

**COMMENTS TO THE PROPOSAL FOR DRAFT AMENDMENTS
 TO REGULATION No. 115 (AEGPL PROPOSAL – NOVEMBER 2004)**

TRANSMITTED BY THE EXPERT FROM POLAND

1. As several comments and remarks raised during the discussions have been taken in consideration, the AEGPL proposal can be supported, as it is a step forward. However, the experienced collected so far shows that further amendments to Regulation No. 115 will be required in the near future (see item 3, 4, 5, 6 below).

2. It is desirable to introduce a provision concerning the validity of existing type approvals granted to the initial version of this Regulation. It is proposed that all existing type approvals should remain valid.

3. LPG and NG are regarded as clean fuels. Excise taxes levied on motor LPG and NG are much lower than those for petrol to promote their use. It is expected in return that vehicles fuelled with LPG and NG will be much cleaner than petrol ones. However, this Regulation and its limit values do not ensure that vehicles converted to gas are really cleaner. On the contrary, such vehicles can be much “dirtier” than petrol ones (see the table below). More stringent emission limit values should be introduced in this Regulation e.g. a provision that emissions with gas after retrofit must be lower than actual emissions with petrol.

Relative emission with petrol ¹⁾ [%]	20	40	60	80	100
Limit values in Regulation No. 115 for vehicles fitted with “intrusive” system ¹⁾ [%]	57	74	91	100	100
Limit values in Regulation No. 115 for vehicles fitted with “non-intrusive” system ¹⁾ [%]	100	100	100	100	100
Ratio: limit values/emission with petrol for “intrusive” systems	2,85	1,85	1,52	1,25	1,00
Ratio: limit values/emission with petrol for “non-intrusive” systems	5,00	2,50	1,67	1,25	1,00

¹⁾ limit values in Regulation No. 83 equal to 100%

4. “Non intrusive” concept

The main advantage of the “non intrusive” concept is that the number of tests is reduced (tests with petrol are not required). However, this concept has several defects:

- the main assumption is not fully correct,
- the criteria how to qualify systems as “non intrusive” are not defined (no criteria in paragraph 6.1.2.2),
- “non intrusive” systems are deemed to comply with the requirements if the emissions are lower than the limit values specified in Regulation No. 83; the requirements for such systems are much more lenient than those for “intrusive” systems (compare paragraphs 6.1.2.5.1.3 and 6.1.2.5.4.1); it is not justified to have different limits for “non intrusive” and “intrusive” systems.

It is proposed to delete all provisions related to “non intrusive” systems.

5. Exhaust emissions according to Regulation No. 49

There are some serious errors in the current Regulation No. 115, not corrected in the proposal.

According to the second indent in paragraph 6.1.2.6 tests should be conducted only with diesel fuel and commercial LPG. It means that a CI engine is converted to SI and fuelled with gas (mono fuel engine). This is in contradiction to paragraph 6.1.2.3 which specifies that Regulation No. 115 is also applicable to engines fuelled with both diesel fuel or diesel fuel and gas (dual fuel engine). This problem has been already raised by the Russian experts.

According to the fourth indent in paragraph 6.1.2.6 the engine with diesel fuel must meet the limit values of Regulation No. 49. To check the compliance with this provision it is necessary to test the engine before the conversion. There is no provision in Regulation No. 115 specifying that the engine must be submitted for type-approval before the retrofit (see paragraph 3.5).

According to the second indent in paragraph 6.1.2.6 the emissions must be measured on the 13-mode cycle. According to Regulation No. 49 (paragraph 5.2) the gaseous emissions for gas engines must be determined on the ETC. As a result, there are no limit values for 13-mode cycle and G in formula (1) and (2) is not known. Consequently, it is not possible to determine the compliance with the requirements as specified in the fifth indent in paragraph 6.1.2.6.

In this situation it is necessary to correct the above errors or to delete paragraph 6.1.2.6 and correct other paragraphs related to such a conversion (e.g. 6.1.2.1, 6.1.3.3).

6. "Cycle beating"

This comment refers to LPG systems.

Some LPG system manufacturers find it difficult to meet the emissions requirements specified in Regulation No. 115. They try to "beat the cycle". One of their strategies is as follows. The engine is started with petrol and the switching over from petrol to LPG is delayed. We have come across a vehicle where this switching took place at the end of the second urban cycle. The emissions with petrol (2 urban cycles) were about 75% and those with LPG (2 urban cycles and extra urban cycle) only 25% of the total emissions measured according to Regulation No. 115. In such a case it is not possible to verify that the retrofit system meets any emission requirements. The emissions during operations on LPG may be several times higher than those during operations on petrol.

It is necessary to take up suitable measures to prevent such a "cycle beating". It is proposed to introduce, for example, the following procedure.

If the switching over from petrol to gas takes place later than after the first 100 s of the cycle:

- a) the cycle in gas mode should be performed; it should be split into 2 parts: operation with petrol after start and with gas after switching over,
- b) the emissions with gas should be determined,
- c) the cycle in petrol mode should be performed; the emissions in the portion of the total cycle where the vehicle operates with gas when in gas mode should be determined,
- d) the emissions determined in b) and c) should be compared,
- e) the retrofit system meets the requirements if the emissions determined in b) are lower than those in c).