



# **Type Approval of H2 engines**

## **Change proposals for UN R49**

**OICA**

89<sup>th</sup> GRPE Session 30 May - 02 June 2023



# PURPOSE OF THE AMENDMENT

- OICA submitted a WD on a new supplement to the 07 series amendments to UN Regulation No. 49 at the 87<sup>th</sup> GRPE, which was adopted.
- The purpose of this amendment is to allow the use of hydrogen (H<sub>2</sub>) as a fuel in emission type approval for heavy duty vehicles.
- OICA proposes to extend this proposal to the 05 and 06 series to allow countries adopting these series to use H<sub>2</sub>-ICE.



# PROPOSED CHANGES TO UNR49 06 SERIES

- The scope of the changes will be the same as for the 07 series with the "Lean" approach, and the changes will be minimum.
- Dual fuel application and dilution measurement will be changed in the second full approach as in the 07 series.
- The changes for H2-ICE in 06 series of UN Regulation No. 49 are the same as those for 07 series, so the text is revised based on "ECE/TRANS/WP.29/GRPE/2023/6" and "GRPE-87-16-Rev.1" proposed in the last GRPE.
- For details, please refer to the description of "GRPE-87-50".



# PROPOSED CHANGES TO UNR49 05 SERIES

- The scope of the changes will be the same as for the 07 series with the "Lean" approach, and the changes will be minimum.
- Dual fuel application and dilution measurement will be changed in the second full approach as in the 07 series.
- The H2-ICE changes in 05 series of UN Regulation No. 49 are based on the changes in the 07 series and modified to conform to the EURO III, IV, and V test methods.
- Please refer to the next page and beyond for the details of the proposed changes.



# PROPOSED CHANGES TO UNR49 05 SERIES

## **Regulation:**

- Measurement of all emission species is required for hydrogen fueled engines.  
(NO<sub>x</sub>, CO, THC/NMHC, PM mass)
- Labels introduced for hydrogen fuelled engines differing between PI / CI engines and gaseous / liquid hydrogen injection.
- Add provisions for increased water content in exhaust gases.  
(Equipment will comply with water content during testing)

## **Annex 1~3**

- Label changes to conform to hydrogen fueled engines.



# PROPOSED CHANGES TO UNR49 05 SERIES

## **Annex 4A (ETC/ESC Test Procedure):**

- Amend the emissions formula to match the ETC/ESC test procedure.
- Add dry/wet correction equations applicable to hydrogen-fueled engines, as in 07 series of UN Regulation No. 49.
- CO analyzer interference check adapted to near zero CO emissions for hydrogen-fueled engines, as in 07 series of UN Regulation No. 49.
- Carbon flow check to be performed on diesel engines before installation of hydrogen-fueled engines, as in 07 series of UN Regulation No. 49.

## **Annex 4B (WHDC Test Procedure):**

- The 05 series of UN Regulation No. 49 is not included in this issue because this test method is used only for Dual Fuel engines.
- It will be amended when Dual Fuel engines are supported in the revision of the Full Approach.



# PROPOSED CHANGES TO UNR49 05 SERIES

## **Annex 5 (Specification of reference fuels):**

- Definition of reference fuel for hydrogen derived from ISO14687:2019 Grade D (Type I (gaseous) or II (liquid)) is needed.
- Therefore, the definition provided in the 07 series of UN Regulation No. 49 is adopted.
- However, it is necessary to consider expanding the definition of reference fuel based on the situation in countries adopting the 05 series.

## **Annex 9A/B/C (On-board diagnostic systems (OBD)):**

- Each monitors shall be based on working principle (CI vs. PI engine) instead of fuel type ( diesel vs. gas).
- OTL demonstration for CO shall not be required for engines that are fuelled with non-carbon fuels, as in 07 series of UN Regulation No. 49.



## NEXT STEP

- Informal Document to be discussed at the next GRPE session.
- Adoption of the Working Document at the GRPE session in January next year.
- Full approach revisions such as dual fuel and dilution measurement in 05 and 06 series of UN Regulation No. 49 need to be amended according to one OICA member's consideration status.