EUROPEAN LIGHT-DUTY EURO 6 AND HEAVY-DUTY EURO VI EMISSIONS LEGISLATIONS

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Dirk Bosteels
Europe Emissions Control companies

- BASF
- IBIDEN
- Johnson Matthey
- NGK
- SOLVAY
- Umicore

European Light-duty Euro 6 and Heavy-duty Euro VI Emissions Legislations

Euro 6b: for all new vehicles since 1/9/2015

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<tr>
<th>limits</th>
<th>THC mg/km</th>
<th>NMHC mg/km</th>
<th>NOx mg/km</th>
<th>NOx+HC mg/km</th>
<th>CO mg/km</th>
<th>PM mg/km</th>
<th>PN #/km</th>
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<td>CI</td>
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<td>80</td>
<td>170</td>
<td>500</td>
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<td>6*10^{11}</td>
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<td>PI</td>
<td>100</td>
<td>68</td>
<td>60</td>
<td>-</td>
<td>1000</td>
<td>4.5(1)</td>
<td>6*10^{11(1,2)}</td>
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(1) GDI only  
(2) 6*10^{12} can be requested until 1/9/2017

CI: Compression Ignition  
PI: Positive Ignition  
GDI: Gasoline Direct Injection
RDE & WLTP legislation to close the gap between lab and real world emissions

Source: the ICCT

Source: AVL
### Euro 6 implementation dates

#### EURO 6C
- final PN limit for GDI and WLTC
- Apply for M1 & N1 Class I from 1 September 2017 (New Types) and 1 September 2018 for all vehicles.
- Apply to N1 Classes II & III and N2 from 1 September 2018 (New Types) and 1 September 2019 (all new vehicles)

#### EURO 6D-TEMP
- RDE (NOx CF step 1, PN TBC)
- Apply for M1 & N1 Class I from 1 September 2017 (New Types) and 1 September 2019 for all vehicles.
- Apply to N1 Classes II & III and N2 from 1 September 2018 (New Types) and 1 September 2020 (all new vehicles)

#### EURO 6D
- RDE (NOx CF step 2, PN TBC)
- Apply for M1 & N1 Class I from 1 January 2020 (New Types) and 1 January 2021 for all vehicles.
- Apply to N1 Classes II & III and N2 from 1 January 2021 (New Types) and 1 January 2022 (all new vehicles)
Published Euro 6 RDE packages 1&2

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EC statement: CF2 = 1.0 as soon as possible, at the latest by 2023

- NTE limit = Euro 6 limit x CF
- Conformity Factor (CF) defined for NOx
- Error margin to be reviewed annually
- CF applies to urban and total RDE
- Portable Emissions Measurement Systems (PEMS) used; results post-processed with normalisation tools

NTE: Not To Exceed
CF: Conformity Factor
NT: New Type Approval
All: All new vehicles
TCMV: Technical Committee – Motor Vehicles
OJ: Official Journal
EC: European Commission

European Light-duty Euro 6 and Heavy-duty Euro VI Emissions Legislations
Expected Euro 6 RDE packages 3&4

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RDE package 3

- Procedure and CF for Particulate Number (PN)
- Cold-start RDE
- Light commercial vehicles (LCVs) and hybrids

RDE package 4: Definition of In-Service Conformity testing


European Light-duty Euro 6 and Heavy-duty Euro VI Emissions Legislations
Different RDE boundary conditions define normal driving

Route criteria

- **Urban** (<60 km/h)
- **Rural** (>60 & <90 km/h)
- **Motorway** (>90 km/h)

Distance share (%)

- (>16 km)
  - Urban (<60 km/h): 29, 34, 44
  - Rural (>60 & <90 km/h): 23, 33, 43
  - Motorway (>90 km/h): 23, 33, 43

Ambient conditions

- **Altitude** (m)
  - Moderate boundary
  - Extended boundary

- **Ambient temperature** (°C)

Higher emissions allowed (measured values divided by 1.6)

European Light-duty Euro 6 and
Heavy-duty Euro VI Emissions Legislations
Different RDE boundary conditions define normal driving

Dynamic conditions

Altitude accumulation (<1200m/100km)

Distance (km)

Altitude (m)

Altitude accumulation (m)

Distance (km)

630/80*100 = 788m/100km

RPA

Avg veh speed (km/h)

NEDC

WLTC

RDE limit

excess or absence of driving dynamics

European Light-duty Euro 6 and
Heavy-duty Euro VI Emissions Legislations
Heavy-duty Euro VI (EC) 595/2009

- Emission limits
  - HD Type Approval uses worldwide harmonised cycles
  - Off-cycle emission testing is included (CI only)
  - Gaseous PEMS testing (CF=1.5)
    - demonstration test at type approval
    - In-Service Conformity testing
  - PEMS currently not for PM&PN but PEMS-PN pilot programme has started
  - Procedure for accelerated ageing to be used for approval of replacement pollution control devices
THANK YOU!

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