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CONSIDERATION OF MEASURES AIMED AT PREVENTION OF AIR POLLUTION FROM INLAND NAVIGATION VESSELS

Addendum 1

Transmitted by the European Association of Internal Combustion Engine Manufacturers (EUROMOT)

**Legislation of exhaust emissions from commercial marine CI engines:
Euromot proposal for regulatory alignment**

I. Introduction

1. Euromot contends that there is a need for international harmonisation of the regulation of exhaust emissions from diesel engines used in commercial marine applications. There are existing regulations which control, or will control when they become effective, exhaust emissions from marine engines. The differing requirements of these regulations will have unfavourable consequences for engine and boat/ship manufacturers, consumers, and indeed also for the environment, particularly in consideration of possible future development of these regulations carried out independently by the various authorities involved.

2. The need to develop different engine specifications in order to compete effectively in different regulated territories increases industry's costs, sometimes to the point where the business case for continuing to serve certain market sectors may not be sustained. The consumer is impacted by higher prices since competition is reduced and the manufacturer's fixed cost are amortised over lower production volumes when the global market is fragmented. Proliferation of regulation does not serve the environment either as industry's research and development resource is diluted in developing and certifying various ranges of engine specifications rather than being applied to develop more advanced emission control technology for future engines. Also if there are various emissions standards, by implication one is more stringent than another and, therefore, all territories are not benefiting from the optimum achievable control of emissions.

3. Industry does not resist the introduction of exhaust emissions legislation when there is an environmental imperative. However, it is industry's contention that international alignment of standards best serves all the stakeholders providing, of course, that regulations are developed by proper process including meaningful consultation with interested parties, and recognising technological feasibility and commercial viability.

4. This note relates to propulsion engines and to auxiliary engines. However, for auxiliary engines the recognition of type approvals according EU directive 97/68/EC (non-road mobile machinery, NRMM) and UNECE Regulation R 96 will be granted.

II. Existing regulations for commercial marine engines

5. There are currently three principal legislated standards effecting, or which will effect, commercial marine engines. These regulations have been promulgated by the International Maritime Organisation (IMO), the Central Commission for Navigation on the Rhine (CCNR) and the US Environmental Protection Agency (EPA).

6. The IMO regulation, the NOx Technical Code of Annex VI MARPOL 73/78, applies to sea going ships operating in international waters. This regulation has not yet entered into force internationally as there is a requirement for a specified number of flag states to ratify the

regulation and for these ratifications to represent a certain percentage of the world shipping tonnage, before it is officially adopted as international legislation. However, the regulation is retrospective and when the adoption criteria is satisfied, the provisions will apply for all engines entered into service after 1 Jan 2000. While the IMO standard is not yet a mandatory legislative requirement, because of its retroactive nature, it is a market requirement and almost all marine engines of >130kW satisfy the IMO requirements.

7. Only NOx emission is limited within the IMO engine emissions requirements. The standard defined is of a comparable level to the Stage 1 emission limits for NRMM engines.

8. The CCNR regulation applies to the five contracting states of the CCNR organisation, namely Germany, France, the Netherlands, Belgium and Switzerland. The regulation will become effective on 1 Jan 2003. However, the legal basis for the CCNR legislation needs to be clarified between EC, CCNR and member states concerning the authority of CCNR to regulate in matters of air quality within the EU in its own right.

9. The CCNR rule defines a Stage 1 standard with the limit values derived from the EU directive 97/68/EC for non-road mobile machinery engines, and from the IMO NOx code for the larger (>560kW) engines.

10. The US EPA rule defines a more stringent standard comparable to Stage 2 for non-road mobile machinery engines. It comes into effect between 2004 and 2007 depending on engine power category. EPA did not regulate an earlier Stage 1 standard on the basis that the IMO requirements are observed in practice, and, therefore, no environmental gain would be achieved by such regulation.

11. The EC has recently indicated that it will commence preparation of a directive proposal concerning exhaust emissions from commercial marine engines.

III. Euromot's proposal

A Emission limits per engine category

12. Euromot proposes that the Tier 2 emissions standard defined by US EPA for commercial marine engines should be adopted into an EC directive to provide alignment of requirements between the EU and USA. The overwhelming reason is to achieve regulatory alignment between the two major markets for engine manufacturers associated in Euromot. At the same time it assured that a high level of environmental protection is kept.

13. Therefore, these requirements should also be incorporated into a UNECE regulation to promote international harmonisation; UNECE contracting nations would have the option of adopting the ECE regulation or applying the IMO regulation for marine engines operated in internal waters. The development of such an aligned set of regulations may also provide the basis for the second phase of emissions control by IMO.

14. The emissions standards proposed by Euromot for commercial marine craft, derived from US EPA, are presented in Table 1. This table also includes the introduction dates in terms of placing on the market proposed by Euromot for inclusion in the EU directive, either a separate directive for inland waterway commercial craft or an amendment to 97/68/EC.

ENGINE CATEGORY / TYPE	**Sub-Category** **SV (Litres/cyl.)**	**Date for introduction** **(31 Dec of given year)**	**NOx+HC** **g/kWh**	**PM** **g/kWh**	**CO** **g/kWh**
1 (mobile non-road types)	SV <0.9 and >37kW	2007	7.5	0.40	5.0
	0.9<SV<1.2	2006	7.2	0.30	5.0
	1.2<SV<2.5	2006	7.2	0.20	5.0
	2.5<SV<5.	2008	7.2	0.20	5.0
2 (Locomotive types)	5.<SV<15.	2008	7.8	0.27	5.0
	15.<SV<20. And <3300kW	2008	8.7	0.50	5.0
	15.<SV<20. And >3300kW	2008	9.8	0.50	5.0
	20.<SV<25.	2008	9.8	0.50	5.0
	25.<SV<30.	2008	11.0	0.50	5.0
3 (Cathedral type)	SV>30.	IMO MARPOL Annex 6 NOx code requirements apply			

SV = Swept Volume per cylinder

Table 1 : Emission limits and introductory dates for propulsion engines for inland waterways commercial vessel

15. It is proposed, as indicated in the table, that different emissions standards should apply for different categories of engines within the broad spectrum of CI engine types used to power commercial boats and ships. This approach of dividing the range of engines covered by the regulation into discreet categories and defining emissions standards in consideration of the technological capability and specific constraints applying to individual categories, is applied for non-road engine emissions legislation. However, unlike non-road mobile machinery engine categories that are defined by power ranges, cylinder swept volume is used as the criteria in categorising marine engines.

16. This categorisation was developed by US EPA. Their logic is summarised in the following extract from the regulation (40 CFR Part 94) preamble:

"*The engines … are very diverse in terms of physical size, engine technology, control hardware, and costs associated with reducing emissions. These differences make it difficult to design one set of emission requirements for all marine diesel engines. For example, numerical emission limits that may be reasonable and feasible for a 37 kW engine used on an 5.5-meter (18-foot)*

boat may not be reasonable or feasible for a 1,500 kW engine installed on a tug or a 20,000 kW engine installed on an ocean-going container ship. Similarly, numerical emission limits appropriate for very large engines may be not be appropriately stringent for smaller engines, requiring little or no emission reduction. Consequently, it is necessary to divide marine diesel engines into categories for the purposes of applying emission limits and duty cycles. We are adopting the categorization scheme summarized in [Table 1]. This relies predominantly on per-cylinder displacement to distinguish between categories of engines. This has the advantage that per-cylinder displacement is an engine characteristic that is not easily changed and is constant for a given engine model or series of engine models."

17. Under this scheme, commercial marine engines are categorised into three basic types with further sub-division of each category. The smaller engines, <5litre/cyl., are characterised as equivalent to mobile non-road engines in that they are generally derivatives of such engines or that they can employ the same level of technology. The emission limits for these Category 1 engines are based on Stage 2 non-road engines levels and the sub-categories correlate with the power categories applied for the non-road engines emissions standards.

18. Most engines with per cylinder displacements in the lower part of the Category 2 range, 5<SV<30litre/cyl, use core engines developed for locomotive applications. The emissions standard is, therefore, based on regulation for locomotives. The limit values for the higher displacement sub-categories in Category are less stringent to allow for the fact that these engines may be developed solely for marine application and, therefore, do not benefit from technology transfer and systems availability; these engines may also be developed to operate on heavy fuel oil.

19. Category 3 represents Cathedral engines with displacements of >30litre/cyl. These are used predominantly in sea-going vessels operating in international waters. It is proposed that the EU directive should define the IMO standard as the requirement for such engines operating in EU inland or coastal waterways.

B Scope of application

20. The regulation applies to propulsion engines and auxiliary engines incorporated in a commercial craft or vessel. Type approvals for all engines, specifically for auxiliary engines, according to EU Directive 97/68/EC and UNECE Regulation 96 (R96) will be recognized.

C Principles for engine testing

21. ISO8178-4 E2 & E3 for propulsion engines is to be applied.

22. The engine family and engine group concepts will be applied as defined in IMO NOx Technical Code Annex VI MARPOL 73/78. The test fuel is to be selected according to the IMO provisions.

D Compliance flexibility provisions

23. The introductory dates suggested in Table 1 are predicated on the assumption of inclusion of Manufacturer Flexibility provisions as Low Volume Exemption, etc. Such provisions have merit in their own right in respect to optimising the cost effectiveness of emissions reduction achievement. However, the case for incorporating these provisions in the EU directive is reinforced by the imperative to achieve harmonisation of regulations.

24. The recognition of comparable standards and related certificates need to be defined. Specifically, engines certified according to IMO standards should be acceptable for inland waterway ship propulsion.

IV. Need for international alignment of legislation

25. The marine engine market has, in general, relative low volumes compared to the on-road and non-road land sectors. However, it is also characterised by very low volume, specialised products in particular niches. Compliance Flexibility provisions may be particularly valuable for the marine engine industry in preventing excessive cost impacts for certain products, or, in ensuring products will remain available which might otherwise be withdrawn as economically non-viable to develop for full compliance. If equivalent provisions to those presented by EPA are not included in EU legislation, it is probable that certain products will be withdrawn from the EU market while still being offered on the US market; the business case for developing very low volume products solely for the EU market will not be sustainable in all circumstances.

26. Euromot supports through this document every effort of the United Nations Economic Commission for Europe (UNECE) to achieve a uniform, possibly worldwide control of exhaust emission, in the interest of the environment and the industry and finally the consumer.
