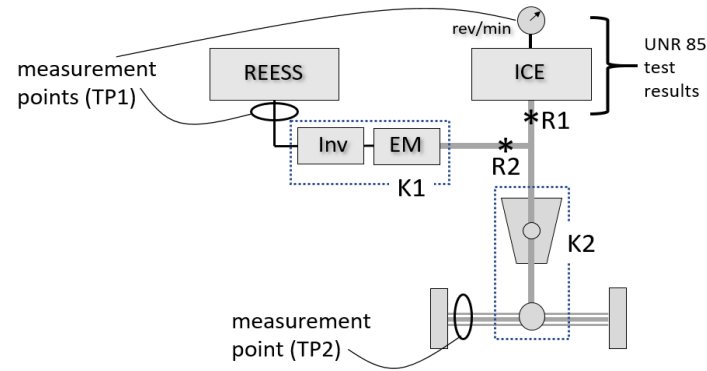


# Introduction

- A validation test was performed on a parallel hybrid vehicle by following the test procedure defined in GTR 21;
- The engine rated power is 118 kW (GB/T 17692, equivalent to ECE R85/00), while the rated power for the motor is 85 kW (GB/T 18488);
- Given that TP1 and TP2 are applicable for parallel type hybrid vehicle, both methods were tested.



TP1:

- 1、 Reference points R1,R2 shown in Figure above;
- 2、 The Voltage, current, engine speed, fuel flow rate and inlet manifold pressure obtained according to onboard CAN data;
- 3、 The electrical energy conversion efficiency (K1): 95% (tested according to GB/T 18488);
- 4、  $P_{DCDC}$  and  $P_{aux}$  : not measured, adopted 1.0 kW instead.

TP2:

- 1、 Reference points R1,R2 shown in Figure above;
- 2、 The speed and torque on wheel-side obtained from dynamometer reading;
- 3、 The mechanical energy conversion efficiency (K2): 90% (estimated value).

# Results

- The maximum vehicle power occurred at 115 km/h vehicle speed (engine speed 4800 rpm);
- The indicated maximum vehicle power from TP1 was 201.6 kW, while the indicated maximum vehicle power from TP2 was 205.3 kW, 1.8% difference.

## Results from TP1

	Max Battery Power minus 1kW	K1	R2 (kW)	R1 (kW)	R1+R2 (kW)		Measured fuel flow rate (kg/h)	Certificated fuel flow rate (kg/h)	Deviation	Measured gauge pressure(kPa)	Certificated gauge pressure(kPa)	Deviation
2 <sup>nd</sup> Repetition	88.1	0.95	83.7	118.0	201.7	2 <sup>nd</sup> Repetition	41.0	41.2	-0.5%	234.3	238.2	-1.6%
3 <sup>rd</sup> Repetition	88.2		83.8		201.8	3 <sup>rd</sup> Repetition	41.8		1.5%	233.8		-1.8%
4 <sup>th</sup> Repetition	88.1		83.7		201.7	4 <sup>th</sup> Repetition	40.8		-1.0%	233.7		-1.9%
5 <sup>th</sup> Repetition	87.5		83.1		201.1	5 <sup>th</sup> Repetition	40.4		-1.9%	234.0		-1.8%
Average	88.0		83.6		201.6	Average	41.0		-0.5%	234.0		-1.8%

Note: the difference between measured and certificated values in fuel flow rate and inlet manifold pressure within 2%

## Results from TP2

	Dynamometer reading power (kW)	K2	R1+R2 (kW)
2 <sup>nd</sup> Repetition	184.8	0.9	205.3
3 <sup>rd</sup> Repetition	184.1		204.6
4 <sup>th</sup> Repetition	185.6		206.2
5 <sup>th</sup> Repetition	184.5		205.0
Average	184.7		205.3

## Questions for Discussion

<b>No.</b>	<b>Description</b>
1	Could the working group share the validation reports from other organizations (different types of hybrid vehicles)?
2	How would the requested data be obtained (namely on-board CAN data or off-board data acquisition equipments)?
3	As the electric motor system is getting highly integrated, which makes it more and more difficult to measure K1. What suggestions?