**GPF Concepts for Low PN Emissions, Backpressure and CO₂ Emissions**

Authors: Kyohei Kato, D. Thier, E. Ohara and C. D. Vogt, NGK EUROPE GmbH

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### Definition

**Background: Engine Technology and Legislation**

Gasoline Direct Injection (GDI) engines cope to meet the CO₂ certification limit from 2021, but have the drawback of increased Particle Number (PN) emissions. On the other hand, PN legislation limit will be 6.0E+11 / km from September 2017. In addition, certification of Real Driving Emission (RDE) including PN limit will be implemented. Gasoline Particulate Filter (GPF) is a strong candidate to cope with the future legislation limits.

**Objective of this study:**
The GPF made of Cordierite is based on the well established ceramic Diesel Particulate Filter technology. It’s working principle and several results based on non-catalyzed and catalyzed GPF were presented in past ETH conferences. The GPF, made of Cordierite, is designed to cope with the future legislation limits.

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### Results

- **Definition**
  - **Engine PN emissions of vehicle decreasing from EU4 to EU6**
  - **Results**
  - **Conclusion of GPF technology**

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### Evaluation contents

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<th>CO₂ emissions / power</th>
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<td>Driving cycle: NEDC, WLTC and RTS</td>
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<td>Driving cycle: NEDC, WLTC and RTS 95</td>
<td>Engine bench full load test</td>
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<td>Filter position: UF, CC</td>
<td>Vehicle mileage: 0 km – 160,000 km</td>
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<td>(Size optimization for dP reduction)</td>
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### Conclusion of GPF technology

- **Raw PN emissions of vehicle decreasing from EU4 to EU6**
- **Requested filtration efficiency of EU6 is reduced in comparison to EU4/5 vehicles**
- **Under EU6 RDE conditions (e.g. RTS95) GPF provides sufficient filtration efficiency**
- **GPF has no measurable influence on CO₂ emissions: Neither under NEDC, WLTC, Artemis, RDE / RTS95**
- **The CO₂ impact at full load is hardly to detect and might be optimized by calibration work**
- **The impact of a coated GPF on power output is small (~ < 2.5 %) at nominal power**

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### GPF: Gasoline Particulate Filter

**Correspondence Address:** Kyohei Kato (kato@ngk-e.de), NGK Europe GmbH, Westerbachstr. 32, D-61476 Kronberg im Taunus, Website: http://www.ngk-e.de