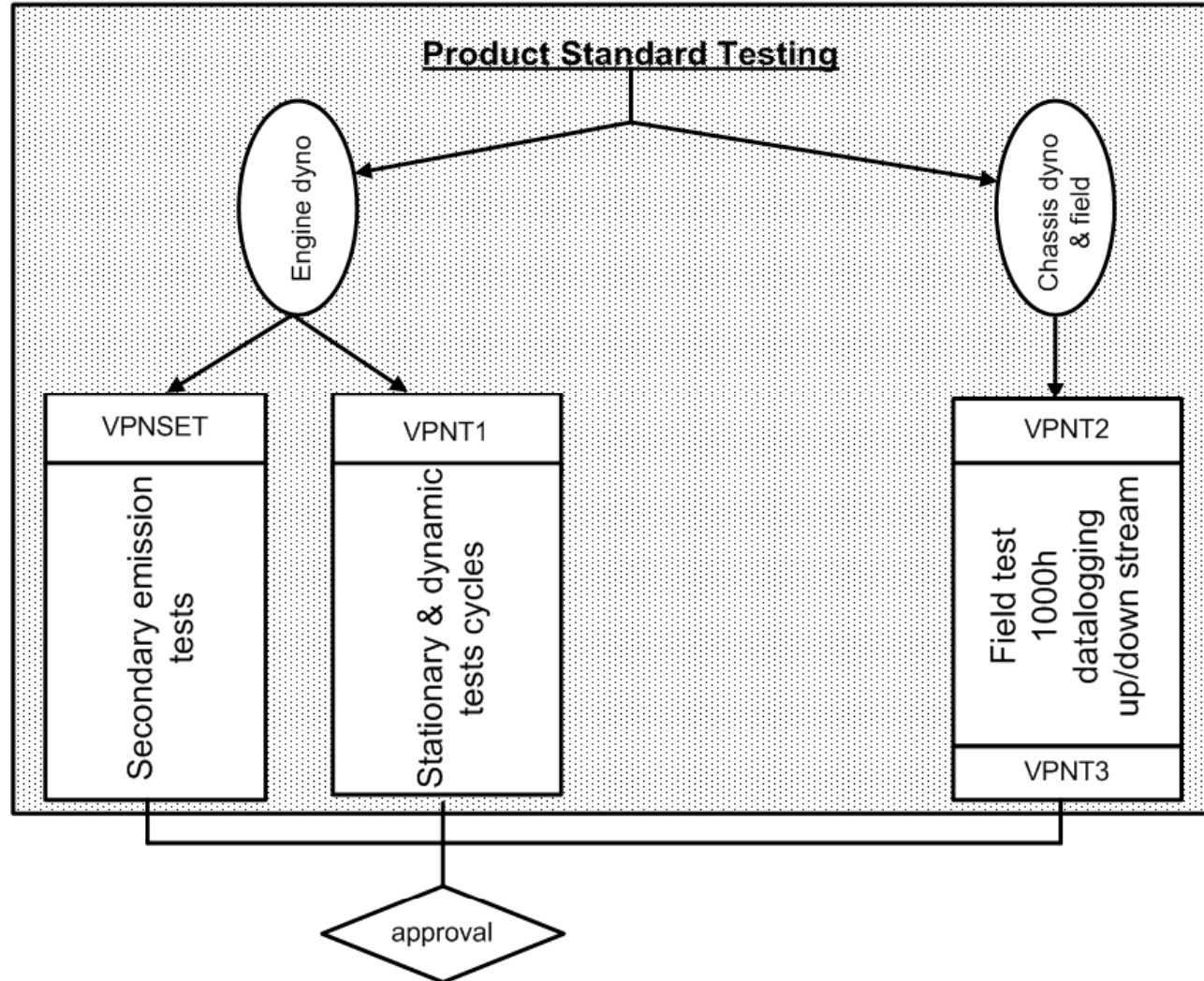
Two Way-DPF

SCR + DPF / FBC active

Performed Tests Procedures:

- stationary test cycles
- dynamic test cycles (ETC + many others)
- urea switch-on/off-test
- real world operation (onroad)
- secondary emission test (SET)

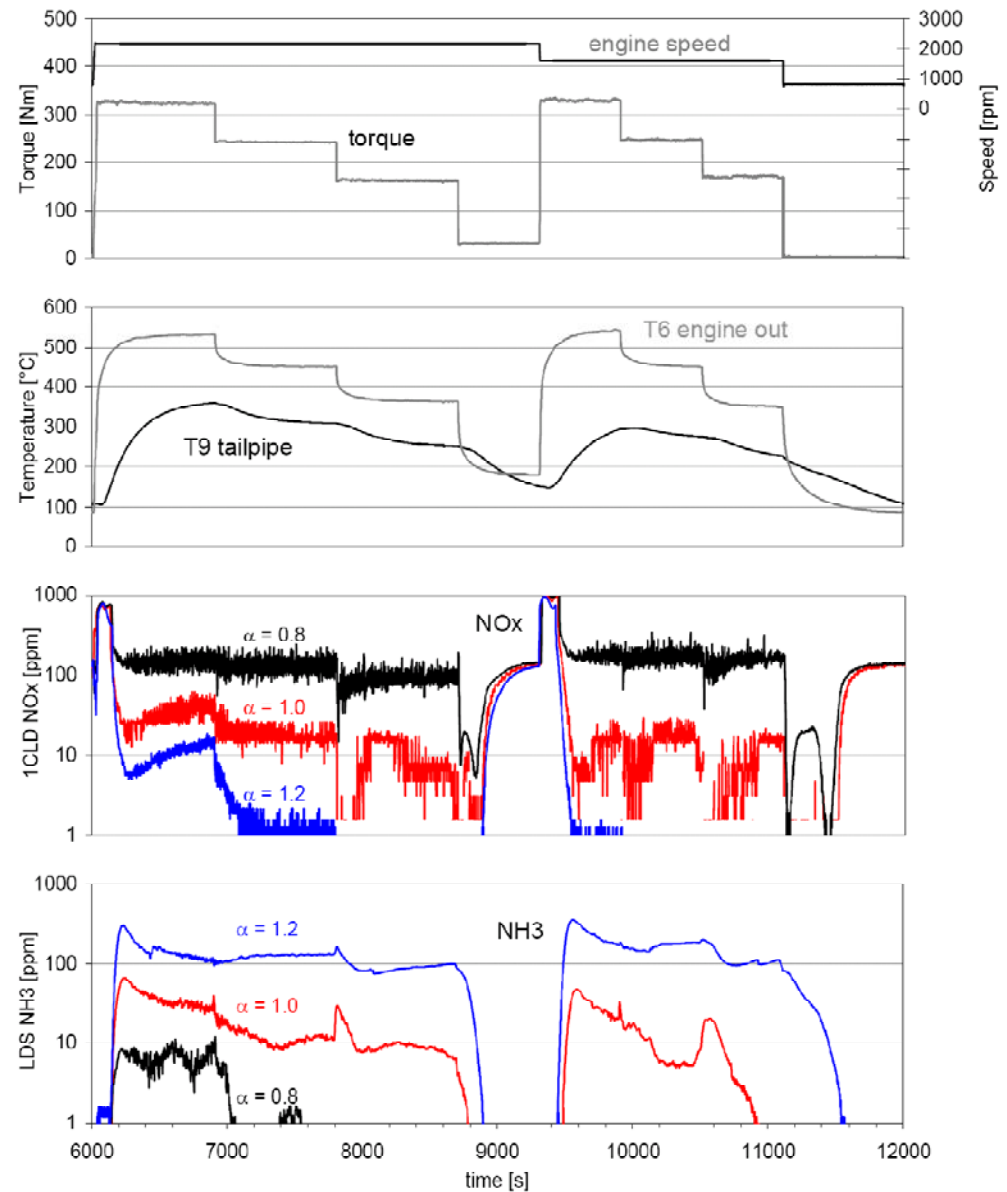
VERTdePN Testing Procedure for DPF+SCR



Some Results:

8 Points-Test

Comparison of results with different α



Exhaust Temperature in Dynamic Cycles

