



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

Beijing, 15 to 17 October 2008

MINUTES OF THE MEETING

Venue: Asia Hotel, 8 XinZhong Xijie, Beijing, PR China
Chairman: J.P. LAGUNA-GOMEZ (European Commission)

1.- ADOPTION OF THE AGENDA

The provisional agenda GRPE/WHDC/A25 was adopted as circulated.

2.- APPROVAL OF THE MINUTES OF THE 24th WHDC MEETING
(GRPE/WHDC/24 - Geneva, 03 June 2008)

The minutes of the 24th meeting were approved.

3.- UPDATE FROM 24th WHDC MEETING

The Secretary summarized the results from the 24th WHDC meeting. It was finally decided to amend section 6.3 on engine power and to add a list of auxiliaries to be fitted to or removed from the engine for the emissions test. The work programs on options 2 and 5 have not yet started. Since EPA's proposal for work program on option 3 cannot be conducted within the WHDC timeline, the WHDC group recommended to GRPE to delete options 3 and 4 from the current mandate (see informal document n° GRPE-56-21). This was accepted by GRPE and finally endorsed by WP.29/AC.3.

4.- DISCUSSION OF WHDC OPTIONS

4.1 Power determination

Document: GRPE/WHDC/FE 23

As agreed at the last meeting, the Secretary presented an amendment to section 6.3, engine power, and the list of auxiliaries (see document GRPE/WHDC/FE 23). Section 6.3 now includes provisions on when auxiliaries need to be fitted to the engine for the emissions test, or not. There are also provisions on how the power absorbed by the auxiliaries needs to be

accounted for. The auxiliaries are listed in a new Annex 7. After some discussion, the proposal was principally accepted. The Secretary was asked to compare the auxiliaries list with ECE R 85. Some editing of the text and of the table is needed for the informal document to be presented at the January 2009 GRPE meeting.

4.2 Single reference fuel

Documents: GRPE/WHDC/FE 22
GRPE/WHDC/FE 24

Dr. Shimpi (EMA) reported that the test fuels had not yet been received. The complete program at SwRI is delayed by about 6 weeks and is expected to be finished by the end of the year. In addition to the fuel test program, EMA decided to add FTP/WHDC correlation testing, as requested by EPA for the option 3 test program.

Dr. Ishii (NTSEL) reported that the test fuels had arrived at NTSEL at the beginning of October. Testing is now being planned for November/December 2008 before the PMP round robin test. The test program will approximately take on month.

The Secretary informed the group that the European Commission DG-JRC Ispra test program had just started. The results are expected to be available for the 26th WHDC meeting.

Dr. Kakegawa (JASIC) presented an interim report about biofuels and emissions for different FAME stocks and two engine/aftertreatment technologies (see document GRPE/WHDC/FE 22). More information will be provided at the 26th WHDC meeting. Preliminary result is that biofuel blends up to 20% do not have a significant influence on emissions. Only NO_x is increasing slightly. Dr. Kakegawa concluded that a 5% biofuel content in the reference fuel might be acceptable for Japan. The Chairman said that the test results very well coincide with findings from JRC.

Mr. Kleinschek (OICA) raised the issue of fuel stability. For a biofuel blend, storage will be limited to max. 6 months. He proposed to add a stability criterion to the reference fuel specifications (see document GRPE/WHDC/FE 24). The proposal was accepted by the group. Since the related standards on stability differ between major biofuel markets (USA, EU, Brazil), discussion of this issue will continue at the 26th WHDC meeting.

4.3 Soak time

After the WP.29/AC.3 decision and in the absence of an EPA representative, the EPA proposal was not discussed.

However, Dr. Shimpi informed the group that EMA is now considering to test one engine according to the EPA proposal in the SwRI program. He added that one EMA member was planning to do testing with different engine sizes. The engine in the SwRI program is the same as for the option 2 program. With the latest amendments to US Part 1065, the requirements for analyzer checks during the soaktime have been changed in a way that would make a 10 minute soaktime technically feasible.

The participants welcomed EMA's contribution. OICA members offered to check internally if they can also contribute to the test program, especially with data from Euro VI prototype light and medium engines. JAMA indicated that data from engines with NSR technology might not be representative for US 2010 technology. It was agreed to first contact EPA to check their acceptance and the data needed.

4.4 Cold start weighting

Mr. Schulte confirmed that the JCAP approach to calculate the cold start weighting factor is acceptable to TÜV Nord. Due to lack of further data, the topic was not discussed at the meeting.

4.5 PM filter specification

Document: GRPE/WHDC/FE 26

Mr. Schulte presented the preliminary test results of engine 1 (SCR/DPF). He reported that on average difference between CVS and raw/PFD was 1.3% for NO_x and 14.9% for PM. However, the absolute PM level was very low ranging between 4 and 6 mg/kWh. The overall variability with the PTFE coated glass fiber filter was 20%, with the best configuration being variant 2 (low dilution, high filter face velocity). No difference between 47 and 70 mm filter diameter was observed. The results with the PTFE membrane filter were inconsistent due to problems with filter handling and filter charging and will be repeated. Subject to confirmation by the test results from engine 2 (SCR), the group agreed on the following, which would resolve option 5:

- The 70 mm filter will be deleted
- Both PTFE coated glass fiber and PTFE membrane filters will be permitted
- Filter face velocity between 0.9 and 1 m/s will be required
- Filter pressure drop requirement will be deleted
- Dilution ratio will be specified
- Double dilution for CVS will no longer be required

5.- OTHER WHDC ELEMENTS

5.1 Gasoline engines

Documents: GRPE/WHDC/FE 20
GRPE/WHDC/FE 21

CATARC presented the test results of the first gasoline fuelled commercial vehicle engine of the Chinese test program (see GRPE/WHDC/FE 20) that was tested on WHTC, WHSC and Chinese test cycles. The engine was a 4 cylinder 2.3 liter engine with TWC and multi-port injection. The gtr definition of n_{hi} is not appropriate for gasoline engines, since normally fuelling will be stopped at 90% of max power. Therefore, n_{hi} was modified to $1.03 * n_{maxpower}$. All cycle statistics were met for this engine. The emissions on the WHTC were considered reasonable, but CO on the WHSC was very high due to high load operation with excess air ratio < 1. It was concluded that WHSC was not applicable to gasoline engines.

JASIC presented very similar findings for a Japanese 4 cylinder 2.7 liter engine with TWC and multi-port injection (see GRPE/WHDC/FE 21). Also here, the n_{hi} definition was modified to $1.05 * n_{maxpower}$. Again, it was concluded that fuel enrichment will lead to high CO emissions under conditions where the engine will normally not be operated. Therefore, major changes to the gtr would be needed.

No progress was reported from the USA. The issue is not high on the priority list, since it is considered a regional problem by EPA.

During the discussion, it became clear that many participants questioned the representativeness of the WHDC cycles for those types of small sized engines. Mr. Narusawa considered it premature to make any decisions at this meeting on the basis of the test results available today. Further discussion would be needed on this topic. Mrs. Yuan

confirmed that China did not see the WHDC as the right solution for gasoline engines, and would therefore accept a regional solution. Since Mr. Laguna also accepted a regional approach for the EU, the group decided to not further pursue this issue within the current WHDC mandate.

5.2 Alignment with NRMM gtr

The secretary briefly explained the major differences between the two gtr's, which are mainly the analyzer linearity and cross sensitivity requirements. A comparison document will be elaborated after the next NRMM meetings scheduled for mid November and 13 January 2009. The secretary asked Dr. Shimpi for assistance.

5.3 Other amendments to gtr n°4

Document: GRPE/WHDC/FE 25

Mr. Hygrel (Volvo, OICA) presented NOx results from an engine equipped with SCR. The results clearly demonstrate that the NOx humidity correction factor works very well for the bare engine, but is not appropriate for the emissions downstream of the SCR system. OICA therefore proposes to delete the NOx humidity correction factor, at least for engines with NOx aftertreatment.

6.- REVIEW OF WHDC TIME LINE

The next meetings will take place as follows:

- 26th WHDC meeting on 13th January 2009, Geneva
- 27th WHDC meeting from 10th to 12th March 2009, Budapest, Hungary
- 28th WHDC meeting in June 2009, Geneva

7.- SUMMARY AND CONCLUSIONS

The secretary summarized the results of the meeting as follows:

- On option 1 (engine power), the secretaries' proposal for amending paragraph 6.3 was principally accepted; the modifications agreed at the meeting will be introduced into the informal document for the January 2009 GRPE session.
- On option 2 (reference fuel), the test programs have not yet started, and therefore the compromise fuel specifications of Inf. Doc. No. GRPE-54-03 will serve as placeholder for the January 2009 GRPE session; the 5% biofuel content was accepted and will be added to the reference fuel specification table.
- On option 3 (soaktime), EMA offered testing one engine according to the EPA proposal; with this opening of the situation, Japan and OICA will also consider to contribute; prior discussion with EPA will be needed.
- On option 4 (cold start weighting factor), no new results were presented; TÜV Nord confirmed that the Japanese approach presented at the last meeting was acceptable.
- On option 5 (PM filter specification), it was agreed, based on preliminary TÜV Nord data, to delete the 70 mm filter diameter and to allow both PTFE coated glass fiber and PTFE membrane filters; final confirmation will be needed after completion of the test program.
- China and Japan presented test results with HD gasoline engines, which show that major modifications to the gtr would be needed for extension of the scope; it was agreed to drop this issue from the gtr, and to seek for regional regulations for HD gasoline engines, instead.

- Alignment with the nonroad gtr will be decided after the meeting of the nonroad working group scheduled for mid November 2008; the secretary will send out the proposal to the WHDC group before the next WHDC meeting.
- The OICA proposal on deleting the NOx correction factor will be discussed at the next meeting.
- It was agreed that only the amendments to gtr n°4 and not the complete gtr with amendments will be presented as informal document to the next GRPE; this will facilitate reading the document for the GRPE members.
- The 27th WHDC meeting will be from 10th to 12th March 2009 in Budapest, Hungary

8.- OTHER BUSINESS

None.
