

Power Determination Validation Testing – Phase 2  
Suggested Modifications to Approach and Test Plan  
EVE 31 – Geneva, May 21, 2019

## PLANNING

1. Identify additional test vehicles where needed to complete the testing matrix. Confirm availability of previously tested vehicles for additional testing.
2. Confirm hybrid configuration – Review and classify each test vehicle according to hybrid configuration present at each drive axle (see the testing matrix). Review the electrical and mechanical power flow and identify where K factors are needed.
3. Obtain K factors, if possible. Options:
  - (a) ask the manufacturer to provide on a confidential basis
  - (b) estimate by use of CAN data (e.g. some vehicles offer component torque and speed signals)
  - (c) additional instrumentation on the vehicle if possible
  - (d) otherwise, select nominal values and solve for the range of K factors that make  $TP1 = TP2$ .

## INSTRUMENTATION

4. Use torque and speed meters, or hub dynamometer, because dyno roller data is no longer permitted. If applicable, collect also roller torque and speed for comparison.
5. Collect current and voltage by measurement devices, in addition to the CAN bus (this lets us confirm that variation between TP1 and TP2 is not due to measurement inaccuracy).
6. If multiple motors are powered by the same battery, instrument the input to each inverter, not just the output from the battery, so that the efficiency through each branch can be accounted for.
7. If chassis dynamometer, improve precision of wheel speed and dynamometer roller speed measurement to help detect and quantify any remaining slippage.
8. Avoid exclusive use of CAN data in calculations unless data is also collected from measurement devices and validated by comparison. May include: engine speed, intake manifold pressure, fuel flow rate, etc.
9. Consider measuring power to DC-DC converter and auxiliaries in place of default 1.0 kW in TP1, to reduce potential variation between TP1 and TP2.

## PROCEDURE

9. Minimize wheel slippage as much as possible by adding weight to the vehicle.
10. Perform five repetitions of power test, because the procedure now specifies repetition and averaging.