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## POSITION PAPER

04 March 2011



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# Proposal for a Common Understanding of Operation at 'A Single Constant Speed' according to the Requirements of the NRMM Directive 97/68/EC

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With the introduction of Stage IIIB emission requirements for intermittent speed engines from beginning of 2011, there is an increased interest in the potential application of constant speed engines.

Euromot believes that 97/68/EC clearly distinguishes between the two engine types, but that there is need for a common understanding of what constitutes operation at 'a single constant speed', in order to ensure consistent enforcement of non-road emission stages across the European Union.

Therefore, Euromot would like to draw attention to the definitions of intermittent and constant speed in 97/68/EC and set forth its members understanding of operation at a single constant speed.

Euromot seeks the support of DG Enterprise, Member State representatives, Approval Authorities and Technical Services in applying these provisions in a consistent manner across the European Union.

### **1 Definitions of intermittent and constant speed engines according to the EU Nonroad Mobile Machinery Directive 97/68/EC**

The Nonroad Mobile Machinery Directive 97/68/EC has separate introduction dates for emission limits of non-road compression ignition engines (other than inland waterway, railcar or locomotive) that are 'constant speed' and for those that are 'other than constant speed'. The definition of what constitutes a constant speed engine and what constitutes an engine that is other than constant speed is elaborated in the scope of the Directive found at Annex I, Section 1. In particular, Annex I section 1 A(i) and (ii) define two types of engines to which the Directive applies:

*(i) a C.I. engine having a net power in accordance with section 2.4. that is higher than or equal to 19 kW but not more than 560 kW and that is operated under intermittent speed rather than a single constant speed; or*

*(ii) a C.I. engine having a net power in accordance with section 2.4. that is higher than*

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*or equal to 19 kW but not more than 560 kW and that is operated under constant speed. Limits only apply from 31 December 2006;*

From the two definitions in 97/68/EC, it is clear to Euromot members that for the purposes of the Directive, engines that are not operated at a **single** constant speed are operated at intermittent speed and are therefore 'other than constant speed engines'.

If in a single operating sequence an engine is operated at multiple constant speeds, or a combination of constant and intermittent speed, then by definition it cannot be claimed that the engine is operated at a single constant speed, as these are mutually exclusive.

## **2 Operation at a single constant speed**

Whilst observing the above definitions from 97/68/EC, all engines and the equipment that they are driving, must be able to be started, operated and then stopped, in a controlled manner that does not damage the engine or equipment to which it is connected. It is therefore understood that when installed in machinery, an engine can be subject to the following three phases of operation without being considered as 'other than constant speed':

### **(a) Starting sequence**

This would normally be a transition phase whereby the engine is accelerated from zero speed to its single operating speed. This sequence may consist of several discrete steps, rather than a single continuous operation and the sequence may depend upon a number of factors, including, but not limited to, size and

type of equipment being driven and operator behaviour.

### **(b) Operation at a single constant speed**

This would normally be operation with a governor which has a defined and preset single operating speed that automatically controls the operator demand to maintain engine speed, even under changing load. Governors do not always maintain speed exactly constant. Typically speed can decrease (0.1 to 10%) below the speed at zero load, such that the minimum speed occurs near the engine's point of maximum power (engines whose constant-speed governor function is removed or disabled are no longer constant-speed engines).

### **(c) Shut-down sequence**

This would normally be a transition phase whereby the engine is decelerated from its single operating speed to zero speed. This sequence may consist of several discrete steps, rather than a single continuous operation and the sequence may depend upon a number of factors, including, but not limited to, size and type of equipment being driven and operator behaviour.

In conclusion, each time the engine is run, each of the above three operations should occur only once. This does not preclude the use of an engine that is type-approved for alternative single constant speeds (e.g. a generator set that can be started and run to deliver one of either 50 Hz or 60 Hz electricity) so long as there is a type-approval covering each speed and the change in the constant speed set-point occurs when the engine is not operating.

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Status: 2011-01-01