EVE Update

WLTP Session #28

Bern, Switzerland
EVE Update – WLTP #28

• Power Determination Status
• Electrified Vehicle Durability Topics
  • Background
  • Objectives
  • Durability Requirements
  • Next steps
Status of power determination GTR

• History
  • Second mandate of the EVE IWG was approved in November 2014
  • WLTP had stated a clear demand for an improved procedure to determine system power of HEVs (for classification and downscaling)
  • Part B of the mandate therefore included a task to develop an Annex to GTR No. 15 for system power determination
  • EVE consulted with several organizations doing similar work (SAE, ISO, KATRI)
  • ISO 20762 was selected as basis for power determination procedure
  • Drafting group was formed to convert ISO 20762 into an Annex to GTR No. 15
  • Later, contracting parties stated a preference for a standalone GTR.
Status of power determination GTR

• Drafting group drafted procedure based on ISO 20762 in 2017-2018
• Validation testing was conducted in 2018
• Significant differences seen between TP1 and TP2
• IWG proposed additional testing, and extension of schedule
• Proposed schedule:
  • June 2019: Approval of authorization by GRPE to extend timeline
  • October 2019: Completion of testing, review of results, and draft GTR changes
  • November 2019: Approval of new timelines in formal document by AC.3
  • January 2020: Preliminary draft of GTR text to be available
  • June 2020: Recommendation of draft GTR by GRPE
  • November 2020: Establishment of the GTR by AC.3 in Global Registry
Status of power determination GTR

• Drafting group: “Determination of Electrified Vehicle Power” (DEVP)

• Recent meetings:
  • DEVP #8: At EVE 30 in Stockholm (April 2019)
  • DEVP #9: At EVE 31 in Geneva (May 2019)
  • DEVP #10: Teleconference (planned)

• Limited opportunity for drafting during Summer 2019
  • Open issues were identified at EVE 30/31 (not simple drafting issues)
  • Several revisions to the procedure were proposed
  • Draft text developed

• Revisions will be evaluated via validation program Phase 2 (in progress)
Status of power determination GTR

• Recent progress
  • JRC and Environment Canada are testing additional vehicles
  • Draft of technical report completed and circulated to drafting group
    • Nature of power determination problem, and approaches considered
    • Analysis of open issues
    • Results of validation testing (forthcoming)
    • Differences from ISO 20762 and their justification

• Next steps
  • Validation testing to be completed by October
  • Technical report and test results will be discussed at EVE 32 (Brussels)
  • Will seek consensus on open technical issues at EVE 32
Electrified Vehicle Durability Background

• GRPE has tentatively approved a new mandate for the EVE to develop a GTR for electrified vehicle durability

• Overall support for the GTR is mixed and the exact timing is not yet determined
  • European Commission wants the GTR completed as soon as possible
  • Japan will provide their position at the EVE meeting in Brussels next month

• EVE IWG has done considerable research and is prepared to propose several alternatives
• Every manufacturer is currently performing some type of battery durability for their electrified vehicles
• All manufacturers are assessing durability differently
  • ... but, they are looking at the same parameters
    • Calendar aging
    • Discharge rates
    • Charging frequency and rates
    • Temperature exposure
• However, the electrified vehicle market is still developing and customer usage profiles are changing with vehicle technologies and infrastructure.
  • Durability GTR should not interfere with the development of xEV’s
Durability Alternatives

• Four alternatives were identified for assessing electrified vehicle durability:
  1. Pre-aged battery
     • prescribed test cycle
  2. Software emulation of an aged battery
     • make the battery look aged with software changes
  3. Aging simulation
     • Simulate battery aging (as demonstrated by JRC)
  4. Pre-defined deterioration factors

• In the US, vehicle manufacturers have reported that they use all four methods for deterioration
GTR Goals

• EVE concluded that a GTR should:
  • Begin a process which provide “rock screening” – establish minimum durability requirement
  • Prohibit substandard products from entering the market
  • Allow room for technology development
  • Allow for data collection to inform future regulations regarding durability
Durability Requirements

• If the EVE direction is to establish durability requirements, some input from WLTP would be helpful

• Electrified Durability requirements could be based on a set deterioration factor
  • Should the DF be additive or multiplicative?
    • Is one alternative more appropriate based on criteria or architecture?
    • Is there a data set which exists which could help inform the selection of a DF?
  • Would alternatives be acceptable?
    • Could a manufacturer adopt the defined DF or present data to establish a different DF?
    • Does EVE need to prescribe a method for determining alternative DF’s?

• Should the durability requirements be added to the existing GTR or should it be a stand alone GTR?
## Durability Requirements – yes or no?

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Criteria Pollutants</th>
<th>CO2/Energy Consumption</th>
<th>Electric Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEV</td>
<td>Yes – already part of WLTP</td>
<td>Yes</td>
<td>No – not required</td>
</tr>
<tr>
<td>PHEV</td>
<td>Maybe - High load cold starts could become more frequent with battery power fade</td>
<td>Yes</td>
<td>??</td>
</tr>
<tr>
<td>PEV</td>
<td>No – not required</td>
<td>??</td>
<td>??</td>
</tr>
</tbody>
</table>
Next Steps

• Next EVE meeting will be in Brussels on October 7th and 8th (EVE 32)
• Japan is expected to make a formal proposal for durability
• Feedback from the WLTP will be communicated to the EVE working group
• Establish recommendation and plan for electrified durability to be presented to GRPE in January 2020