Worldwide Harmonised Test Procedure for Light Duty Vehicles (WLTP)

EVE 2nd Session
13 of September
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Objective WLTP

• Development of a worldwide harmonised test procedure for light duty vehicles
  – Pollutant emissions
  – CO₂ emissions
• Global Technical Regulation, GTR
• Three phases
  – Test procedure and driving cycle
  – Test procedures for low ambient temperature, high altitude and conformity
  – Reference fuel, emission limit and correlation with existing cycles
Road map WLTP

- Phase 1 ongoing
- DHC validation 1 finished, discussion about cycle dynamics ongoing
- DTP validation phase 2 ongoing
- Confirmation test until May 2013
- Round Robin test until October 2013
- GTR adoption 162nd WP29 March 2014
- Phase 2 start January 2014
Organisation WLTP

• DHC
  – Data collection
  – Development of driving cycle
  – Validation phase 1
    • Low-power vehicle validation phase 1b

• DTP
  – Development of test procedures
  – Validation phase 2

• Drafting coordinator
  – Structure of GTR
  – Consolidating of GTR text

• Validation task force
  – Coordination of testing for validation phase 2
Organisation DTP

- Subgroups
  - Test procedures conventional vehicles
  - Test procedures electrified vehicles
  - PM/PN test procedures
  - Additional pollutants
  - Reference fuels
Subgroup EV

• Test procedures for EV in addition to test procedures for conventional vehicles
• Pollutant emissions for HEV
• CO$_2$ emissions and fuel consumption
• Electric range
• Energy consumption
Subgroup EV

• Evaluation of current regulations worldwide
  – US
  – Japan
  – EU/ECE

• Development of test procedures for EV
  – EV
  – OVC HEV
  – NOVC HEV
Subgroup EV

• Electrical vehicles operate in two modes
  – Charge depleting
  – Charge sustaining

• Testing of a EV takes several days
Sub group EV open issues

• A number of open issues will be solved by Sub group test procedures for conventional vehicles
• Utility factor
• Depending on results from validation phase 2
  – Criteria for test termination
  – End of charge criteria
  – Charging time
  – Detection of CS condition
  – Accuracy of measurement equipment
  – Calculations
Sub group EV open issues

- **Battery condition [Ah]**
  - **Precondition**
  - **Discharge**
  - **Drain & Fill**
  - **Soak 6hr**
  - **Canister loading**
  - **Pre-con cycle**
  - **WLTC × 1**
  - **Confirm tire pressure**
  - **Prepare RCB measurement**

- **Performance of Watt-hour meter, Am-meter (PL3)**
- **Multi mode gear box (PL11)**
- **Termination condition for EV range (PL6/7)**
- **RCB break off criteria (PL2/9)**
- **Order of CD/CS (PL4)**
- **Interruption condition (PL5)**
- **Charging voltage 100 / 200V (PL12)**
- **End of charge criteria (PL1)**
- **CO2/FC calculation (PL8/10)**
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- **Order of CD/CS (PL4)**
- **Discharge**
- **WLTC × 1**
- **WLTC × n**
- **WLTC × 1**
- **Full charge**

**Test flow (independent test for L/M/H/ExH)**

1. **Precondition**
2. **Discharge**
3. **Drain & Fill**
4. **Soak 6hr**
5. **Canister loading**
6. **Pre-con cycle**
7. **WLTC × 1**
8. **Confirm tire pressure**
9. **Prepare RCB measurement**
10. **Charge sustaining (CS) mode test (cold)**
11. **(Drain & Fill) Soak 12~36 hr**
12. **Plug OFF**
13. **Charge depleting (CD) mode test**
14. **Prepare RCB measurement**
15. **Within 1hr**
16. **Charge sustaining (CS) mode test (hot)**
17. **WLTC × n**
18. **WLTC × 1**
19. **Full charge**

**Termination condition for EV range (PL6/7)**

- **RCB break off criteria (PL2/9)**
- **Order of CD/CS (PL4)**
- **Interruption condition (PL5)**
- **Charging voltage 100 / 200V (PL12)**
- **End of charge criteria (PL1)**
- **CO2/FC calculation (PL8/10)**
- **Performance of Watt-hour meter, Am-meter (PL3)**

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*) **AER**: Equivalent All Electric Range
*) **EAER**: Charge Depleting Range
*) **RESS**: Rechargeable energy storage system
*) **RCBD**: Charge Depleting Range
*) **NEC**: Net Energy Change = RCB * nominal voltage of RESS
Next meeting

• DTP/DHC in Ispra 24 – 26 of September
• Subgroup EV 13 – 14 of November?