OICA comments on GTR21

EVE-IWG #66
06.-07.12.2023

OICA

GTR 21 Table 5

Item	Units	Accuracy	Validity of applying C/D test	Validity of system bench application
Engine speed	min -1	± 10 min -1 or ± 0.5% of measured value		
Intake manifold pressure	Pa	± 50 Pa		
Atmospheric pressure	Pa	±0.1 kPa, with a measurement frequency of at least 0.1 Hz	OK	OK
Specific humidity	g H2O/kg dry air	± 1 g H2O/kg dry air	OK	OK
Fuel flow rate	g/s	± 3 %		
Electrical voltage	V	±0.3 % FSD or ±1 % of reading		
Electrical current	A	±0.3 % FSD or ±1 % of reading		
Room temperature	K	±1 °C, with a measurement frequency of at least 0.1 Hz	OK	OK
Dynamometer speed	km/h	The dynamometer speeds shall be controlled with an accuracy of ±0.2 km/h.	unnecessary	unnecessary
Dynamometer force	N	The accuracy of the force transducer for all measured increments. This sha initial installation, after major mainten days before testing.		
Time	s	± 10 ms; min. precision and resolutio		
Axle/wheel rotational speed	rev/s	± 0.05 s-1 or ± 1 %, whichever is gr		
Axle/wheel torque	Nm	± 6 Nm or ± 0.5 % of the maximum measured total torque, whichever is greater, for the whole vehicle.	Item for TP2, not required for TP1	Item for TP2, not required for TP1
Accelerator pedal command	percent	± 1 %		

Measurement updates

- Matthias presented the table with the overview of the update on the test conditions
- Discussion point was the control of the dynamometer speed.
- Mike S. did not agree, that the control with the tolerance of 0,2km/h is not necessary
- There was maybe still a misunderstanding for which purpose the control is needed

Action item: We should prepare 1-2 slides in order to describe the problem and propose a solution

Discussion points in [ ] after working document submission GTR 21

■ Details of the JAMA study

In order to provide sensitivity to dynamometer vehicle speed accuracy, the effect on system output for vehicle speed displacement is calculated.
The calculation was carried out by simulation to eliminate measurement variations.

■ Result

・HEV System①

Vehicle speed deviation	System output deviation
-3%	-0.14%
-2%	-0.09%
-1%	-0.05%
0%	0.00%
+1%	-0.02%
+2%	-0.05%
+3%	-0.07%

Target speed： 85km/h

・HEV System②

Vehicle speed deviation	System output deviation
-3%	0.00%
-2%	0.00%
-1%	0.00%
0%	0.00%
+1%	0.00%
+2%	0.00%
+3%	0.00%

Target speed： 160km/h

・HEV System③

Vehicle speed deviation	System output deviation
-3%	-0.35%
-2%	-0.30%
-1%	-0.20%
0%	0.00%
+1%	-0.58%
+2%	-1.89%
+3%	-

Target speed： 170km/h

・BEV System①

Vehicle speed deviation	System output deviation
-3%	0.00%
-2%	0.00%
-1%	0.00%
0%	0.00%
+1%	0.00%
+2%	0.00%
+3%	0.00%

Target speed： 100km/h

■ Consideration

- The system output influence on the vehicle speed deviation varies widely from system to system.
  Therefore, the elimination of the vehicle speed condition is not possible.
- The sensitivity of the HEV system③ is large. However, the vehicle speed variation for system output deviation of 0.2% (1/10 of the required value) is -1.7 to +0.6km/h. That is sufficiently large compared to the accuracy requirement of ±0.2 km/h.
  Therefore, relaxation of the required value is considered possible.

Discussion points in [ ] after working document submission GTR 21

Company	Upper speed limit	Dynamometer speed accuracy	memo
OICA A	250km/h	±0.1% of full scale	Accuracy of dynamometer requirements for GTR21 ：±0.2km/h
OICA B	200km/h	±0.1% of full scale	
OICA C	310km/h	±0.1% of full scale	
OICA D	250km/h	±0.1% of full scale	
OICA E	250km/h	±0.1% of full scale	
OICA F	200km/h	±0.1% of full scale	
OICA G	200km/h	±0.1% of full scale	
OICA H	200km/h	200km/h ± 0.1km/h	
OICA I	250km/h	±0.05% of full scale	
OICA J	150 km/h	150km/h±0.07km/h	
OICA K	250km/h	± 0.2 km/h	
OICA L	260km/h	±0.1% of full scale	

The requirement of OICA's dynamometer accuracy is ±0.1% of full scale.

[Current definition]
±0.2km/h
[Proposed change]
「±0.2km/h」 or 「full scale vehicle speed (FS) 0.1%」, whichever is greater
※Since 0.1% of 200km/h is 0.2km/h, then it will be selected the FS ±0.1% above 200km/h.

OICA proposal to modify 6.9.2.1. according to COP tolerance

If:

$$|(measured\ fuel\ flow\ rate - fuel\ flow\ rate\ at\ certification)| < (0.02)(fuel\ flow\ rate\ at\ certification)$$

and

$$|(gauge\ pressure\ at\ test - gauge\ pressure\ at\ certification)| < (0.02)(intake\ manifold\ pressure\ at\ certification)|$$

OICA

Question whether 2% deviation between results from an R85 measurement with combustion engine A and results from the GTR21 measurement with combustion engine B represent a plausible tolerance range; in COP, the power between the aggregates may vary by 5%.

27. September 2023, 10:18

@erwähnen oder antworten

Justification:

- Alignment to the COP tolerance of 5% reflects the test condition much better than the 2% from R85
- With the current text, R85 results could be difficult to be used for the TP1 test

Update:

- OICA is trying to provide data from COP to demonstrate the need of an increased tolerance
- Up to now it was not successful and we will try it again if really required