

Draft Minutes on the 4th GRPE-REC informal group meeting 31 March 2011, 09.30 – 13.00, Brussels, DG-ENTR

1. Welcome & Introduction

The REC Chairman Henk Baarbé welcomed participants. A tour de table allowed participants to introduce themselves. The attendance list is in document REC-04-05.

2. Approval of the draft agenda

The agenda for the REC-04 meeting was adopted without change.

3. Approval of the draft minutes of the 3rd REC meeting (Geneva, 11 January 2011)

The minutes of the REC-03 meeting were adopted without change.

4. Discussion of draft REC Regulation

a. Draft REC Regulation – doc. REC-04-03

Baarbé advised participants that the latest draft had been prepared by Mr. Schulte (TÜV), following comments at the Geneva meeting, with additional input from Simon Davies (UK DfT).

Section 1: Purpose

Two alternative texts for the 'purpose' section had been prepared. EMA commented that that the text should refer to vehicles *and machinery*.

Signer wanted to have the correct term for 'PN' as 'PM number', which is used in EU Regulations.

Stein pointed out that the phrase 'worldwide harmonised' is incorrect as REC will be an UNECE Regulation, not a gtr.

Section 2: Scope

It was noted that the scope has been amended to include constant speed engines.

Billi said that the reference to T category vehicles in section 2.3 is not needed as Reg. 96 already covers such vehicles. He also said that 2.4 and 2.5 which define variable and constant speed engines are similarly unnecessary. Schulte said that it had been agreed that these were necessary to cover any machinery not approved to Reg. 96.

Belaen asked whether it would be sensible to limit the scope so as to exclude very old machinery. Baarbe explained that this had previously been discussed and it had been agreed that they should not be excluded.

Belaen then proposed that Stages IIIB and IV should be excluded. The chairman saw no reason to exclude them from the scope.

Igoe asked whether other verifications (e.g. US) would be accepted. Schulte noted that para 2.6 says that "contracting parties may choose to recognise other regulations as being equivalent to this regulation."

D'Urbano asked whether it would be useful to include a list of such schemes. The chairman said that this would be up to the contracting parties, but could be considered later.

Section 3: Definitions

Under section 3.4 (definition of Class A retrofit device) it was felt that the wording of the requirement on NO₂ (based on California requirements) is unclear.

Bortfeld said that the CARB wording has now been changed and should be reviewed.

Eberhardt felt that the wording should not rely on the California wording but be specifically developed for the European situation.

Baarbé suggested introducing a separate category for systems that give no NO₂ increase. Tremayne commented that London had recently reviewed the NO₂ requirement based on European test procedures and concluded that the figure should be 30%.

Müller suggested an absolute limit (g/kWh) rather than a percentage figure. Baarbé said that this would require every combination of engine and filter to be tested but Müller said that this could be included in the family definition.

Eberhardt felt that 20% still was too high but could support Baarbé's proposal.

May asked whether such a class would require additional controls. Baarbé responded that in specific cases the filter would simply block and the engine would stop working, so it would be self-resolving.

Stein agreed that the regulation must have a clear requirement to ensure that regeneration actually occurs. Baarbé said that the manufacturer would have to suit the regeneration system to the application and this could not be determined at the time of Type Approval.

Billi quoted the Italian retrofit manufacturers' association that the state of the art is a 5% increase in NO₂. Tremayne said that this would limit the number of systems available. Igoe noted there is a trade-off between NO₂ and operability considerations.

Billi said that for NRMM operators would need to be aware of increased NO₂ levels, particularly in closed spaces. D'Urbano pointed out that this is covered in most countries by workplace atmosphere legislation. Eberhardt proposed that there should be a class A* with near-zero NO₂ increase.

Bortfeld said that in section 3.7 (Reduction level) it should be made clear whether this is the reduction from raw exhaust (engine out) or tailpipe. He added that there is also a problem in the combination of Stage levels and percentage improvements in that case. Schulte said that this is independent of the OE aftertreatment.

A definition of NO₂ still needs to be discussed.

The definition of "particulate reduction system" will be clarified to show that it includes the regeneration system.

Text to ensure that the parameters specified by the OEM (e.g. back-pressure) are not changed is currently placed in the section but is to be included in a later paragraph. Similarly a paragraph with a demonstration requirement if parameters such as EGR are changed would be included in a later section. This is to ensure that functioning of the engine or existing aftertreatment is not affected.

Section 4: Reduction levels

Table 4.1: Reduction levels

	Reduction efficiency (%)	
	NOx	PM
Reduction Level 1	33 (<i><25 / >25</i>)	50 (<i><25 / >25</i>)
Reduction Level 2	66 (<i>>40 / >55</i>)	90 (<i>>50</i>)
Reduction Level 3	80 (<i>>70, further step >85</i>)	90 (<i>>85</i>) / PN

(Values highlighted in *italic* copied from California Code of Regulations, Title 13, Division 3, Chapter 14.)

Eberhardt said that only 2 levels of NOx reduction are needed – 40-50% and 70-80%. Germany is also not convinced that a PN limit should be included as this is only called up in Euro VI.

There was then a discussion on whether the intent is to have the two requirements (percentage reduction in Table 4.1 and Euro stage upgrade in Table 4.2) both required (as in Anlage XXVII) or whether they would be 'either-or' for contracting parties.

Bortfeld said that the combination would require Stage IIIB PM to be upgraded when it is already the same as Stage IV. Baarbé said that the intent is to exclude systems which would provide only a small improvement whilst giving a change in emissions class.

D'Urbano felt that it would be appropriate to allow contracting parties to select either or both, but would not be against combining both. However inclusion of PN is essential for Switzerland. Billi said this would be decision for the local authority, not the contracting party.

Eberhardt considered that the process would be worthless if both requirements are not included as a requirement. VDMA supported the 'either-or' option. Eberhardt remained concerned that it might open the door (as a legal requirement of contracting parties) to allowing systems approved to the Regulation that met only one requirement. The chairman noted that the GRPE chairman and UNECE staff are currently examining whether Regulations can include different stringency levels.

The chairman asked members to send possible solutions to this issue and the drafting group will attempt to find a solution. He also proposed resolving the issue of PN by putting it into the annex with secondary pollutants.

Table 4.2: REC Classes / Reduction level:

	Reduction level applicable	
	NOx	PM or PN
Class A	-	1 or 2 (or 3)
Class B	1 or 2 (or 3)	-
Class C	1 or 2 (or 3)	1 or 2 (or 3)

The chairman proposed replacing 'class' by 'category' and retaining 'class' only for reduction levels.

Table 4.3: REC Matrix for Regulation No. 49

Base	Component	Class A	Class B	Class C
Stage A	NOx	5,0 g/kWh	3,5 g/kWh	3,5 g/kWh
	PM	0,02 ¹⁾ / 0,03 ²⁾ g/kWh	0,10 ¹⁾ / 0,16 ²⁾ g/kWh	0,02 ¹⁾ / 0,03 ²⁾ g/kWh
Stage B1	NOx	3,5 g/kWh	2,0 g/kWh	2,0 g/kWh
	PM	0,02 g/kWh	0,02 ¹⁾ / 0,03 ²⁾ g/kWh	0,02 g/kWh
Stage B2 / EEV	NOx	2,0 g/kWh	400 ³⁾ / 460 ⁴⁾ mg/kWh	400 ³⁾ / 460 ⁴⁾ mg/kWh
	PM	10 mg/kWh	0,02 g/kWh	10 mg/kWh

- 1) for the ESC cycle
- 2) for the ETC cycle
- 3) for the WHSC cycle
- 4) for the WHTC cycle

Base	Component	Class A	Class B	Class C
Stage II	NOx	Stage II	Stage III A	Stage III A
	PM	Stage III A	Stage II	Stage III A
Stage III A	NOx	Stage III A	Stage III B	Stage III B
	PM	Stage III B	Stage III A	Stage III B
Stage III B	NOx	Stage III B	Stage IV	Stage IV
	PM	Stage IV	Stage III B	Stage IV

Signer noted that most Euro IV and V engines use SCR. OEMs believe that the system from the engine to the SCR catalys must not be modified without full approval of the OEM. The same applies to Stage IIIB engines. There are also safety issues for retrofitting of, for example, tractors. Schulte said that CARB requires retrofit manufacturers to talk to the OEMs and to take responsibility. He agreed that the text in 3.29 could be strengthened to show that the OEM system must not be modified or the retrofitter has to work with the OEM to provide an integrated system. Baarbé said that at the June meeting he could provide some information on a study of downstream fitment of aftertreatment.

Schulte proposed deleting the possibility to retrofit from Euro IV/V to Euro VI and to create a separate Annex for Euro VI. It was also clarified that it is intended that retrofit could take a vehicle

from Euro n to Euro n+x, but would not allow re-approval of the vehicle/machine to the full requirements for the higher Euro stage.

PN would be included either in the Euro VI annex or that on secondary pollutants. Signer said that there must be a proper scientific basis for any requirement on PN. Baarbé noted the AECC data on PN from an NRMM engine. Signer said that this is one engine out of hundreds.

Williams said that at some point there will be a study for Stage V and only then could a PN limit be discussed. Baarbé said that there is Swiss experience on this. Signer said that the Swiss data is all from testing on one engine. D'Urbano felt that the regulation should look to the future. It was noted that the regulation can always be updated. Baarbé said that the intent is to ensure that filters are effective for particle number.

Schulte asked for ideas on how to improve the NRMM tables, taking into account the different power classes.

Section 5: Requirements for retrofit emission control devices

The durability requirements have yet to be defined. It was commented that artificial ageing might be considered.

Igoe queried the minimum durability requirements of [200 000] km/ [6] years for HD or [4000] hours/[6] years for NRMM, which it was explained came from Anlage XXVII. They commented that these figures were double normal warranty requirements.

Åsman said that the requirement is to show durability (not a warranty requirement) and suggested that suitable text is available in Euro VI.

Bortfeld asked whether the hours/km should be reduced, but Eberhardt felt that the km specified equated only to 2 years use and should not be reduced. He was supported by Åsman.

Williams commented that for engines >37kW the hours quoted equate to half of engine useful life. Igoe said that the figures sounded reasonable.

The Chairman asked for members to submit reasoned arguments for any other proposals.

Section 6: Compliance criteria for particulate reduction REC

It was proposed that "[Minimum] thickness of the coating of the particulate reduction system or upstream catalysers (g/ft³)" should be changed to "[Minimum] total charge of catalytically active materials".

It was agreed that Section 6.2 (Further use of the existing oxidation catalyser(s)) could be deleted as there are no such systems in the field.

Section 7: Compliance criteria for NOx reduction REC

Baarbé said that there is a programme in the UK aimed at having a NOx reduction scheme available for September this year. He proposed liaising with the UK with the aim of using the UK proposal in the UNECE Regulation.

Müller asked whether this would be ready in time to allow submission for the June 2012 GRPE. Baarbé said that it was worthwhile to await 2-3 months to see what develops in the UK rather than trying to work in parallel. He will contact Simon Davies to understand how the work is progressing.

Section 8: Active Devices

Section 9: Fuel

Müller asked why the maximum change in fuel consumption was 4% and said there should be some examination of trade-offs. Schulte said that this was based Anlage XXVII to allow for active regeneration and has proven to be reasonable. It was clarified that this did not refer to SCR.

Billi pointed out that there is no fuel consumption test for NRMM. Schulte proposed modifying this to specific fuel consumption over the applicable test cycle. Billi proposed referencing Reg.120, but Stein felt that this was already covered in the emissions test procedure.

Baarbé suggested that retrofit may be required in some areas with higher sulfur fuel and some systems may be sulfur-tolerant. He proposed allowing certification of sulfur-tolerant systems. Schulte felt that this was already covered in section 8.2 allowing testing on market fuels.

Section 10: Choice of the test engine

It was agreed to adopt the CARB requirements on test engine and REC combination.

Section 11: Test of a particulate reduction REC

Bortfeld proposed deleting the opacity test. After discussion this was agreed.

Section 12: Family Criteria

Schulte briefly reviewed the contents of this section. He then said that the following sections in the REC-draft have not been further worked on.

b. UBA NO₂ measurement procedure – doc REC-04-04

Stein said that the UBA procedure could not be directly adapted into the regulation. It is not acceptable to use only the urban part of the ETC nor to specify HC and NO_x levels. In addition it would require an additional test.

It was agreed that written comments on the document should be sent to Schulte.

c. Other input

There was no further input.

5. Next Meeting(s)

Eberhardt proposed two drafting groups to speed up the process – one on particle retrofit led by Schulte and Eberhardt and a second on NO_x. AECC and Baarbé offered to work on NO_x retrofit with the UK DfT.

Savvidis proposed a separate group for non-road and that that group should also do some cost-benefit analysis. Stein said that the REC mandate has been set in Geneva to cover both HDV and NRMM. Baarbé said that there is no need to generate additional information on cost-benefit. There have already been a number of studies on the subject. Eberhardt commented that the regulation would not be mandatory but would be available for use by contracting parties if desired.

It was suggested that there could be some text on specific safety.

6. Any Other Business

None.