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Economic Commission for Europe**Inland Transport Committee****World Forum for Harmonization of Vehicle Regulations****Working Party on Pollution and Energy****Sixty-first session**

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Item 4 of the provisional agenda

Worldwide harmonized Motorcycle emission Test Cycle**Proposal for draft Amendment 2 to global technical regulation No. 2****Submitted by the expert from Germany ***

The text reproduced below was prepared by the expert from Germany to introduce performance requirements into the existing global technical regulation (gtr) No. 2 on the Worldwide harmonized Motorcycle emission Test Cycle (WMTC) and to improve the current text of the gtr. This updated document takes into account the subsequent comments received from the members of the World Forum for Harmonization of Vehicle Regulations (WP.29), the Working Party on Pollution and Energy (GRPE) and the informal group on WMTC. This document is based on document ECE/TRANS/WP.29/GRPE/2010/10 and informal documents GRPE-60-04, GRPE-60-07 and GRPE-60-14, distributed at the sixtieth session of GRPE (see report ECE/TRANS/WP.29/GRPE/60, paras. 21–23). Modifications to the current text of the gtr are marked in bold for new or strikethrough for deleted characters.

* In accordance with the programme of work of the Inland Transport Committee for 2006–2010 (ECE/TRANS/166/Add.1, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

I. Proposal

Part A (Statement of technical rationale and justification)

Paragraph 2., amend to read:

“2. Procedural Background

The work on the gtr started in May 2000 was also approved as a gtr project by AC.3.

~~The draft text of the gtr No. 2 without limit values, was approved by GRPE AC.3 in January June 2005, subject to final decisions concerning the format of the text by AC.3. The final text of the gtr without limit values is presented below, in Part B of this document. Amendment 1 to gtr No. 2 was approved by AC.3 in November 2007.~~

~~At its April 2006 meeting held in Pune (India), WMTC/FEG agreed to prepare new test cycle proposals and a new vehicle classification for draft amendments to the gtr in order to suit low powered vehicles, such as commonly used in India and China.~~

~~A small WMTC Task Force, coordinated by IMMA, was set up to prepare a proposal on the test cycle(s) and any new classification that might be necessary to achieve this objective. The Task Force was attended by Germany (TUV), India, Italy, Japan (JASIC) and IMMA. Task Force meetings were held in August and October 2006.~~

~~At its November 2006 meeting held in Ann Arbor (United States of America), WMTC/FEG agreed to a modified version of one of the WMTC Task Force proposals and forwarded it to WMTC Informal Group in January 2007 where it was approved for submission to GRPE.~~

The draft text of Amendment 2 to gtr No. 2 on the introduction of performance requirements (limit values for pollutant emissions for vehicles fitted with gasoline engines) was approved by GRPE in January 2011, subject to final decisions concerning the format of the text by AC.3.”

Paragraph 4., amend to read:

“4. Discussion of Issues Addressed by the gtr

...

In each of these steps, specific technical issues were raised, discussed, and resolved. The technical report describes this information. Additionally, other issues addressed in this gtr are identified below.

...

(d) Performance Requirements

~~As a first step, the gtr is being presented without limit values. In this way the test procedure can be given a legal status which also requires the Contracting Parties to start the process of implementing it in their national law.~~

~~When implementing the test procedure contained in this gtr as part of their national legislation or regulation, Contracting Parties are invited to use limit values which represent at least the same level of severity as their existing regulations, pending the development of harmonized limit values by AC.3 under the 1998 Agreement of the World Forum for Harmonization of Vehicle Regulations (WP.29).~~

~~The performance levels to be achieved in the gtr will therefore be discussed on the basis of the most recently agreed legislation in the Contracting Parties, as required by the 1998 Agreement.~~

~~The Informal group will continue its work on the comparative database of results from the different test procedures, which will act as a major input on the discussion of limit values that are compatible to the existing limit values in different regions/countries.~~

The principal emission limit values (paragraph 5.2. of the text of the regulation) represent the most stringent limits currently applied in national or regional legislation with the test procedures set out in this gtr. Vehicles complying with the principal emission limits contained in paragraph 5.2. are therefore deemed to comply with the alternative requirements contained in paragraph 5.3.

Paragraph 5.3. contains alternative emission limits of stringency proposed by the Contracting Parties, as foreseen by articles 4.2 and 7.2 of the 1998 Agreement.

There can be several reasons for the introduction of alternative emission limits:

- (i) Different environmental priorities for different gaseous pollutants, CO₂ and energy/fuel conservation, or cost-benefit situation;**
- (ii) Diverse traffic situation or special vehicles (performance, classification);**
- (iii) Separated or combined limits for HC and NO_x;**
- (iv) Different reference fuels because of the market fuel situation.**

Contracting Parties may opt to accept motorcycles complying with one or more of these alternative performance requirements (paragraph 5.3.) in addition to the motorcycles complying with principal requirements (paragraph 5.2.).

When a Contracting Party transposes this global technical regulation in a manner that includes any of the specified alternative performance requirements, the national or regional legislation should ensure that a motorcycle that complies with the principal performance requirements in this gtr will satisfy the national or regional legislation. This will give some planning reliability for manufacturers. Compliance with the principal or alternative performance requirements, as opted for by the Contracting Party, will be determined by the national or regional certification or type approval authority.

It is the intent that gtr would be amended to update the principal emission limits at such time when new more stringent limits are adopted through national or regional legislation. It may also become necessary to amend the alternative emission limits due to such developments in countries opting for alternatives.

It is also expected that different Contracting Parties will start applying principal emission limits at different dates considering the lead time required for implementing stricter norms. It may also become necessary to induct the earlier principal emission limit as one of the alternatives.

(e) Reference Fuel

~~The use of one standardized Reference Fuel has always been considered up to now. The principal performance requirements introduced in paragraph 5.2. of this gtr are based on the use of the reference fuel as specified in Annex 2.1. of gtr No. 2. The use of this standardized reference fuel for determining compliance with the emission limits set out in paragraph 5.2. is considered as an ideal condition for ensuring the reproducibility of regulatory emission testing, and Contracting Parties are encouraged to use such fuel in their compliance testing. However, until performance requirements (i.e. limit values) have been introduced into this gtr, Contracting Parties are allowed to define a different reference fuel to that specified in Annex 2 for its national legislation, to address the actual situation of market fuel for vehicles in use. The reason for the use of such a different reference fuel and the specification of the parameters shall be reported to the Secretary General of UN.~~

Contracting Parties may use alternative reference fuels for the principal performance requirements in paragraph 5.2. on condition that their equivalence with the reference fuel in Annex 2.1 in terms of emissions is demonstrated.

The alternative performance requirements in paragraph 5.3. are applicable with the corresponding reference fuels.

(f) Durability requirements and/or useful life provisions are currently outside the scope of this gtr. Accordingly, Contracting Parties may specify durability requirements and/or useful life provisions in their national or regional legislation in relation to the emission limits set out in section 5 of this gtr.”

Paragraph 5., amend to read:

“5. Regulatory Impact and Economic Effectiveness

...

(b) Potential cost effectiveness

Specific cost effectiveness values for this gtr have not been calculated. ~~The decision by the Executive Committee of the 1998 Agreement to move forward with this gtr without limit values is the key reason why this analysis has not been completed. This agreement has been made knowing that specific cost effectiveness values are not immediately available. However, it is fully expected that this information will be~~

developed, generally in response to the adoption of this regulation in national requirements and also in support of developing harmonized limit values for the next step in this gtr's development. For example, each Contracting Party adopting this gtr into its national regulations will be expected to determine the appropriate level of stringency associated with using these new test procedures, with these new values being at least as stringent as comparable existing requirements. Also, experience will be gained by the motorcycle industry as to any costs and costs savings associated with using this test procedure. This cost and emissions performance data can then be analyzed as part of the next step in this gtr development to determine the cost effectiveness values of the test procedures being adopted today along with new harmonized limit values. **It is expected that each Contracting Party can develop such information with the transposition of this gtr into national or regional legislation. Specific cost effectiveness values can be quite different, depending on the national or regional environmental needs and market situation.** While there are no calculated cost per ton values here, the belief of the ~~technical~~ **informal group on WMTC** is that there are clear benefits associated with ~~this regulation~~ **Amendment 2 to gtr No. 2.**"

Part B (Text of the regulation)

Paragraph 5., amend to read:

“5. Performance requirements for vehicles fitted with gasoline engines

~~When implementing the test procedure contained in this gtr as part of their national legislation, Contracting Parties are invited to use limit values which represent at least the same level of severity as their existing regulations; pending the development of harmonized limit values, by the Administrative Committee (AC.3) of the 1998 Agreement, for inclusion in the gtr at a later date.”~~

Insert new paragraphs 5.1. to 5.3.3., to read (inserting also new footnotes ^{1, 2}):

5.1. Optional performance requirements

The principal requirements of performance are set out in paragraph 5.2. Contracting Parties may also accept compliance with one or more of the alternative performance requirements set out in paragraph 5.3.

5.2. The principal performance requirements ¹

The gaseous emissions for each class of vehicle defined in paragraph 6.3., obtained when tested in accordance with the cycles specified in paragraph 6.5.4.1., shall not exceed the values specified in Table 5-1.

¹ The limit values set out in Table 5-1 represent the most stringent national or regional emission limits applied by a Contracting Party at the time of adoption of the last amendments to this gtr. It is the intent that the gtr would be amended to update these limit values at such time that new more stringent standards are adopted through national or regional legislation, in order to represent those new limit values.

Table 5-1
Limit values for gaseous emissions CO, HC and NO_x

Vehicle Class	CO		HC		NO _x	
	Class 1 and Class 2	Class 3	Class 1 and Class 2	Class 3	Class 1 and Class 2	Class 3
Limit values <i>L_A</i> in mg/km	2200	2620	450	270	160	210

5.3. Alternative performance requirements ²

5.3.1. Alternative performance requirements A

The gaseous emissions for each class of vehicle defined in paragraph 6.3., for the alternate performance requirements, obtained when tested in accordance with the cycles specified in paragraph 6.5.4.1., except that vehicles in Class 2.1 are to be tested by using the cycles prescribed for Class 1, shall not exceed the values specified in Table 5-2.

Table 5-2
Limit values for gaseous emissions CO, HC + NO_x

Vehicle Class	CO		HC + NO _x		
	Class 1 and Class 2.1	Class 2.2 and Class 3	Class 1 and Class 2.1	Class 2.2	Class 3
Limit values <i>L_B</i> in mg/km	1870	2620	1080	920	550

5.3.2. Alternative performance requirements B

The gaseous emissions for each class of vehicle defined in paragraph 6.3., obtained when tested in accordance with the cycles specified in paragraph 6.5.4.1., shall not exceed the values specified in Table 5-3.

Table 5-3
Limit values for gaseous emissions CO, HC, HC + NO_x

Vehicle Class	CO	HC	HC + NO _x
	All	Class 1 and Class 2	Class 3
Limit values <i>L_B</i> in mg/km	12000	1000	800

5.3.3. Alternative performance requirements C

The gaseous emissions for each class of vehicle defined in paragraph 6.3., obtained when tested in accordance with the cycles specified in paragraph 6.5.4.1., shall not exceed the values specified in Table 5-4.

² If necessary, at the request of a Contracting Party, further sub-paragraphs can be added to paragraph 5.3. in order to allow additional alternatives.

Table 5-4
Limit values for gaseous emissions CO, HC and NO_x

Vehicle Class	CO	HC		NO _x	
	All	Class 1 and Class 2	Class 3	Class 1 and Class 2	Class 3
Limit values <i>L_A</i> in mg/km	2620	750	330	170	220

”

Paragraph 6.3.1., amend to read:

“6.3.1. Class 1

Vehicles that fulfil the following specifications belong to class 1:

50 cm³ < engine capacity < 150 cm³ and $v_{\max} \leq 50$ km/h

or

class 1

engine capacity < 150 cm³ and 50 km/h < v_{\max} < 100 km/h”

Paragraph 6.4., amend to read:

“6.4. ~~Specification of the Reference fuel~~

~~The appropriate reference fuels as defined in Annex 10 to Regulation No. 83 must be used for testing. For the purpose of calculation mentioned in paragraph 8.1.1.5., for petrol and diesel fuel the density measured at 15 °C will be used. The technical data of the reference fuel to be used for testing vehicles are specified in Annex 2.~~

Table 6-1 specifies the reference fuel specifications for the respective performance requirements in paragraph 5.

Table 6-1
Reference fuel specifications

Performance requirements	Reference fuel specification
Principal requirements in paragraph 5.2.	See Annex 2 (A.2.1)
Alternative A in paragraph 5.3.1.	See Annex 2 (A.2.1)
Alternative B in paragraph 5.3.2.	See United States Code of Federal Regulations, Title 40, Part 86, section 86.513-2004 “Fuel and engine lubricant specifications” (40 CFR 86.513-2004)
Alternative C in paragraph 5.3.3.	See Annex 2 (A.2.1)

”

Paragraph 6.5.7., amend to read:

“6.5.7. Measurement accuracies

Measurements have to be carried out using equipment that fulfil the accuracy requirements as described in table 6-42 below:

Table 6-42

Required accuracy of measurements

...”

Paragraph 8.1.1.5.1., amend to read:

“8.1.1.5.1. Test vehicles (motorcycles) with a positive ignition engine fuelled with petrol

$$FC = \frac{0.1155}{D} \times (0.866 \times HC + 0.429 \times CO + 0.273 \times CO_2) \quad \text{Equation 8-14}$$

Where:

...

D is the density of the test fuel in kg/litre at 15 °C. In the case of gaseous fuels this is the density at 20 °C.”

Annex 2.1, amend to read (inserting a new footnote ⁷ to the table):

“Annex 2.1

Technical data of the reference fuel to be used for testing vehicles equipped with positive ignition engines (unleaded petrol properties) ⁷

...

⁷ The Japanese reference fuel specified in the Road Vehicles Act, Safety Regulations for Road Vehicles, Announcement that Prescribes Details of Safety Regulations for Road Vehicles, Attachment 44 can be used by Contracting Parties as an alternative fuel for paragraph 6.4. for compliance with the principal emission limits in paragraph 5.2. Contracting Parties may also use other alternative reference fuels for the principal performance requirements in paragraph 5.2. under condition that their equivalence with the reference fuel in Annex 2.1 in terms of emissions is demonstrated.”

II. Justification

This updated proposal takes into account the subsequent comments received from the members of the World Forum for Harmonization of Vehicle Regulations (WP.29), the Working Party on Pollution and Energy (GRPE) and the informal group on WMTC. This document is based on document ECE/TRANS/WP.29/GRPE/2010/10 and informal documents GRPE-60-04, GRPE-60-07 and GRPE-60-14.