



## **AECC POSITION ON THE PRELIMINARY DRAFT PROPOSAL FOR A COMMISSION DIRECTIVE ON EMISSIONS FROM MOTORCYCLES, TRICYCLES, QUADRICYCLES AND MOPEDS**

**AECC\*** is pleased to provide comments on the preliminary draft proposal for a Commission Directive adapting to technical progress Directives 97/24/EC and 2002/24/EC, which will amend the emissions requirements for mopeds, motorcycles, tricycles and quadricycles.

AECC wishes to comment on a number of items covering both the format of the proposed Directive and the technical content. For clarity, these comments have been grouped under specific headings rather than in order of the draft directive text. Our comments include reference to data from the AECC Motorcycles Programme, details of which were presented to the MVEG Motorcycles group on 13 July 2004 and which have been published in SAE paper 2005-01-2156.

### **REGULATORY APPROACH**

Directive 2002/51/EC required the Commission to make proposals to the European Parliament and Council for a number of changes to emissions requirements to be applied from 2006 including Stage 2 emissions limits for tricycles and quadricycles; Stage 3 emission limits for mopeds; durability and in-use conformity; particulate emissions and CO<sub>2</sub> measurement. It also required a Commission proposal on test methods for the measurement of particulate emissions to be submitted to the Committee for Adaptation to Technical Progress. Finally it required the Commission to present a proposal for inclusion of the World Harmonised Motorcycle Test Cycle (WMTC) with a set of limit values correlated to Euro 3 (2006) levels.

The proposed Commission Directive would introduce the WMTC with limits intended to be correlated to the current limits for Euro 3, in line with the requirements of 2002/51/EC. But it would also introduce, via comitology, the new limits for tricycles and quadricycles and for mopeds and the requirements for durability which were intended to be introduced via the co-decision procedure. In all previous emissions Directives 'political' parameters such as limit values and durability requirements have been set via the co-decision process. This proposal thus provides limited opportunity for the European Parliament to express its views on these political issues.

### **WMTC LIMIT PROPOSALS**

1. The proposed limit values are derived from, but significantly different from, the figures suggested by the recent DG-JRC report<sup>1</sup>. The JRC report suggested limits of 2.62 g/km CO for all motorcycles, 0.75 g/km HC for motorcycles <150cc and 0.33 g/km for motorcycles ≥150cc, and an option for NOx of either a limit of 0.17 g/km for all motorcycles or a higher limit of 0.22 g/km for Category 3 (as defined in the WMTC) motorcycles and 0.17 g/km for Categories 2 & 3. The separate HC limits for motorcycles <150cc and ≥150cc is in line with the current requirements for Euro 3 on the European (ECE+EUDC) cycle.

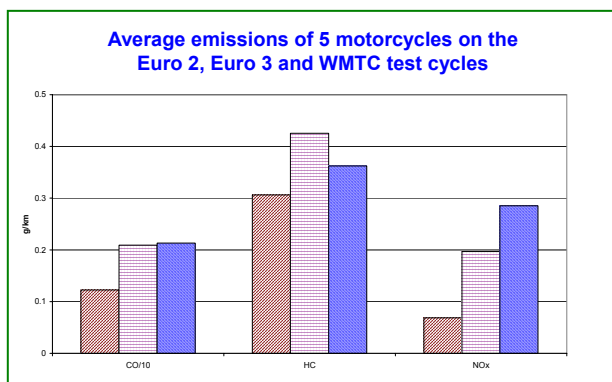
The proposal modifies this to set separate limits for each of three WMTC classes. Thus the proposal for Category 1 aligns with the JRC proposal as all Category 1 motorcycles are <150cc. Similarly the proposal for Category 3 aligns with 'Option 2' of the JRC proposals, but whilst the CO and NOx limits for Category 2 reflect the JRC proposals the HC limits allow an increase of more than 125% for larger motorcycles (over 150cc) providing their speed is capped at 130km/h. In particular Class 2-2, which covers machines capable of speeds up to 130/km/h, would only have to meet this relaxed limit. This could thus provide a significant 'loophole' for larger motorcycles to meet much more relaxed emissions requirements. A comparison of the figures from the JRC report and from the proposed Directive is shown in Table 1:

HC LIMIT VALUES	ENGINE CAPACITY	V <sub>MAX</sub>	JRC PROPOSAL	COMMISSION DRAFT
	CC	km/h	g/km	g/km
CLASS 1, SUB-CLASS 1-1	≤ 50	> 50, ≤ 60	0.75	0.75
CLASS 1, SUB-CLASS 1-2	> 50, < 150	< 50	0.75	0.75
CLASS 1, SUB-CLASS 1-3	< 150	≥ 50, < 100	0.75	0.75
CLASS 2, SUB-CLASS 2-1 and	< 150	≥ 100, < 115	0.75	0.75
	≥ 150	< 115	0.33	0.75
CLASS 2, SUB-CLASS 2.2	ALL	≥ 115, < 130	0.33	0.75
CLASS 3, SUB-CLASS 3-1	ALL	≥ 130, < 140	0.33	0.33
CLASS 3, SUB-CLASS 3.2	ALL	≥ 140	0.33	0.33

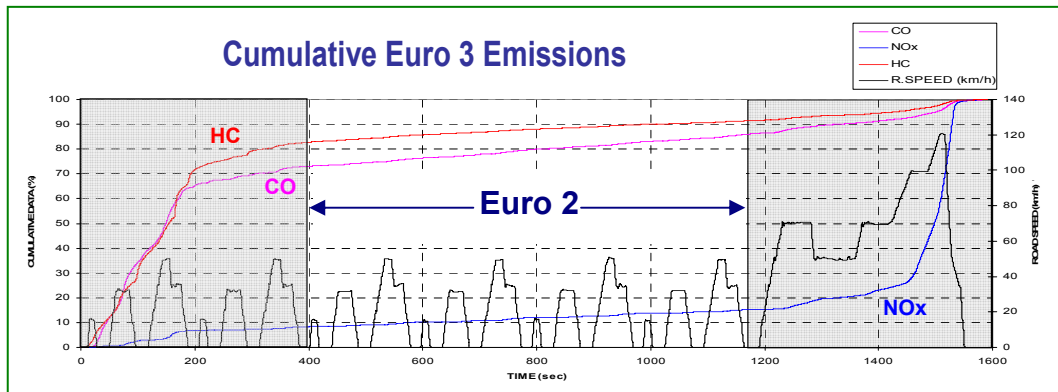
**Table 1:** Comparison of HC limit values from JRC report and Preliminary Draft Directive.

2. The correlation of limit values for the Euro 3 cycle and the WMTC should ideally be established using motorcycles that already meet the requirements for Euro 3 which were laid down in 2002. However, as these requirements do not come into force until 2006 it must be accepted that existing motorcycles must be used. To obtain the most realistic correlation for future Euro 3 machines the vehicles selected should be those using the state-of-the-art technologies which are likely to continue in use for Euro 3. Whilst the JRC report has attempted to meet this requirement by selecting correlation factors for catalyst-equipped vehicles, it must be recognised that only three of the 34 catalyst-equipped machines actually meet Euro 3 requirements (and 3 fail to meet even Euro 2 requirements). Neither could all the systems be described as state-of-the-art, as not all have three-way catalysts and one still uses carburettor, rather than fuel injection for fuelling control. The best correlation factors should be obtained by using only those vehicles with closed-loop controlled three-way catalyst systems expected to be required to meet Euro 3.

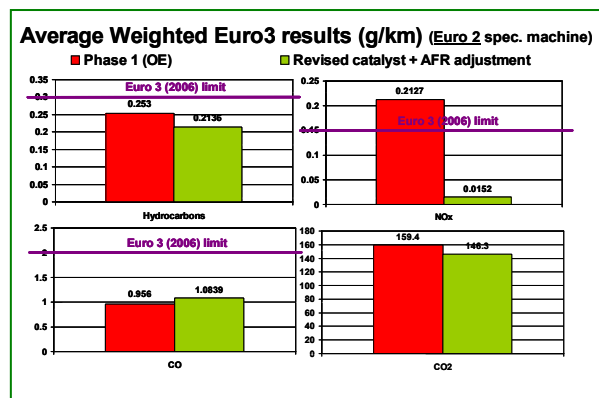
3. The AECC test programme in 2003 attempted to establish the correlation factors using modern, state-of-the-art motorcycles. This programme showed that the WMTC NO<sub>x</sub> figure proposed by the JRC for Category 3 motorcycles is reasonable, albeit still based on Euro 2 calibrated machines. It also showed that much better figures for CO and HC are achievable with recent-technology systems. The equivalent WMTC limits, based on the AECC test work, would be 2.0 g/km CO - the same as for the Euro 3 cycle - and 0.26 g/km HC, somewhat lower than the Euro 3 cycle.



4. The vehicles used for the JRC correlation exercise will have been calibrated and tuned to, at best, the Euro 2 requirements. The changed cycles for Euro 3 (whether European cycle or WMTC) will require new calibrations for manufacturers to achieve their optimum balance of emissions with performance and driveability. The chart below shows the effect of the addition of the extra-urban cycle on cumulative NO<sub>x</sub> and the effect of the cold start on CO and HC.



5. The AECC test programme also confirmed that the motorcycle calibration can be adjusted to match the requirements of different cycles. The results from machines calibrated for the new cycles are thus likely to differ from current calibrations and permit, as demonstrated by AECC, lower NOx emissions. The chart shows the improved (90% reduction) NOx results from a modern Euro 2 motorcycle in original condition and after fitment with an improved catalyst and simple modifications to the calibration.



## DURABILITY

- The table of durability requirements shown in Annex VIII does not align with the WMTC motorcycle categories (classes). In the WMTC, Class 2 includes motorcycles both above and below 150cc and with different Vmax, but only single values are shown in the proposal. Similarly, Class 1 in the WMTC includes sub-classes with different Vmax, whereas the draft directive shows Vmax as 'not applicable'. Also Class 3 has 2 sub-classes in the WMTC, whereas the draft directive shows it only as  $\geq 130$  km/h. The requirements should align with the WMTC categories.
- The table in Annex VIII introduces a new fourth level of durability requirement set at 18000 km for Category 2 motorcycles. Previous discussions had centred around three different levels: 10000 km for mopeds, 12000km for 2-strokes, tricycles, quadricycles and 4-strokes <150cc and 30000 km for 4-strokes  $\geq 150$ cc.  
Assuming that the new table is intended to indicate that durability requirements are the same for 2-strokes as for 4-strokes, it is still not clear whether the requirements also apply to tricycles and quadricycles, as previous wording (e.g. the table of emission limits) applies the term motorcycles specifically to two-wheelers.
- Critically, the new 18000 km level makes a significant reduction in durability requirements for all larger ( $\geq 150$ cc) motorcycles with maximum speeds below 130 km/h. This proposal therefore builds upon the significant loosening of emissions limit values for these motorcycles by reducing the durability requirements by 40%. The two proposals together could result in a significant shift in the market to speed-limited machines which have to meet substantially looser requirements on both emissions and durability.



## IMPLEMENTATION DATES

The implementation dates are not defined in the current draft.

## OTHER ISSUES

The LAT report<sup>2</sup> which provided data on the cost-benefit of requirements for in-use compliance, PM control, new limits for mopeds, tricycles & quadricycles, roadworthiness, OBD etc. which were foreseen in 2002/51/EC includes cost figures that in AECC's view are unreasonable.

The LAT report uses a 300% mark-up for the costs of technologies to reflect the actual 'cost' to the consumer. This appears to be based on undisclosed data on retail costs for some replacement catalysts relative to production costs rather than on the costs for series-production original equipment. Applying this artificial mark-up distorts the cost/benefit study. In fact it results in a serious overestimation of the cost-factors that are used in the cost/benefit calculations. In real terms prices are not derived by multiplying costs by a mark-up factor. Any price is established in a market and driven by market forces in a competitive environment.

As a result the emissions levels suggested as being cost-effective may thus be higher than would have been proposed with a more realistic cost level, and measures which have not been included in the proposals may have been more cost-effective than reported.

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<sup>1</sup> EURO3 Stage for motorcycles: Derivation of equivalent limits for the WMTC driving cycle, P. Bonnel, G. Martini, A. Krasenbrink; DG-JRC, July 2005

<sup>2</sup> Final Report on: "Impact assessment/Package of New Requirements Relating to the Emissions from Two and Three-Wheel Motor Vehicles", L.Ntziachristos, A. Mamakos, A. Xanthopolous, E. Iakovou; Laboratory of Applied Thermodynamics, Aristotle University, Thessaloniki, July 2005.

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*\*AECC is an international non-profit scientific association of European companies engaged in the development, production and testing of catalyst and filter based technologies for vehicle and engine emissions control. This includes the research, development, testing and manufacture of autocatalysts, ceramic and metallic substrates and speciality materials incorporated into the catalytic converter and filter and catalyst based technologies to control diesel engine emissions (especially particulates and nitrogen oxides). Members' technology is incorporated in the exhaust emission control systems on all new cars and an increasing number of commercial vehicles, buses and motorcycles in Europe.*

*AECC's members are: Argillon GmbH, Germany; Corning GmbH, Germany; Delphi Automotive Systems SA, Luxembourg; Emitec Gesellschaft für Emissionstechnologie mbH, Germany; Engelhard Technologies GmbH, Germany; Ibiden Deutschland GmbH, Germany; Johnson Matthey PLC, United Kingdom; NGK Europe GmbH, Germany; Rhodia Electronics & Catalysis, France and Umicore AG & Co. KG, Germany.*