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GLOBAL REGISTRY

Created on 18 November 2004, pursuant to Article 6 of the
AGREEMENT CONCERNING THE ESTABLISHING OF GLOBAL TECHNICAL
REGULATIONS FOR WHEELED VEHICLES, EQUIPMENT AND PARTS WHICH CAN BE
FITTED AND/OR BE USED ON WHEELED VEHICLES
(ECE/TRANS/132 and Corr.1)
Done at Geneva on 25 June 1998

Addendum

Global technical regulation No. 11

ENGINE EMISSIONS FROM AGRICULTURAL AND FORESTRY TRACTORS AND
FROM NON-ROAD MOBILE MACHINERY

(Established in the Global Registry on 12 November 2009)

Appendix 1

Proposal and report pursuant to Article 6, paragraph 6.3.7. of the Agreement

- Proposal to develop a global technical regulation concerning the exhaust emissions from non-road mobile machinery (TRANS/WP.29/AC.3/14).
- Final report on the development of the global technical regulation concerning the test procedure for compression-ignition engines to be installed in agricultural and forestry tractors and in non-road mobile machinery with regard to the emissions of pollutants by the engine (ECE/TRANS/WP.29/2009/119).



UNITED NATIONS

**PROPOSAL TO DEVELOP A GLOBAL TECHNICAL REGULATION CONCERNING
THE EXHAUST EMISSIONS FROM NON-ROAD MOBILE MACHINERY
(NRMM)**

I. OBJECTIVE OF THIS PROPOSAL

1. The objective of this proposal is to establish a Global Technical Regulation (gtr) for non-road machinery engine emissions under the 1998 Global Agreement. The basis will be the harmonized non-road test protocol, including test cycles, as developed by the NRMM informal group of the GRPE (see also the informal document No. 1 distributed during the forty-fifth GRPE session). The work on the gtr will provide an opportunity to consider, most, if not all, international procedures as well as available technological developments and thus providing all necessary elements for the gtr on NRMM and taking also into account the cost effectiveness of the related laboratory equipment. The outcome of the comparison of the different legislations at world level can be used for other test protocols under GRPE and not only for NRMM.

2. Some countries have already enforced regulations governing exhaust-emissions from non-road machinery engines but the test procedures vary. To ensure the maximum benefit to the environment as well as the efficient use of energy, it is desirable that as many countries as possible use the same test protocol for emission control. For this a gtr is an important step forward. In the light of the ongoing international effort on improving the emission regulations from NRMM engines, it is considered that this would be an excellent opportunity to develop and establish a gtr in this area.

3. Everyone would benefit from the harmonization of the regulations. The benefits to the governments will be the harmonization of requirements and a general global reduction of the emission levels. Manufacturers of non-road machinery are already operating in a world market and it is economically inefficient for manufacturers to have to prepare different engine models in order to meet different emission regulations. To enable manufacturers to develop new models most effectively, it is desirable that a gtr should be developed. Finally, the consumer would benefit by having a choice of engines built to a globally recognized standard.

II. DESCRIPTION OF THE PROPOSED REGULATION

4. The work within the NRMM informal group, which was started in 2003, was preceded by the work of an international task force on the development of a real world, representative test cycle for non-road machinery engines. Major regulators from United States of America, Japan and Europe and industries were stakeholders in this effort. After intense work throughout 1998 to 2002, an internationally representative cycle was derived and validated in an extensive test campaign. This test cycle was adopted by the regulations on NRMM engines enforced in the European Union (21 April 2004), in United States of America (29 June 2004) and it is currently under examination by the Japanese Ministry of the Environment. This represents a very solid base for the UNECE effort on harmonization which could result in the proposed gtr.

5. The proposed gtr will be based on this task force's work which represents a worldwide pattern of real non-road machinery operation.

6. The NRMM informal group is performing an extensive comparison exercise between the different existing regulations and international standards. The comparison report and the identification of differences have been elaborated and are presented in a large working document by EC DG-JRC. This way all the open items are presented and possible solutions can be discussed. This implies that the future gtr will include the most up-to-date technical and procedural improvements currently under consideration. In this way, the gtr will not only reflect the vehicle testing under cycle conditions representative for real world operation but it will also improve the global standards of emission measurements from existing and future NRMM machinery to the highest level.

III. EXISTING REGULATIONS AND INTERNATIONAL STANDARDS

7. The following regulations and standards will be taken into account during development of the new gtr:

UNECE Regulations:

8. UNECE Regulation No. 96 - Uniform provisions concerning the approval of compression-ignition (C.I.) engines to be installed in agricultural and forestry tractors with regard to the emissions of pollutants by the engine

EU:

9. Directive 97/68/EC of the European Parliament and of the Council of 16 December 1997 on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery.

10. Directive 2002/88/EC of the European Parliament and of the Council of 9 December 2002 amending

11. Directive 97/68/EC on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery.

12. Directive 2004/ 26/EC of the European Parliament and of the Council of 21 April 2004 amending Directive 97/68/EC on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery.

Japanese Regulation:

13. Road Vehicle Act, Law No.185 of June 1, 1951, as last amended by law No.55 of May 26, 2004, Article 41 "Systems and Devices of Motor Vehicles";

14. Safety Regulations for Road Vehicles, Ordinance No. 67 of July 28, 1951, as last amended by ordinance No. 97 of December 2, 2004, Article 31 "Emission Control Device";

15. Announcement That Prescribes Details of Safety Regulations for Road Vehicles, Announcement No. 619 of July 15, 2002, as last amended by announcement No. 1477 of December 2, 2004, Article 41 "Emission Control Device" and Attach 43 "Measurement Procedure for 8-Mode Exhaust Emission of Diesel-Powered Special Motor Vehicles";

TRIAS 24-8-2003 "8-Mode Exhaust Emission Test Procedure for Diesel-Powered Special Motor Vehicles".

United States of America Regulations:

16. Non-road Diesel Engine Regulations:

17. Tier 3 Non-road Diesel

40 CFR 89

Tier 4 Non-road Diesel

40 CFR 1039 Control of Emissions from New and In-use Non-road Compression Ignition Engines

40 CFR 1065 Test Procedure and Equipment

40 CFR 1068 General Compliance Provisions for Non-road Programs

Non-road Diesel Fuel Regulations:

40 CFR 80

ISO Standards:

18. ISO 8178-1 Reciprocating internal combustion engines - Exhaust emission measurement - Part 1: Test-bed measurement of gaseous and particulate exhaust emissions

19. ISO DIS 8178-11 Reciprocating internal combustion engines - Exhaust emission measurement - Part 11: Test-bed measurement of gaseous and particulate exhaust emissions from engines used in non-road mobile machinery under transient test conditions.

FINAL REPORT ON THE DEVELOPMENT OF A GLOBAL TECHNICAL REGULATION
CONCERNING THE TEST PROCEDURE FOR COMPRESSION-IGNITION ENGINES
TO BE INSTALLED IN AGRICULTURAL AND FORESTRY TRACTORS AND
IN NON-ROAD MOBILE MACHINERY WITH REGARD TO THE EMISSIONS
OF POLLUTANTS BY THE ENGINE

I. INTRODUCTION

20 The objective of this proposal is to establish a global technical regulation (gtr) for Non-Road Mobile Machinery (NRMM) compression-ignition (C.I.) engine emissions under the 1998 Global Agreement. The basis is the harmonized non-road test protocol, including test cycles, as developed by the NRMM informal group of the GRPE and also using the non-road transient test cycle (NRTC), developed between 2000 – 2002 by an international task force. This report also documents the development of the gtr by the Working Party on Pollution and Energy (GRPE) and the informal working group on NRMM.

21. Some countries have already enforced regulations governing exhaust-emissions from non-road mobile machinery engines with limits and implementation dates largely aligned, but the test procedures vary.

22. To ensure the maximum benefit to the environment as well as the efficient use of energy, it is desirable that as many countries as possible use the same test protocol for emission control. Society will benefit from this harmonization of requirements through a general global reduction of emission levels. Manufacturers of non-road mobile machinery are already operating in a world market and it is economically more efficient for them to develop engine models to meet internationally consistent emissions regulations. The harmonization achieved through this gtr enables manufacturers to develop new models most effectively. Finally, the consumer would benefit from having a choice of low emitting engines built to a globally recognized standard at a lower price.

23. New research into the worldwide pattern of real NRMM use was fed into the transient test cycle development work which had been initiated by the United States Environmental Protection Agency (US-EPA) and developed in cooperation with the Directorate General Joint Research Centre (DG-JRC) of the European Commission and an international task force. From the collected data a transient test cycle with both cold and hot start requirements was developed. For hot start steady state test cycle (NRSC), the basis was offered by an expert committee of the International Organization for Standardization (ISO). The test cycles have been published in standard series ISO 8178. The procedure reflects exhaust emissions measurement technology with the potential for accurately measuring the pollutant emissions from future low emission engines. The NRTC test cycle has already been adopted in the European Union (EU), Canada and the United States emission legislations and it is the basis for the special vehicle legislation under development in Japan. This gtr intends to achieve a high level of harmonization of the complementary testing conditions among these existing or progressing legislations.

24. The test procedure reflects worldwide NRMM engine operation, as closely as possible, and provides a marked improvement in the realism of the test procedure for measuring the emission performance of existing and future NRMM engines. In summary, the test procedure was developed so that it would be:

- (a) representative of worldwide non-road mobile machinery engine operations;
- (b) able to provide the highest possible level of efficiency in controlling non-road mobile machinery engine emissions;
- (c) corresponding to state-of-the-art testing, sampling and measurement technology;
- (d) applicable in practice to existing and foreseeable future exhaust emissions abatement technologies; and
- (e) capable of providing a reliable ranking of exhaust emission levels from different engine types.

25. At this stage, the gtr is being presented without limit values and the NRMM engines applicable power range. In this way, the test procedure can be given a legal status, based on which the Contracting Parties are required to start the process of implementing it into their national law.

26. The gtr contains one option, whose adoption is left to the discretion of the Contracting Parties. This option is related to the dilution air temperature. However, this option should be harmonized when common limit values are established.

27. 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 the Executive Committee (AC.3) of the 1998 Agreement administered by the World Forum for Harmonization of Vehicle Regulations (WP.29). The performance levels (emissions test results) to be achieved in the gtr will, therefore, be discussed on the basis of the most recently agreed legislation among the Contracting Parties, as required by the 1998 Agreement.

28. In order to facilitate the regulatory activities of certain countries, in particular those that have not yet enforced legislation in this field or whose legislation is not yet as ambitious as the ones mentioned above, a guidance document is also available. The format is based on the one used in the EU for New and Global Approach Directives. It is important to note that only the text of the gtr is legally binding. The guidance document has no legal status and it does not introduce any additional requirements, but it aims at facilitating the use of the gtr and easing its application. The guidance document is placed next to the gtr on the UNECE WP.29 website, as already agreed by AC.3.

II. ANTICIPATED BENEFITS

29. NRMM engines are developed and produced for single world market. It is economically inefficient for manufacturers to have to design and produce substantially different models in order to meet different emission regulations and methods of measuring emissions, which, in

principle, aim at achieving the same objective. To enable manufacturers to develop new models more effectively and within a shorter time, it is desirable that a gtr should be developed. These savings will accrue not only to the manufacturer, but more importantly, to the consumer as well.

30. In order to fulfil the mandate given when work on this gtr was first started, this test procedure does not just address the economic questions, but improves the state of testing of NRMM engines, and reflects better how NRMM engines are used today.

31. It can be expected that the widespread application of this gtr for emissions legislation within the Contracting Parties to the 1998 Agreement will result in a higher control of emissions and finally an improvement for the environment.

III. POTENTIAL COST EFFECTIVENESS

32. Specific cost effectiveness values for this gtr have not been calculated. The decision by AC.3 to move forward with emission gtrs without limit values is the key reason why this analysis has not been completed. However, this information will be available when, in the later phase of this gtr development, harmonized limit values will be developed. Special attention will be given to the ongoing process of the development of such performance requirements for the insertion into gtr No. 2 on Worldwide harmonized Motorcycle emission Test Cycle (WMTC). Experience will be also gained by the NRMM engines industry as to which cost and cost saving are associated with using this test procedure. The cost and emissions performance data can then be analysed as part of the next step in this gtr development to determine the cost effectiveness values of the test procedure in this gtr. While there are no values on calculated costs per ton, the belief of the GRPE experts is that there are clear benefits associated with the adoption of this gtr.

IV. PROCEDURAL BACKGROUND

33. The NRMM gtr was developed by the GRPE informal working group on NRMM. The work to develop this gtr began with the establishment of the NRMM working group. The NRMM working group had its first meeting in May 2003.

34. As required by the 1998 Global Agreement, a formal proposal for the establishment of a gtr was proposed to AC.3 by EU. At its fourteenth session in June 2005, the proposal from EU was approved by AC.3 (TRANS/WP.29/AC.3/14) and assigned to GRPE.

35. A preliminary and progress report including a thoughtful review of the proposal was adopted by AC.3 at its June 2007 session (ECE/TRANS/WP.29/2007/43).

36. A large number of documents and meeting minutes of the NRMM working group, including a list of the NRMM meetings as well as the representations, provide a chronology of the development of the gtr. This documentation is available on the UNECE website (<http://www.unece.org/trans/main/wp29/wp29wgs/wp29grpe/nrmm.html>).
