# Status of UN GTR No. 21 Determination of Electrified Vehicle Power (DEVP)

GRPE Power Determination Workshop

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# UN GTR No. 21 on Determination of Electrified Vehicle Power (DEVP)

- Brief History
  - Developed by IWG on on Electric Vehicles and the Environment (EVE IWG)
  - Initial motivation: to support classification and downscaling under WLTP
    - WLTP determines vehicle classification and cycle downscaling based on engine power rating
    - However, it does not specify a method for determining an equivalent system power rating for electrified vehicles that have more than one source of propulsion, such as an internal combustion engine and one or more electric motors
  - Under its mandate, in 2015 the EVE IWG formed a subgroup to investigate options for developing a test procedure for this purpose, applicable to UNECE class M1 and N1 light duty HEVs and pure electric vehicles (PEVs) with more than one propulsion motor
  - EVE also considered other uses for a maximum power rating, such as consumer information
  - ISO 20762 was under development at the time and provided an initial template
  - Modifications were necessary to align with WLTP requirements and the needs of a regulatory application
  - EVE members conducted a vehicle testing program to develop and validate the emerging GTR procedure

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- Phase 1 (original GTR)
  - Proposal: ECE/TRANS/WP.29/2020/125
  - Technical report: ECE/TRANS/WP.29/2020/126
  - Approved by WP. 29 in the November 2020 session
  - Established in the Global Registry as GTR No. 21 on January 18, 2021
- After Phase 1, the EVE IWG continued work under its mandate to consider further development of the GTR (Phase 2)
- A number of potential revisions were proposed by EVE IWG members during 2022 and 2023 and discussed at regular meetings of the EVE
- The IWG reached consensus on a number of revisions to the GTR

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- Phase 2 topics included:
  - Considered use of CAN signals in place of direct measurement
    - Data analysis conducted
  - Considered more appropriate accuracy requirements
    - Reviewed technical necessity of requirements that posed a burden with little benefit
  - Considered offering measurement alternatives for highly integrated systems
    - Considered the use of vehicle CAN signals in lieu of instrumented values where power branches cannot be instrumented
  - Considered need for a family concept to reduce testing burden
  - Considered alternative for system bench testing in place of dynamometer testing
  - Continued considering need for Candidate Method
  - Continued considering need for power determination of heavy-duty and fuel-cell vehicles

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- Phase 2 revisions to GTR-21:
  - Family concept added (Section 7)
  - Additional TP1 method 6.1.3.1.2 (d) to accommodate highly integrated powertrain
    - Uses a power distribution ratio between two powertrain branches based on CAN signal
  - Use of a system bench is allowed in the case of vehicles that are too powerful to be tested on a chassis dynamometer (3.6 and 6.1)
  - Revisions to accuracy requirements
    - Soak area temperature revised to specify a tolerance around a set point and to accommodate Type 1 soak area target temperature (5.1.4)
    - Engine speed, fuel flow rate, atmospheric pressure allowed from onboard signal (5.2.1/6.1.2)
    - Accuracy of intake manifold pressure, dynamometer speed, time, accelerator pedal (5.2.1)
    - TP1 calculation revised to 5% tolerance for fuel flow rate and manifold pressure to align with COP requirement (6.9.2.1)
- Phase 2 revisions approved by GRPE in January 2024
- June 2024: To be submitted as a working document for consideration by AC.3.

# EVE Terms of Reference – GTR No. 21

- Topics of consideration for Phase 3
  - Consider the scope and application of system bench testing.
  - Consider the need for power determination of electrified heavy-duty vehicles.
  - Consider measurement alternatives for highly integrated systems.
  - Consider a candidate method.
  - Consider fuel-cell electric vehicles.
  - Future amendments as new data and continued research, analysis and testing lead to new developments
- January 2026 (tentative): Submission of Phase 3 amendments as a working document for consideration by GRPE