

---

## EUROMOT POSITION

04 April 2013



---

### EUROMOT Response on the Stakeholder Consultation on the revision of Directive 97/68/EC on emissions from non-road mobile machinery engines

Since the launch of the 97/68/EC review in 2007, Euromot has been an active contributor to the discussion on the next set of non-road emission regulations, whilst already delivering substantial emission reductions by the implementation of the already-published Stages IIIB and IV.

Euromot congratulates the Commission for adopting the recommendations of the multi-stakeholder GEME working group (GEME WG) in many of its proposals to increase scope and set new emission stages, recognising the need to align EU emission limits with those of the major international trading region, the USA.

Principle concerns from Euromot members are where the proposals in the consultation would introduce unique emission limits for Europe.

Euromot has already submitted some preliminary views during the 2013-02-14 stakeholder hearing.<sup>1</sup> This document is intended to complement these preliminary views and provide some more detailed comments.

In addition to the comments, Euromot has provided, at Annex 1, a summary chart that indicates the limit values and sequence of introduction of new stages that would apply based upon the Commission proposal but modified according to this document.

Due to the complexity of directive 97/68/EC and the non-road sector, Euromot would welcome the opportunity to directly discuss with Commission staff the content of this document

---

<sup>1</sup> <https://circabc.europa.eu/sd/d/2247cfb5-d499-4479-9abd-7c1a133cc342/13-02-14%20NRMM%20-%20EUROMOT%20Presentation.pdf>

**President:**

Georg Diderich

ENGINE IN SOCIETY

A European Interest Representative (EU Transparency Register Id. No. 6284937371-73)

**General Manager:**

Dr Peter Scherm

A Non Governmental Organisation in observer status with the UN Economic Commission for Europe (UNECE) and the International Maritime Organisation (IMO)

## 0. CHARACTERISTICS OF THE EU INDUSTRIAL ENGINE BUSINESS

The EU industrial engine market is a substantially smaller market than the heavy-duty on-road engine market with much wider variation in installed power, application and usage. There are thousands of applications for which industrial engines are used, many in niche markets of less than one hundred sales units per year.

Whilst some engine manufacturers active in this business also manufacture engines for the on-highway market, there are others that only specialise in developing and manufacturing industrial engines. Furthermore, whilst some industrial engine manufacturers also produce non-road machines, other manufacturers only produce engines. Substantial development work and resources are required for adaptation of on-road technology to non-road mobile machinery engines and equipment. It should not be assumed that all features of the Euro VI regulations are technically or commercially feasible for amendments to the NRMM legal act.

The needs of this 25 Billion Euro turnover EU engine business can be summarized as follows:

- Long-term certainty in future requirements in order to enable investment for growth.
- Global alignment of emission leading areas to maximise market size and gain economies of scale (EU, USA, Japan), enabling maximum emissions reduction at minimum cost to society.
- Sufficient lead-time prior to introducing new stages to enable cost-effective product development/technology transfer and sufficiently long duration of Stages to recover investment.
- Harmonised EU regulation to minimise inefficient local regulation, either within or between Member States.
- Avoidance of large peaks in engine development and type approval/certification, and avoidance of large peaks and troughs in engine production.

This paper has been developed on the basis of broadly supporting the Commission proposals outlined in the consultation paper, whilst providing additional input to enable emissions reductions, with associated air quality and health benefits, to be achieved in a manner that Euromot believes to be the most cost effective to society.

## 1. EXTENSION OF THE SCOPE

### 1.1 Inclusion of CI engines below 19 kW

Euromot supports the creation of two power classes as proposed in the Commission consultation document, namely  $< 8$  kW and  $8 \leq \text{kW} < 19$ . It additionally supports the limit values contained in the consultation document, which are aligned with those of the equivalent U.S. Tier 4 power class.

If limits remain aligned with those in the U.S., Euromot recommends an engine placing on the market date no sooner than three years after publication in the official journal (OJ), with a type approval date one year earlier.

Euromot advocates a type approval approach using the NRSC G2 cycle, with the optional alternative use of the NRSC C1 cycle. Importantly, Euromot does NOT support the introduction of an Internal Production Control Module for placing engines on the EU market.

Euromot advocates the introduction of a specific test cycle for engines to be installed in transport refrigeration units (TRUs), as explained further in section 4.5 of this document.

## **1.2 Inclusion of CI engines over 560 kW**

Euromot supports the inclusion of engines > 560 kW, as proposed in the Commission consultation document.

It additionally supports the limit values contained in the consultation document, which, for variable speed engines, are aligned with those of the equivalent U.S. Tier 4 non-generator set (non-genset) power class.

Euromot would like to highlight that for non-road engines in this power class (but not the other power classes) the U.S. regulations divide the engines according to genset and non-genset application, rather than dividing according to variable and constant speed application. Euromot proposes that this distinction is also made in the EU legal act.

If limits remain aligned with those in the U.S., Euromot recommends an engine placing on the market date no sooner than three years after publication in the official journal (OJ), with a type approval date one year earlier.

Euromot advocates a type approval approach using the NRSC C1 cycle, consistent with the 2010 recommendation of the GEME WG for non-genset engines,<sup>2</sup> and the cycles D2 or G2 for genset engines.

## **1.3 Inclusion of stationary engines (excluding gaseous-fuelled)**

Euromot supports the inclusion of diesel-fuelled constant and variable speed stationary engines that have a power < 5 MW thermal input and a displacement of < 10 litres/cylinder. These engines are commonly derived from non-road engines. Euromot does not support the inclusion of engines outside of this range as these are typically of distinctly different design to mobile non-road engines. The upper power threshold respects the fact that diesel-fuelled stationary engines larger than this are covered by specific provisions in the Gothenburg Protocol on Long-range Trans-boundary Air Pollution Prevention.<sup>3</sup>

Euromot fully endorses the concept of using the most advanced equivalent non-road engine limit values for those engines that operate for long periods (non-emergency engines), whilst setting less demanding requirements for emergency engines that will only be operated for a limited number of hours each year. This principle of setting less demanding requirements for emergency engines is already used in some member-state legislation applied to stationary engines and is consistent with that used by U.S. EPA.

An appropriate definition of 'emergency use' will be required for the legal act and appropriate markings will be required for engines intended for emergency use.

---

<sup>2</sup> [https://circabc.europa.eu/sd/d/79e51066-5e1d-4970-bc65-0207c82a8c2f/GEME%20WG%202010\\_09\\_13\\_final.pdf](https://circabc.europa.eu/sd/d/79e51066-5e1d-4970-bc65-0207c82a8c2f/GEME%20WG%202010_09_13_final.pdf)

<sup>3</sup> See under: [http://www.unece.org/env/lrtap/multi\\_h1.html](http://www.unece.org/env/lrtap/multi_h1.html)

Euromot recommends first engine placing on the market dates for each power class that are aligned with the placing on the market dates for the proposed new stage of constant speed CI non-road engines (section 2.1 of this document). For the engines > 560 kW, consistent with the mobile non-road engines, Euromot proposes that the distinction is made in the EU legal act between genset and non-genset application, rather than constant and variable speed, and that the corresponding limit values are used.

Euromot would like to highlight that it has previously submitted a more detailed paper to Commission on this topic.<sup>4</sup> Euromot recommends that Commission consult this paper for additional detail on the inclusion of stationary engines.

As a pre-requisite for the inclusion of stationary engines, it will be necessary to ensure that the market fuel quality mandated by 98/70/EC for non-road engines is additionally mandated for stationary engines.

It should be noted that this recommendation is for liquid diesel-fuelled engines. Euromot does not recommend including gaseous-fuelled stationary engines in scope as these are often not so closely related to non-road engines and the Gothenburg protocol applies to gaseous-fuelled engines down to the lower power threshold value of 1 MW thermal input. Additionally, stationary gaseous-fuelled engines have to be adjusted to the local gas quality, which does not fit to the type-approval approach.

#### **1.4 Inclusion of large spark ignited engines (petrol-fuelled, 19-56 kW)**

Euromot supports the inclusion of large spark ignited petrol-fuelled engines in the range  $19 \leq \text{kW} < 56$ . Euromot notes that Commission provides a proposed set of limit values in the summary table of the consultation document that deviate from those of the U.S., but that Commission does not elaborate the rationale or cost/benefit analysis for the proposed limit values.

Euromot recommends that a further evaluation of appropriate limit values be conducted, taking into account the full range of products that Commission anticipates bringing into the scope of the legal act. It is observed that test cycles appropriate to the intended in-scope applications will also be required.

Euromot will provide a separate proposal to Commission on this topic, setting out recommendations for appropriate limits and test cycles.

## **2. INTRODUCTION OF NEW STAGES**

### **2.1 Constant speed CI engines**

Euromot supports the introduction of a new stage for constant speed CI non-road engines using the emission limit values proposed in the Commission consultation document, with the exception of those for engines  $19 \leq \text{kW} < 37$ .

---

<sup>4</sup> <http://euromot.org/download/329e8447-f15b-487c-8e8a-fbdb9d1cdd5c/EU%20NRMM%20TechRev%20small%20stationary%20inclusion%20proposal%202011-07-04.pdf> and Euromot presentation at 12 May 2011 GEME meeting: <https://circabc.europa.eu/sd/d/a9b94046-b08c-439a-9427-c1431794aec6/Euromot%20proposal%20small%20stationary%20engines%20GEME%20120511.pdf>

The limit values proposed for all the other power classes are aligned with those of the equivalent U.S. Tier 4 power class or existing EU variable speed limit, but the limits proposed for the  $19 \leq \text{kW} < 37$  power class are not aligned. Euromot instead proposes the following limit values:

CO:	5.5 g/kWh;
NOx + HC:	4.7 g/kWh;
PM:	0.035 g/kWh.

These limits are aligned with the U.S. Tier 4 values, taking into account different rounding rules in U.S.

In respect to the introduction dates for this new constant speed CI engine stage, Euromot previously contributed a proposal that was included in the report provided to Commission by RPA in 2011.<sup>5</sup> This advocated introduction dates staggered by power class in order to avoid re-developing all power classes simultaneously, with the associated peak in development and type approval activity. Due to the time that has elapsed since the RPA study was published, commencing the sequence of placing on the market dates in 2016 (with type approval one year earlier) is no longer realistic. If limits in all power classes are aligned with those in the U.S., Euromot recommends retaining the staggered approach with the first engine placing on the market dates no sooner than three years after publication in the official journal (OJ), with a type approval date one year earlier. The Euromot summary chart at Annex 1 to this document provides an updated proposal for introduction dates.

Euromot would like to highlight that for non-road engines in the  $> 560$  kW power class (but not the other power classes) the U.S. regulations divide the engines according to genset and non-genset application, rather than dividing according to variable and constant speed application. Euromot proposes that this distinction is also made in the EU legal act.

## 2.2 Stage IV/V for Inland Waterway Vessels

Euromot has consistently advocated introducing a Stage IV for this sector, aligned with the limits of the comparable engine categories in the U.S., with the application of the IMO NOx limit where this is more strict (130 – 600 kW).

Euromot believes that the timely introduction of a Stage IV for this sector provides an opportunity for further emission reduction without the dis-proportionate cost of developing a unique product for the small EU market.

Euromot would also like to draw attention to the fact that whilst 97/68/EC applies to engines for use in inland waterway vessels it currently does not provide any type approval opportunities for gaseous-fuelled engines. Consequently it is necessary to provide legal certainty on the requirements for such engines if the stated aim to promote the use of LNG for the inland waterway fleet is to be fulfilled.

Euromot has been an active stakeholder in the 'Common Expert Group on emission reduction of the inland waterway transport fleet' led by DG MOVE. It has contributed data and provided observations on the study conducted by Panteia. Euromot has strong concerns regarding the

---

<sup>5</sup> <https://circabc.europa.eu/sd/d/8376a0bc-339c-435d-8a25-422b6869a480/Microsoft%20PowerPoint%20-%20NRMM%20Presentation%20-%20Module%202.pdf>

evaluations and recommendations contained in the 2013-02-28 Panteia report.<sup>6</sup> Euromot submitted a position paper dated 2013-03-28, providing comments on this report. This position paper is available from Euromot.<sup>7</sup>

One of the apparent proposals in the Panteia report is that it could be required that new engines placed on the market in conformity with one legal act (97/68/EC or its successor) would be prevented from being placed into service by another legal act (for example 2006/87/EC) unless retrofitted with additional emission reduction devices. Euromot strongly advocates that the type approval of the complete engine (inclusive of after-treatment system) should remain under the auspices of 97/68/EC and that new engines that comply with this legal act should not require retrofit of additional emission reduction devices prior to placing into service in a vessel.

### 2.3 Stage IV CI engines 19-37 kW

Euromot supports the introduction of a new stage for CI non-road engines  $19 \leq kW < 37$ . However, it does NOT support using the emission limit values proposed in the summary table of the consultation document, because these are not aligned with those of the U.S., contrary to the intention to align that is indicated in section 5.2.3. of the document.

Euromot instead proposes the following limit values:

CO:	5.5 g/kWh;
NOx+HC:	4.7 g/kWh;
PM:	0.035 g/kWh.

These limits are aligned with the U.S. Tier 4 values, taking into account different rounding rules in U.S.

If limits are aligned with those in the U.S., Euromot recommends an engine placing on the market date no sooner than three years after publication in the official journal (OJ), with a type approval date one year earlier.

Euromot supports a type approval approach using both the NRSC C1 cycle and the NRTC cycle, consistent with the 2010 recommendation of the GEME WG.<sup>8</sup> In addition, as highlighted by the GEME WG,<sup>9</sup> Euromot advocates the introduction of a specific test cycle for engines to be installed in transport refrigeration units (TRUs), as explained further in section 4.5 of this document.

### 2.4 New emission limits – Stage V

Euromot supports harmonised measures beyond Stage IV to further improve air quality and provide consequent benefits to public health, but only where such measures are:

---

<sup>6</sup> Draft final report on "Contribution to impact assessment of measures for reducing emissions of inland navigation" prepared and presented by the contractors Panteia on behalf of European Commission-DG MOVE/Unit B.3 at the meeting of the "Common Expert Group on emission reduction of the inland waterway transport fleet" on 12 March 2013

<sup>7</sup> <http://euromot.org/download/ef0a909d-9a1a-4839-ab54-e4069c1fa118/NRMM%20TechRev%20IWT%20policy%20options%20for%20emission%20reduction%202013-03-28.pdf> and <http://euromot.org/download/0fb320dc-fb58-450b-b0a1-e488b713113a/NRMM%20TechRev%20IWT%20policy%20options%20for%20emissions%20reduction%202012-10-22.pdf>

<sup>8</sup> [https://circabc.europa.eu/sd/d/79e51066-5e1d-4970-bc65-0207c82a8c2f/GEME%20WG%202010\\_09\\_13\\_final.pdf](https://circabc.europa.eu/sd/d/79e51066-5e1d-4970-bc65-0207c82a8c2f/GEME%20WG%202010_09_13_final.pdf)

<sup>9</sup> Ibid.

- Cost-effective to society; and
- Not based upon technical feasibility alone.

Euromot notes that there will be no contribution from Stage V if the engines and machines become unattractive for the end-user to purchase in comparison to maintaining existing engines and machines.

Within that context, as it has previously stated,<sup>10</sup> Euromot supports the development of a roadmap for Stage V within the following boundary conditions highlighted in the Commission consultation document:

- The need for Commission to demonstrate, prior to introduction, that such a stage will indeed be cost-effective to society.
- That the applicability is limited to 56 – 560 kW variable speed non-road engines.
- Minimum length of the preceding Stage IV of five years.

With respect to introduction date and limit values, Euromot advocates:

- First placing on the market date no earlier than five years after publication in the OJ with type approval one year earlier.
- Initial introduction of 130 – 560 kW followed by 56 – 130 kW one year later.
- Particulate number limit appropriate to non-road engines tested on non-road test cycles, with no change to Stage IV gaseous and PM mass emission limits.

The Euromot summary chart at Annex 1 to this document includes an indicative stage V based upon the above boundary conditions.

## 2.5 In-service conformity

Euromot members have been supporting the development of appropriate in-service conformity (ISC) measurement and analysis procedures for variable speed non-road engines 56 – 560 kW via the JRC PEMS pilot programme.

Euromot members have studied the resulting detailed test protocol proposed by JRC and uploaded to CIRCABC on 2013-02-25,<sup>11</sup> and will be providing separate comments to JRC on this protocol, however Euromot is unable to complete the evaluation of this test protocol without first receiving the anticipated draft report from the pilot programme, which has yet to be provided. It was understood by Euromot that this report would contain an analysis of the test data that was supplied by manufacturers.

Most importantly, whilst Euromot continues to support this activity, it notes that there is a current lack of any proposal from Commission in respect to concluding the open policy items within the draft protocol, nor any proposal as to how and when such measures would be

---

<sup>10</sup> Euromot presentations given at 6 April stakeholders meeting: <https://circabc.europa.eu/sd/d/7c4c6f1f-0dc3-419c-b2fc-64fe8c3f8512/NRMM%20TechRev%202011-04-07%20Stage%20V%20Euromot%20perspective%20final%20V2.pdf> and at 11 May 2011 GEME meeting: <https://circabc.europa.eu/sd/d/0d239c0e-7a5d-45e7-8d32-69f25f510f82/Euromot%20considerations%20next%20stage%20GEME%20120511.pdf>

<sup>11</sup> [https://circabc.europa.eu/sd/d/9e89d58f-97c5-415c-868f-9115e2d4886c/Draft\\_ISC\\_Proc\\_%20NRMM-PEMS.docx](https://circabc.europa.eu/sd/d/9e89d58f-97c5-415c-868f-9115e2d4886c/Draft_ISC_Proc_%20NRMM-PEMS.docx)



implemented. As such information is critical in order to be able to assess the impact of introducing ISC, Euromot believes it is essential for Commission to provide further information in this regard before completing the consultation, impact assessment and draft legal act.

### 3. EXEMPTIONS, DEROGATIONS AND TRANSITIONAL MEASURES

As stated in the Euromot position statement dated 2011-11-28,<sup>12</sup> from an engine manufacturers perspective it is most important to provide transition provisions that:

- Enable the placing on the market of engines without also promoting abnormal levels of engine inventory. This minimises peaks and troughs in engine production.
- Notwithstanding the need to avoid abnormal inventory, set a clear date for end of engine PRODUCTION, followed by sufficient time to place engines on market, regardless of location of engine or machine plants.
- Above all, provide provisions that are clear and can be uniformly enforced.

Euromot would like to stress the need for great care to be taken when making changes to the legal act. The introduction of change to the way in which placing on the market is permitted at the transition between emission stages could introduce unintended commercial consequences and lead to inequalities between manufacturers based upon manufacturing location if not drafted with utmost care. Consequently, Euromot urges the European Commission to work closely with industry and other stakeholders to ensure any revised regulatory text delivers the intended result.

Euromot supports the proposal to retain a sell-off of stock provision (Article 9(4a)), but to set a two-year time limit on the first placing on the market of new machines in which such engines are installed. Euromot additionally supports the retention of a flexibility scheme.

As stated in the Euromot position statement,<sup>13</sup> Euromot supports the deletion of the end-of-series provision (Article 10(2)). However, if there are further proposed changes to the exemptions, derogations and transitional measures that are not foreseen in the Commission consultation document then it may be necessary to re-evaluate this point.

Euromot supports the addition of the engine production date (month and year) in the required engine markings to assist market surveillance.

Finally, it should be noted that Euromot would also consider other new proposals that may emerge in response to the Commission consultation if they also satisfy the principles outlined at the start of this section 3.

---

<sup>12</sup> <https://circabc.europa.eu/sd/d/3216addb-f0ec-49a5-8900-f5208a545509/EUROMOT%20Position%20Transitional%20Provisions%20281111.pdf>

<sup>13</sup> Ibid.



## **4. OTHER ISSUES**

### **4.1 Simplification and better legislation**

In general Euromot supports simplification and better legislation, whilst maintaining limit values, introduction dates and test requirements that are appropriate to each intended engine application.

Euromot has historically been highly supportive of the development of globally harmonised test standards for non-road engines at UNECE, having actively participated in the development of the non-road GTR 11 under the 1998 agreement, and the implementation of the content of this GTR in regulation R96.03 under the 1958 agreement. Euromot agrees with the use of the UNECE forum for development and publication of such test procedures, but also notes the considerable integration challenge created by the difference in scope between the UNECE texts and 97/68/EC. Euromot is willing to contribute to further development of both the UNECE and EU draft text in this regard.

Euromot would welcome the integration of all the amendments to 97/68/EC and the upcoming revision into a single EU regulation. Whilst Euromot supports the need to provide adequate requirements for economic operators and market surveillance by the adoption of elements of the New Legislative framework, it seeks the opportunity to review a draft version of the legislative text that will be proposed by Commission in order to assess the impact of these changes.

### **4.2 Alternative fuels**

Euromot is generally supportive of the definition of appropriate type-approval criteria for alternative fuel engines, but recognises this requires significant amendment of the legal act. Euromot recommends that this extension to include alternate fuels is focused in the first instance on gaseous fuels and that an amendment is developed and introduced in a manner that will not delay adoption of the legal act. Additionally, when a specific proposal is drafted, the impact of the proposal on entities providing existing products using fuels other than diesel and petrol should be assessed.

Euromot notes that in order to enable type approval of engines operated on gaseous fuel it will be necessary to change the basis of the hydrocarbon measurement from total hydrocarbons to non-methane hydrocarbons. It will also be necessary to be clear to what extent spark-ignited gas engines and dual fuel gas engines (for example those fuelled on gas but using a certain amount of diesel fuel as an ignition source) will be regulated by the legal act.

As a pre-requisite for the inclusion of gaseous-fuelled engines, it will be necessary to ensure that an appropriate market fuel quality is also mandated.

Euromot believes that more detailed proposals are required. In the meantime, until a type approval methodology is introduced into the legal act, Euromot recommends that engines operating on such fuels be clearly exempted from the scope in order to avoid that such engines are prevented from entering the market.

### **4.3 Derogation for engines to be used in machines certified for use in hazardous environments (ATEX)**

Euromot notes a technical conflict in complying with both Directive 97/68/EC and Directive 94/9/EC for engines installed in equipment to be used in potentially explosive atmospheres (ATEX). Engines up to Stage IIIA can be manufactured or adapted to comply with the ATEX requirements. However, most Stage IIIB or later engines are unable to be manufactured or adapted to conform to the technical requirements of both directives. The two difficulties that exist are the provision of electronic control systems and sensors suitable for use in such atmospheres, and the conflict between the need to maintain low surface and exhaust gas temperatures to comply with 94/9/EC, and the high temperatures required for the successful operation of after-treatment systems.

Euromot recommends that a derogation be introduced in order to permit engines to continue to be placed on the market at stage IIIA emission level but only when specifically intended for use in machines conforming to the requirements of 94/9/EC. Such engines should be required to be fitted with markings restricting their use and should not be permitted to be placed into service until the completion of the conformity assessment according to 94/9/EC.

### **4.4 Agricultural & forestry tractors**

The emissions of agricultural & forestry tractors are currently regulated by Directive 2000/25/EC, which in the past has always been aligned as much as possible with 97/68/EC due to the fact that engines from the same engine emission family are often used in both tractors and non-road machines. In the future the emission of tractors will be regulated by a new regulation on 'environmental and propulsion performance requirements' under the new Tractor Regulation. The approach would be to refer to 97/68/EC as much as possible. Therefore it would be appropriate for the needs of agricultural & forestry tractors to be taken into account in the revised legal act.

### **4.5 Test cycle for engines to be installed in transport refrigeration units (TRUs)**

TRUs are refrigeration units that are fitted to on-highway trucks and other means used to transport refrigerated goods. The engines that drive these TRUs are already within the scope of 97/68/EC and are typically < 37 kW.

These engines are arranged to operate at two different constant speeds. The lower speed is used to maintain the temperature when the refrigerated compartment is sealed, whilst the higher speed is used when a higher cooling rate is required (e.g. when the door to the refrigerated compartment is open)

Due to the steady-state nature of the operation of these units the equivalent U.S. legislation does not require TRU engines to be tested using the NRTC or C1 NRSC. Instead, they have introduced a dedicated two-speed TRU engine NRSC test cycle that replicates the in-use operating modes of these engines.<sup>14</sup> It is expected that this cycle will also be included in an amended version of the non-road test standard ISO 8178-4 due to be published in 2014.

Euromot believes that engines to be installed in TRUs should be subject to the same emission limits as their variable speed counterparts, but tested using the TRU test cycle. Consequently

---

<sup>14</sup> See US EPA 40 CFR 1039.645 under <http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&SID=3e90bfe86e42ed9fa954e85d82c2b097&rgn=div8&view=text&node=40:34.0.1.1.5.7.1.12&idno=40>

Euromot requests that Commission should include the TRU test cycle in the amended legal act. Specific markings limiting the application of engines type-approved in this manner to use in TRUs should also be included in the legal act.

Euromot will provide further information on this topic in a separate document.

#### **4.6 Clarification on separate shipment of after-treatment systems**

The after-treatment systems that comprise one or more of the additional anti-pollution devices that are part of the approved engine type are often produced in a separate facility to the rest of the engine. The two manufacturing sites may be in different countries or even different continents. Furthermore, the after-treatment will often be installed on the equipment at a different stage in the equipment production process. As a consequence it is normal industry practice to ship these devices separately to the rest of the engine.

The GEME WG developed a draft text to clarify the requirements when after-treatment systems are shipped separately to the rest of the engine.<sup>15</sup> Euromot recommends the inclusion of clarification on separate shipment in the legal act.

#### **4.7 Derogation for field-test of engines in equipment**

In order to successfully develop new non-road engines and equipment it is often necessary to conduct field-tests of the engines installed in the equipment prior to engine type approval. It is also possible that engines and equipment are being developed for placing on the market in third countries. Furthermore, the engine manufacturer and equipment manufacturer will often be different legal entities.

Consequently the GEME WG developed a draft text for a derogation to regularise the practice of field-testing.<sup>16</sup> Euromot recommends the inclusion of clear requirements for field test of engines in equipment in the legal act. Euromot believes that further discussion will be required on the GEME WG text proposal.

#### **4.8 Control area for stage IV**

Euromot notes that the control area for stage IV that was introduced to 97/68/EC via amendment 2012/46/EU is specifically designed for engines tested according to the C1 test cycle that applies to variable speed engine categories Q & R. As additional stage IV engine categories are introduced for engines tested on other test cycles (e.g. inland waterway engines), it is necessary to simultaneously introduce the control area appropriate to each test cycle, in order to avoid incompatible combinations of test cycle and control area.

The appropriate control areas for each test cycle are available in the current draft amendment of the non-road test standard ISO 8178-4. Euromot will provide further information on this topic in a separate document.

---

<sup>15</sup> <https://circabc.europa.eu/sd/d/6e63bbe7-45f5-41e5-9eed-56bb80ca46eb/GEME%20WG%20Proposals%20v3.zip>

<sup>16</sup> Ibid.

#### 4.9 Requirements on NOx control measures for stage IV engines

Euromot notes that the requirements on NOx control measures for stage IV engines that were introduced to 97/68/EC via amendment 2012/46/EU were specifically designed for variable speed non-road engine categories Q & R. Due to the specification of the inducements and the NOx trigger thresholds contained in the 2012/46/EU amendment, modification of this text will be required prior to application to other stage IV engine categories. Euromot will provide further information on this topic in a separate document.

#### 4.10 Introduction of ramped modal cycles (RMCs)

The ramped modal test cycle (RMC) was devised as an alternative to the discrete mode steady state test. A non-road RMC is intended to provide a method for performing an NRSC test in a pseudo-transient manner. Each RMC consists of a series of steady state modes with a linear transition between them. The relative total time at each mode and its preceding transition match the weighting of the discrete mode steady state cycles.

RMCs for the C1 and D2 NRSC cycles have already been introduced as an optional method for performing a 97/68/EC NRSC test using Annex 4B of UNECE regulation R96. However the C1 and D2 cycles alone are insufficient for all type approval categories in 97/68/EC. The GEME WG recommended the introduction of RMCs into the legal act.<sup>17</sup> Since the publication of the recommendations from the GEME WG this issue has also been examined during the development of the next amendment of ISO 8178-4 where introduction of RMCs is also planned. Euromot would welcome the opportunity to work with Commission to ensure that the latest information is used to insert RMCs during the development of the legal act and will provide further information on this topic in a separate document.

#### 4.11 Definition of engine power

When 97/68/EC was first introduced there was no directive or regulation specifically for the determination of non-road engine power. Consequently, 97/68/EC uses a definition of net power based upon 80/1269/EEC as last amended by 89/491/EEC, but with certain differences.

In 2005 the UN ECE regulation R120 was published in order to provide a dedicated method for determination of non-road engine power. Euromot supports the GEME WG recommendation to revise the definition of power at this opportunity to refer to R120.<sup>18</sup>

#### 4.12 Durability Requirements

Amending directive 2012/46/EU introduced into 97/68/EC more explicit technical requirements for demonstrating the emissions durability of non-road engines, according to the recommendations of the GEME WG.<sup>19</sup> However, it was not possible to complete the associated required update to section 4.1.1 of Annex I to 97/68/EC during the comitology amendment process. Euromot advocates that the changes to this section recommended by the GEME WG are made to the legal act during this amendment. It should be additionally noted that the corresponding changes were already made to UNECE regulation R96 during the 03 and 04 series of amendments.

---

<sup>17</sup> Ibid.

<sup>18</sup> Ibid.

<sup>19</sup> Ibid.

#### 4.13 Update to type approval numbering system

The GEME WG recognised that amendments are required to the type approval numbering system, both to provide clarity for certain existing stages where the numbering system is deficient, and to facilitate the planned additional stages. The amendment of the numbering system was deferred during previous amendments to 97/68/EC by comitology. Euromot proposes that this issue is addressed during the development of the new legal act.

#### 4.14 Marking of engines intended for use outside of the EU

Engines that are placed on the market in the EU but are intended for eventual export outside of the EU are currently explicitly excluded from the placing on the market limitations of Article 4 of 97/68/EC. Such engines will be present for distribution (but not use) within the EU market. They may be manufactured in the EU, or may be imported into the EU for installation into machines. This flow of engines that may not comply with EU emission limit values is essential in order for EU-based engine and machine manufacturers to compete in international growth markets.

Currently 97/68/EC contains no requirement to provide markings that identify that such engines are not permitted to enter service in the EU. Euromot will provide further information on this topic in a separate document.

---

EUROMOT – 2013-04-04

**For more information please contact:**

**European Association of Internal Combustion  
Engine Manufacturers – EUROMOT**

Dr Peter Scherm, +49 69 6603-1354, [peter.scherm@euromot.eu](mailto:peter.scherm@euromot.eu)

EU Transparency Register ID number: 6284937371-73

## ANNEX 1

This summary chart indicates the limit values and sequence of introduction of new stages that would apply based upon the Commission proposal but modified according to this document.

EU Non-Road Mobile Machinery (NRMM)									
Variable speed engines <sup>(1)(2)</sup>									
Power Classes from stage IV	Years after publication in Official Journal (OJ)								New Power Classes
	+1	+2	+3	+4	+5	+6	+7	+8	
						**3.5 / 0.19 / 3.5 / 0.045			kW > 560
130 ≤ kW ≤ 560	**0.4 / 0.19 / 3.5 / 0.025					**0.4 / 0.19 / 3.5 / 0.025 & Particulate Number Limit			130 ≤ kW ≤ 560
56 ≤ kW < 130	**0.4 / 0.19 / 5.0 / 0.025						**0.4 / 0.19 / 5.0 / 0.025 & Particulate Number		56 ≤ kW < 130
37 ≤ kW < 56	*4.7 / 5.0 / 0.025								37 ≤ kW < 56
19 ≤ kW < 37	*7.5 / 5.5 / 0.6			*4.7 / 5.5 / 0.035					19 ≤ kW < 37
						*7.5 / 6.6 / 0.4			8 ≤ kW < 19
						*7.5 / 8.0 / 0.6			kW < 8

EU Non-Road Mobile Machinery (NRMM)									
Constant speed engines <sup>(1)(2)</sup>									
Power Classes from stage IIIA	Years after publication in Official Journal (OJ)								New Power Classes
	+1	+2	+3	+4	+5	+6	+7	+8	
						**0.67 / 0.19 / 3.5 / 0.035			kW > 560
130 ≤ kW ≤ 560	*4.0 / 3.5 / 0.2			**0.4 / 0.19 / 3.5 / 0.025					130 ≤ kW ≤ 560
75 ≤ kW < 130	*4.0 / 5.0 / 0.3				**0.4 / 0.19 / 5.0 / 0.025				56 ≤ kW < 130
37 ≤ kW < 75	*4.7 / 5.0 / 0.4					*4.7 / 5.0 / 0.025			37 ≤ kW < 56
19 ≤ kW < 37	*7.5 / 5.5 / 0.6			*4.7 / 5.5 / 0.035					19 ≤ kW < 37
						*7.5 / 6.6 / 0.4			8 ≤ kW < 19
						*7.5 / 8.0 / 0.6			kW < 8

<sup>(1)</sup> For > 560 kW the U.S. divides engines into non-genset and genset in place of variable speed and constant speed

<sup>(2)</sup> Applicability to stationary engines limited to diesel-fuelled non-emergency with displacement < 10 litres/cyl and power < 5 MW thermal.

EU Emission Stages		Placing on market for existing emission stage
		Placing on market for new emission stage
		Type approval for new emission stage
Limit Values	*	NOx+HC / CO / PM in g/kWh
	**	NOx / HC / CO / PM in g/kWh

[Version 1.1. 2013-03-26]

EUROMOT is the European Association of Internal Combustion Engine Manufacturers. It is committed to promoting the central role of the IC engine in modern society, reflects the importance of advanced technologies to sustain economic growth without endangering the global environment and communicates the assets of IC engine power to regulators worldwide. For more than 20 years we have been supporting our members - the leading manufacturers of internal combustion engines in Europe, USA and Japan - by providing expertise and up-to-date information and by campaigning on their behalf for internationally aligned legislation. The EUROMOT member companies employ all over the world about 200,000 highly skilled and highly motivated men and women. The European market turnover for the business represented exceeds 25 bn euros. Our **EU Transparency Register** identification number is **6284937371-73**.

<http://www.euromot.eu> – your bookmark for IC engine power worldwide

**Our members are:**

### **DIESEL AND GAS ENGINE MANUFACTURERS**

**AGCO POWER**

**CASE NEW HOLLAND**

**CATERPILLAR POWER SYSTEMS GROUP**

**CUMMINS ENGINES**

**DAIMLER**

**DEUTZ**

**DOOSAN**

**FPT INDUSTRIAL**

**GE ENERGY & TRANSPORTATION**

**HATZ**

**JCB POWER SYSTEMS**

**JOHN DEERE**

**KOMATSU ENGINES**

**LIEBHERR**

**LOMBARDINI**

**MAN GROUP**

**MHI EQUIPMENT EUROPE**

**MOTEURS BAUDOIN**

**MTU GROUP (TOGNUM)**

**MWM**

**ROLLS-ROYCE**

**SAME DEUTZ-FAHR**

**SCANIA**

**STEYR MOTORS**

**VOLKSWAGEN INDUSTRIAL ENGINES**

**VOLVO CONSTRUCTION EQUIPMENT**

**VOLVO PENTA**

**WÄRTSILÄ**

**YANMAR GROUP**

### **SMALL SI ENGINE MANUFACTURERS**

**BRIGGS & STRATTON**

**DOLMAR**

**EMAK**

**GLOBAL GARDEN PRODUCTS**

**HONDA EUROPE**

**HUSQVARNA GROUP**

**KAWASAKI EUROPE**

**LOMBARDINI – KOHLER GROUP**

**SOLO**

**STIHL**

**TORO EUROPE**

**WACKER NEUSON**

**YAMABIKO GROUP**