

## MINUTES ON THE 2<sup>nd</sup> GRPE INFORMAL GROUP MEETING ON RETROFIT EMISSIONS CONTROL DEVICES (REC) Brussels, 27 September 2010, 10:00 – 12:30

### 1. Welcome and Introduction

The *chairman* welcomed participants. The attendance list is attached as REC-02-03.

### 2. Approval of the draft agenda

The draft meeting agenda was approved without change (document REC-02-02).

### 3. Approval of the draft minutes of the 1<sup>st</sup> REC meeting held in Geneva on 07 June 2010

The minutes of the REC-01 meeting (document REC-01-03) were approved without change.

*Bosteels* noted that the documents are uploaded on the GRPE-REC web page:

<http://www.unece.org/trans/main/wp29/wp29wgs/wp29grpe/rec01.html>.

### 4. Review of the mandate for the REC informal group of GRPE

It was noted that the mandate was agreed by GRPE. The document will be posted on the GRPE-REC web site (document REC-01-05).

### 5. Presentations and discussion documents from stakeholders

#### 5.1 Chairman

The *chairman* said that he has worked on a draft template for the Regulation, but it was not yet ready to distribute.

#### 5.2 European Commission

*Åsman* explained that in the latest TCMV meeting (17 September) there was an agenda item on 'future approach for emissions'. There have been discussions with Member States and DG-Environment on the difficulties of meeting the EU air quality legislation. In this context also the role of this REC group has been discussed. DG-Enterprises intends to have a workshop involving Member States as well as stakeholders with the topic "Future approach on emissions" later this year (tentatively scheduled for November) with the objective to form a roadmap on the needed actions for the emissions legislation both for light duty cars as well as for heavy duty vehicles. This roadmap should also cover retrofits. The Commission recognises that the REC group should be the forum for discussion of harmonisation of retrofit legislation and could be used to give guidance for Member States on the subject.

#### 5.3 National authorities

##### 5.3.1. Switzerland

*D'Urbano* presented a short summary of the Swiss Regulation on retrofit for NRMM (document REC-02-05).

The new provisions for Switzerland are valid for all construction sites in that country. They apply to all new applications  $\geq 18\text{kW}$  and there are retrofit requirements for engines  $\geq 37\text{kW}$  built between 2000 and 2008. Emissions from construction machines must meet the requirements of Directive 97/68/EC plus a particle number count limit of  $1 \cdot 10^{12}/\text{kWh}$  on the NRTC and NRSC. The latter is deemed to be met for approved DPF. Data from OEMs shows results 100 times below this limit.

The requirements for approved particle filter systems are that they must separate 97% of solid particles of 20-300 nm diameter in new condition and after 100 h in typical operation. They must separate 90% of solid particles during regeneration. There are also requirements on electronic monitoring of pressure loss, opacity and machinery labelling. DPFs must not be capable of being installed in reverse-flow direction and must not use copper additives or copper catalytic coatings. FOEN publishes a list of approved particle filters (available on their website) and operates a

system for accreditation of testing labs. Currently AFHB (Biel), AVL-MTC and EMPA are approved and discussions are under way with SwRI.

**Baarbé** asked whether there was any requirement on NO<sub>2</sub>. There are passive systems where it is difficult to assess NO<sub>2</sub>, **D'Urbano** commented, and that it had originally been considered – the main problem, though, is considered to be NO<sub>x</sub> from the engines rather than NO<sub>2</sub>.

### 5.3.2. Germany

**Schulte** reviewed the German Anlage XXVII which was notified to Brussels in 2006 (documents REC-02-06 and REC-02-07). It includes PM limits in g/kWh – efficiency is only used for system classification, not for showing emissions stage compliance as requirements for MAUT and for environmental zones are based only on EU emissions limit values. Aftertreatment DPF families are defined and the requirements are technology-neutral. If a regeneration additive is used UBA needs to confirm/approve its use. The manufacturer/applicant is responsible for durability and installation has to be done in a notified garage or installation shop.

'Regulated' (>90% efficiency) and 'unregulated' systems (min. 30% or 50% efficiency) are defined. The testing burden is greatest for the least efficient systems. Testing requirements differ for continuous- or periodically-regenerating systems. Anlage XXVII does not allow a DPF retrofit to jump completely from one emissions stage to another because EU emissions stages include provisions other than PM.

For future use, the current ±15% cylinder displacement criterion for families has proven to be a little too narrow. Schulte also suggested that a minimum catalytic coating requirements should be used for testing and additional requirements on NO<sub>2</sub>, durability, in-use checks and CoP may be needed. Provisions for NRMM are not currently fully covered and consideration of different power classes and test cycles may need to be considered in applying Anlage XXVII to NRMM. The UBA is, Schulte said, developing proposals for NO<sub>2</sub> and consideration is being given to what requirements would be needed for NO<sub>x</sub> retrofit systems.

**D'Urbano** asked what labs. could undertake testing? **Schulte** responded that German labs approved for Type Approval testing can be used – in principle this could be extended to labs outside Germany. In response to a question from **Steenackers**, **Schulte** said that stationary applications such as gensets, which are not covered by the German road traffic acts, are not covered by Anlage XXVII.

**Baarbé** commented that the Dutch regulations were developed following discussions with Germany and are very similar to Anlage XXVII, but with reduced durability (25 cycles instead of 100) and strengthened CoP requirements. He also commented that a list of retrofit approval schemes had been developed in the previous JRC working group, and suggested that this could be submitted to a future meeting of this group.

## 5.4 Industries

### 5.4.1. CLEPA

**CLEPA** presented its initial views (document REC-02-08) and said that although there is experience with the ETC for on road vehicles, the NRTC has not been used for any NRMM applications before Stage IIIB – the engines were not built to be run on this cycle and have not been tested on it. They are all certified on steady state cycles. The test cycle for approval of retrofits for NRMM should therefore be similar to the one that was originally used for Type Approval of the engine.

Concerning regeneration testing, the max. 100 h cycle and soot filling procedure specified in para. 4.3 of Annex XXVII have very poor reproducibility and CLEPA is concerned about the stability of the results. CLEPA is working on a much simplified alternative method.

The costs of testing to Annex XXVII are excessive, in CLEPA's view.

CLEPA strongly supports the proposals to include NO<sub>x</sub>-only retrofit systems in the work of the group. NO<sub>2</sub> is related to operating temperature. The cycle may well be hotter than real-life use, so testing procedures need to consider NO<sub>2</sub> emissions in lower temperature use.

CLEPA is therefore ready to contribute to the working group with the aim to improve the cost-benefit of the Type Approval test.

**Baarbé** commented that it is difficult to achieve repeatability, especially with so-called partial flow filters.

**Schulte** commented that most of the development work on NRTC was done on Stage II engines, so even engines with a mechanical governor should be able to cope with this cycle. **Stein** said that the NRTC includes representative cycles for various types of machine and they would strongly oppose the development of any new cycle. If a DPF is certified for a Stage IIIB engine, it has to be done on the NRTC and NRSC. **Steenackers** commented that if the electronics that enable a machine to be run on a different cycle are not installed then testing on a different cycle would not be possible. **Schulte** said that in Anlage XXVII the retrofit manufacturer has to request information (e.g. on back-pressure) from the OEM. **Steenackers** said that this may work in national legislation, but it does not work internationally. **Billi** disagreed, saying that most OEMs are international.

## 5.5 Other stakeholders

There were no other presentations.

In general discussions:

**D'Urbano** suggested that the group should develop some mechanism by which existing approvals to national systems could be transferred to any new harmonised system. **Baarbé** commented that some transitional provisions could be considered once the requirements of any ECE Regulation are agreed.

**Baarbé** commented that he had recently received information from Transport for London that they have introduced a requirement in their retrofit scheme for NO<sub>2</sub> to be no more than 30% above the engine-out NO<sub>2</sub>. This is, he said, less stringent than the US CARB requirement.

In a further discussion on test cycles, **Stein** said that if engines are to be upgraded to Stage IIIB requirements by retrofit, then the test cycle should be the NRTC, as would be required for original equipment at Stage IIIB. The cycles to be used for constant-speed engines were also discussed. **Baarbé** felt that reproducibility is a key item which will have to be addressed in the development of any new requirements.

**Billi** said that any regulation needs to consider installation and safety "as normally these systems interfere with the safety performance of the machines". **Schulte** said that Anlage XXVII requires that the registration requirements of the vehicle are still met. This would need to be extended to the machinery Directive for NRMM. **Baarbé** considered that this would have to be done in national requirements as the specific machines to be retrofitted would already be in service. He asked **Billi** to prepare a one-page summary of concerns and possible solutions regarding machinery requirements. **Germany** considered that requirements should be included in any eventual retrofit regulation to ensure that it is checked that (with the retrofit in place) the vehicle/machine continues to meet all other requirements (safety, visibility, surface temperatures, EMC...). **Åsman** said that the issues should be highlighted but should be addressed separately from the emissions requirements. **Billi** agreed in general but said he had experience of tractors in Switzerland "with huge barrels in front of the windscreen". The eventual Regulation must therefore "wave a big red flag". **D'Urbano** said that guidelines had been prepared in Switzerland (available in German only) and he could supply a copy of these.

**Stein** proposed that an ECE Regulation should be developed based on Anlage XXVII and offered to develop this in co-operation with TÜV Nord. **Steenackers** said that CLEPA would wish to be involved. **Signer** said that OICA supported the Euromot proposal to develop a proposal based on Anlage XXVII as a single regulation covering both heavy-duty and NRMM, perhaps with different chapters for the two applications. The chairman welcomed the offer from Euromot and felt that this would be a suitable approach. **CLEPA** and **AECC** also supported such a scheme based on Anlage XXVII and asked to be involved in the development.

**D'Urbano** suggested that for retrofitting to Euro VI there should be a requirement for PN. **Stein** said that this should not apply to NRMM Stage IV where there is no PN requirement. **Schulte** suggested a measurement requirement for NRMM, rather than a limit.

In a further discussion on NO<sub>2</sub>, **Baarbé** proposed that the requirements should allow for systems which did not have NO<sub>2</sub> requirements as well as for ones where the increase in NO<sub>2</sub> would be limited. **CLEPA** argued that both NO<sub>2</sub> and PN requirements should be the same as for OE. **Stein** agreed that PN limits should not be set where there is no OE requirement. **Baarbé** commented that two sponsoring countries see a need for a particle number requirement.

## **6. Next steps**

### **(a) Roadmap and project planning**

The REC project is due to run to mid-2012.

### **(b) Contributions from contracting parties**

Euromot, TÜV, CLEPA, OICA, AECC, Switzerland, the Secretary and the Chairman will work together to develop a draft regulation based on Anlage XXVII.

Schulte will provide the English version of Anlage XXVII.

Baarbé will provide an English-language version of the Dutch requirements.

Billi will submit a short paper on conflicts with other machinery requirements.

D'Urbano will provide Swiss guidelines on safety etc. (documents REC-02-09 and -10)

### **(c) Meetings**

The next meeting (REC-03) is currently scheduled on Monday 10 January 2011, 10.00 – 12.30 in Geneva. It was suggested to contact the GRPE secretariat to avoid having the meeting on the Monday morning and to look for another date during GRPE week.

**Billi** suggested that original equipment machinery manufacturers should also be encouraged to participate.

## **7. A.O.B**

There was no other business from a Tour de Table.