



GRPE/WHDC/21
December 2007

**TWENTY FIRST MEETING OF THE GRPE WORKING GROUP ON THE
WORLDWIDE HEAVY DUTY CERTIFICATION PROCEDURE (WHDC)**

San Francisco, 18/19 October 2007

MINUTES OF THE MEETING

Venue: US Environmental Protection Agency, 75 Hawthorne Street, San Francisco, USA
Chairman: J.P. LAGUNA-GOMEZ (European Commission)

1.- ADOPTION OF THE AGENDA

The provisional agenda GRPE/WHDC/A21 was adopted as circulated.

2.- APPROVAL OF THE MINUTES OF THE 20th WHDC MEETING
(GRPE/WHDC/20 - Geneva, 06 June 2007)

The minutes of the 20th meeting were approved.

3.- UPDATE FROM JUNE GRPE AND AC.3 MEETINGS

Documents: ECE/TRANS/WP.29/GRPE/54
ECE/TRANS/WP.29/2007/42

The Secretary informed about the results from the 54th GRPE meeting and the June AC.3 meeting:

- GRPE approved at the 54th session the work program and timetable proposed by the WHDC working group.
- The European Commission presented at the last AC.3 meeting document ECE/TRANS/WP.29/2007/42 to amend gtr No. 4. AC.3 adopted the proposal and agreed to transmit it to GRPE for consideration.
- Consequently, the work program can now be started as proposed.

4.- DISCUSSION OF WHDC OPTIONS

Documents: Inf. Doc. No. GRPE-54-03
GRPE/WHDC/FE05
GRPE/WHDC/FE06
GRPE/WHDC/FE07

As an introduction, Mr. Stein gave an overview of the situation. He compared the options to the current legislation in order to facilitate compromise solutions. The results of this meeting were integrated into the presentation, which is circulated as document GRPE/WHDC/FE05.

4.1 Power determination

Mr. Sherwood presented the US gross power requirements contained in CFR 1065.110. In general, only the auxiliaries needed for operating the engine, such as fuel or oil pump have to be considered for the emissions test. Mr. Schulte presented the situation for EU and ECE regulations (see document GRPE/WHDC/FE06), which refer to net power. He indicated that the only significant difference to the USA is the fan, which need to be considered for the emissions test in the EU. He also noted that the power absorbed by a viscous fan or similar device is always considered in loose/unloaded operation, and therefore the difference to gross power is small. Mr. Stein added that the net power definition for nonroad engines (ECE R 120) does not include the fan. Mr. Gustavsson confirmed that such provision is more realistic for on-highway engines, too.

The working group members did not object to running the emissions test without fan. In order to avoid problems with ECE and EU power regulations, Mr. Stein proposed to completely separate emissions testing from power determination and to delete reference to power regulations from the WHDC gtr. In this case, the list of auxiliaries to be considered for the emissions test would have to be directly inserted into the gtr. This was accepted by the group on the premises that the final emissions result will not be affected, significantly. Messrs. Schulte and Stein were asked to check the influence on the basis of the test data from the Mercedes OM 501LA engine used in the WHDC validation studies. The decision will be presented at the 22nd WHDC meeting in January 2008 for approval.

4.2 Single reference fuel

Mr. Stein introduced a proposal for a test program (see document GRPE/WHDC/FE07) Mr. Laguna presented the situation in the EU where a 4.5% to 5.5% biofuel content (FAME) will be proposed for the reference fuel. He therefore suggested a max. biofuel content of 5.5% for the WHDC reference fuel. Mr. Kakegawa indicated that Japan has a standard for B5, but that biofuel content is prohibited in the reference fuel. Mr. Sherwood indicated that EPA needed to further explore into the issue before making any decision. Engine manufacturers were asked to look for test data that show impact of B5 on emissions.

As regards the test program on fuel influence on emissions, Mr. Laguna offered the services of the European Commission DG-JRC in Ispra, provided engine manufacturers are willing to supply engines. Mr. Stein was asked to clarify the details with JRC technical staff. In Japan, NTSEL will conduct a test program with a 4 l Hino engine equipped with EGR and NOx/PM aftertreatment. Mr. Ishii was asked to check if this program can be extended to cover the WHDC test program. Mr. Shimpi will check if one of the engines used in the CRC ACES program (US 07 technology) can be made available as US contribution to the test program. Mr. Laguna emphasized the importance for the Commission to include investigation on the soak time in this program.

ACEA members offered to explore potential sources for supplying the fuels needed for the test program.

4.3 Soak time

Mr. Shimpi explained EMA's position, which is largely influenced by the calibration and check procedures required by CFR Part 1065. According to these requirements, a soak time of 5 minutes will be impossible, a soak time of 10 minutes difficult. He indicated that something around 15 minutes soak time might be feasible.

The European manufacturers were of the opinion that a soak time of 4 to 5 minutes presents no problem for partial flow systems. For full flow systems, less than 10 minutes is possible, but this would need some modifications to the system hardware and software.

Mr. Sherwood noted that he was not able to find any evidence for the 20 minutes soak time requirement in EPA's records. Most likely it was due to the time needed for analyzer calibration. He clearly emphasized EPA's position that the soak time period will have an influence on emissions and consequently on the level of stringency of the emission standards. Since the 2010 emission standards can not be changed, EPA will not accept any change of the level of stringency when adopting the WHDC. Therefore, any change to the soak time period must be backed by test data. EPA will not generate such data, so other parties would have to do the work. Earlier data from EPA had shown that the NO_x emissions on the WHTC were higher than on the US FTP cycle.

Mr. Stein summarized the discussion by condensing it to three basic issues:

- the time needed for analyzer calibration, drift determination, bag evacuation and leak checks
- the influence of the soak time on emissions
- the level of stringency of FTP/20 minutes vs. WHTC/xx minutes.

In order to proceed with this issue the following tasks were agreed. EPA will

- check what kind of data they would require
- check if comparison of FTP/20 minutes vs. WHTC/10 minutes would be acceptable
- check if manufacturers' produced data would be acceptable or if an outside consultant would be required

EMA, ACEA and JAMA will put together data from their members with respect to the times needed for the steps necessary during the soak time period. Potential measures for shortening those times will also be provided.

4.4 Cold start weighting

Only limited data are available. JAMA made some investigations in the late 1990's that will be presented after further elaboration. The WHDC database only shows the engine warm-up times, but not the proportion of cold starts. It was noted that some data might be available in the EU after the introduction of the digital tachgraph. Mr. Schulte proposed to find field operators that have vehicles equipped with data logging systems. This proposal was considered the most promising solution for real in use data. OICA also offered to look into their internal databases of test and customer vehicles.

4.5 PM filter specification

At the last WHDC meeting it had been agreed to conduct a test program on this issue. Mr. Stein briefly introduced a proposal for such test program (see document GRPE/WHDC/FE07). Mr. Shimpi made a presentation on the new elements of CFR Part 1065 currently under discussion. These include a residence time in the system of 1 to 5 seconds, a dilution air temperature of 25 ± 5 °C and a dilution ratio of 5:1 to 7:1 with at least 2:1 in the primary dilution step. He indicated that EMA had asked for acceptance of 70 mm filters but EPA rejected. Mr. Sherwood explained that 47 mm PTFE membrane filters have had long history in ambient PM measurement, and EPA preferred to have the same filter specification for ambient and emissions measurement. As regards full flow vs. partial flow systems, EPA Washington has not yet approved the general acceptance of the partial flow system, but discussions between EMA and EPA are ongoing.

The draft test program was agreed in principle. Messrs. Schulte and Stein will develop the detailed test program on whose basis TÜV Nord will make an offer to OICA. The test program will also be sent to EPA Ann Arbor for review and comments. OICA members offered to fund this program and to supply engines (Euro V, EPA07).

4.6 Funding

- DG-JRC will conduct the reference fuel test program (option 2) on their own test cells without the need for external funding; the engines for the program will be offered by OICA; fuel supply will be checked by OICA.
- EMA will check the possibility of funding tests on option 2 (reference fuel) with one of the engines used in the CRC-ACES program.
- NTSEL and JAMA will check the possibility of funding tests option 2 (reference fuel) with the Hino engine available to NTSEL.
- OICA members will fund the PM filter study (option 5) at TÜV Nord and supply the engines needed for the program.

5.- OTHER WHDC ELEMENTS

Document: GRPE-54-03

5.1 Gasoline engines

Mr. Sherwood indicated that he was not able to find out why a different test cycle is used for gasoline engines in the USA. Mr. Gustavsson explained that the gasoline engine FTP runs at higher engine speeds than the diesel FTP. This was obviously caused by the real in use behavior of gasoline engines in the USA at the time the cycle was developed (1970's). Mr. Pollak noted that gasoline trucks were operated in Russia, and some in use data might be available. Mr. Laguna supported extending the scope to gasoline engines, since with the new differentiation between light and heavy duty vehicles in the EU, emissions testing of gasoline engines on the WHDC would become necessary.

It was confirmed that the major issue was whether the WHTC and WHSC cycles were representative for operation of gasoline engines. Since application of the cycles for SI CNG and LPG engines has already been demonstrated, their application to gasoline engines should be possible. With respect to representativeness, Mr. Shimpi was asked to check with EMA members that produce gasoline engines. Mr. Stein proposed to ask the Chinese test

institute CATARC to conduct tests with gasoline engines on the WHDC cycles. He will send a letter on behalf of the WHDC group.

5.2 Engine family concept

No further discussion took place in the absence of a Chinese delegate.

5.3 Alignment with NRMM gtr

Mr Stein gave a short background information of the activities within the NRMM working group. The next meeting will take place on 7th to 9th November 2007 at JRC in Ispra. Mr. Shimpi was asked to send a list of potential differences between NRMM and WHDC to Mr. Stein, who will circulate this info to the WHDC group.

6.- REVIEW OF WHDC TIME LINE

The timeline agreed at the last WHDC meeting was confirmed provided that the planned test programs can be conducted as expected.

7.- SUMMARY AND CONCLUSIONS

The secretary summarized the results of the meeting as follows:

- Reference to power regulations (option 1) will be deleted from the gtr; the list of auxiliaries to be considered for the emissions test will be added to the gtr.
- DG-JRC will run reference fuel test program (option 2); OICA members will submit engines and check availability of test fuels. Conduction of additional test programs will be considered by NTSEL and EMA; decision to be communicated to WHDC group.
- Decision on soak time period will be based on emissions stringency level. EPA to inform WHDC group, if comparison of FTP/20 vs. WHTC/10 will satisfy their requirements. Industry and test laboratories to check which minimum soak time periods can be realized.
- WHDC members to collect data on cold start weighting.
- TÜV Nord to conduct test program on PM filter specification. OICA members agreed to fund this program. Stein/Schulte will propose test program at next WHDC meeting and send to EPA for comments.
- Principal agreement to extend scope to gasoline engines; China will be asked to run test program on gasoline engines
- Shimpi/Stein to elaborate differences between NRMM and WHDC gtr's.

The next meetings will take place as follows:

- 22nd WHDC meeting on 16th January 2008, Geneva
- 23rd WHDC meeting on 10th and 11th April 2008 at JASIC offices, Tokyo, Japan.

8.- OTHER BUSINESS

None.