

EVE-IWG SG

System Power Determination of HEVs

Summary from Discussions with
Experts from
WLTP-SG-EV, SAE, ISO, KATRI

Web-Telcons

(since EVE 17th Meeting, Geneva, Jan 11.01.2016)

Date	Agenda / Items	Deliverables
05.02.	State of affairs after EVE 17 th Meeting	Collecting open issues, compilation of discussion list; 7 topics identified
29.02	Methodologies, Requirements, input-/Output data	WLTP-SG EV: System Power of HEV in the context of GTR#15 (H. Steven) ISO: Explanation of Method and reasoning for measuring the RESS-power (M. Kubodera)
16.03	HEV System Layout, Operating Points, Control Strategy, Load Collectives	ISO: Determination of Maximum System Power (M. Kubodera)
04.04	Added value aspects, customer information	No clear state of opinions, to be continued
	Summary of discussions	Input for a state-of-affairs report at EVE18

State of Discussions

No	topic
1	Requirements
2	Methodologies
3	HEV System Layout and Control Strategy
4	Input / Output Data
5	Operating Points
6	Load Collectives and Maximum Power
7	Customer information

State of Discussions

No	heading	Challenge/task/question	tech. / pol.	Part A / B*)
1	Requirements	Procedure to cover all types of HEV configurations (series, parallel, power split)	T	A✓
		Equivalent to the rated power of an ICE	P	A✓
		To be integrated into GTR #15	P	A✓
		Reference Method => related to Chassis Dyno measurement with completed vehicle Candidate Method => related to component Tests and using HILS etc. to determine SP	P	A?, B?

Recommendation:

=> Concept of “Candidate Method” to be decided before Part B; is a political question / decision **Showstopper?**

*) EVE mandate Part A: until Nov 2016

Part B: from Nov 2016, GTR development initiates

State of Discussions

No	heading	Challenge/task/question	Tech. / pol.	Part A / B
2	Methodologies	Which procedures are already available?	T/P	A✓
		SAE J2908/ KATRI : Nominal Rating and System Power Test, different test types (fixed speed, speed sweeps) Method 1: System power= Engine Power (estimated) + Battery power (measured)		
		ISO TC22/SC37/WG02 : Nominal Rating, series of fixed speeds to identify max. power		

Recommendation:

⇒ ISO method identified as a basis for possible future development under EVE-IWG, good verifiability, closest to ICE rated power.

State of Discussions

No	Heading	Challenge/task/question	Tech. / pol.	Part A / B
3	HEV System Layout and Control Strategy	All HEV configurations (series, parallel, power split) should be reasonably assessed. Certain series hybrids showed some peculiar system power results (over estimation of power) when measured after SAE method 1, which is presumed to be very similar to ISO method. However, since sufficient data is currently lacking, further research seems necessary.	T/P	B

Recommendation:

⇒ ISO methodology seems promising, however must be proven to produce reasonable results esp. with series hybrid vehicles and REX.

State of Discussions

No	heading	Challenge/task/question	Tech. / pol.	Part A / B
4	Input / Output Data	Input: Road load values (F1, F2, F3), vehicle weight, etc.	T	B
		Output: Vehicle speed, engine speed, engine power, RESS-data (voltage, current, power), etc.		

Recommendation:

⇒ To be further defined during Part B, no critical issue

State of Discussions

No	heading	Challenge/task/question	Tech. / pol.	Part A / B
5	Operating Points	Definition of appropriate power rating(s): Peak Power, Rated Maximum System Power	T/P	A✓
		Definition of SoC of RESS	T/P	A✓

⇒ Requirements given from GTR#15: Rated Maximum System Power.

⇒ Proposal from ISO: RESS of (N)OVC-HEVs fully charged.

State of Discussions

No	heading	Challenge/task/question	Tech. / pol.	Part A / B
6	Load Collectives and Maximum Power	Definition of an appropriate load pattern (fixed speed, speed ramp, etc.) to find the point at which the vehicle delivers maximum system power.	T	B

Recommendation:

⇒ ISO proposes variation of fixed vehicle speeds on chassis dyno, to identify maximum system power; this proposal was generally agreed and could be basis for further development.

State of Discussions

No	heading	Challenge/task/question	Tech. / pol.	Part A / B
7	Customer information	<p>Possibility for a fair comparison between battery-like HEVs and PEV (pure electric vehicles)</p> <p>Examples: REX and series HEV with a high pure electric range</p>	P	A? B?
Recommendation: ⇒ Discussion not closed so far				

Next steps

Based on the current outcome of the expert discussions, the following action items should be considered under the EVE-IWG:

- After discussion and pre-agreement at EVE 18 as input for Part A report: Recommendation and tentative work program to develop an addendum to GTR#15
- Report to be drafted and finally tuned at EVE 19 in June and report to GRPE
- give notice to WP.29 and to be proposed for a AC.3 vote in November

Part of EVE Report Part A:tentative items of a work program

I. OBJECTIVE AND SCOPE: ...*see “Requirements”*

II. DRAFT WORK PLAN:

1. Consideration of the concepts:
 - Reference Method – Chassis Dyno
 - Candidate Method – Component TestingConsideration of the Open Points 3, 4, 6 and 7
Creation of plans with task list and including allocation of work load.
2. Proof of concepts:
Studies with different types of HEVs incl. series HEV, REX
3. Drafting of the regulation
4. Test, refine / improve and validation of the method(s)
5. Proposal for a draft amendment to GTR#15
6. Approval at GRPE, voting at AC.3

III. WORK SCHEDULE: ...*to be schedule as a 36 (24) month project*