

Proposal for limit values connected to D/ISO proposal for Regulation No. 51

**For consideration in its advice to WP.29:
GRB will have to choose between**

- 1. Real progress**
- 2. Slow progress or**
- 3. No progress at all (all vehicles will pass)**

The Netherlands chooses for option 1: real progress.

1. Introduction

The GRB Informal Group on Regulation No. 51 has discussed in its January 2005 meeting the results of an OICA test program which compares the noise emission of circa 150 vehicles as measured with the current Regulation No. 51 and with the D/ISO proposal for amendment of Regulation No. 51. In this meeting Germany and France have proposed a system of limit values connected to the D/ISO proposal. This discussion is summarized in a table, which was shown during the meeting by Mr Steven and which will be presented in GRB (informal document No. GRB-41-xx).

The Netherlands has discussed the results of the OICA test program on a national base. This paper gives the Netherlands proposal for limit values, based on the above-mentioned summary. Only M1, N1 and M2 vehicles are taken in to account.

2. Data

The results of the comparison tests are given in Table 1. Those data have been selected from the raw database which comply with

- the latest stage of the D/ISO proposal as well as with the current Regulation No. 51.
- the Regulation No. 51 limit value +1 dB (COP demand).

Table 1: Results L_{typ} new of comparison measurements

class	L _{typ} new in dB(A)											no of vehicles
	66	67	68	69	70	71	72	73	74	75	76	
M1	1	2	5	24	21	13	2	2				70
M1s				1	2	1	2	1	1			8
M1o					2		3	4	1			10
N1/M2-a			1	1	2	2	2	1				9
N1/M2-b				2	1	2	3	3	1	1		13
total	1	2	6	28	28	18	12	11	3	1		110

ACEA proposal for vehicle classes:

- M1: M1 vehicles with power to test mass ratio ≤ 120 kW/t
M1s: M1 vehicles with power to test mass ratio > 120 kW/t
M1o: M1 off road vehicles as defined in RE.3
N1/M2-a: N1 or M2 with GVM ≤ 2500 kg
N1/M2-b: N1 or M2 with 2500 kg $<$ GVM ≤ 3500 kg

3. NL considerations for future limit values

Before discussing any concrete values, the Netherlands has set the following goals, constraints and assumption for a future system of limit values:

With respect to short term and long term acoustical goals:

1. The future system shall enforce real acoustical improvement.
2. The long term goal is based on the broader implementation of currently available low noise technology. It is not intended to enforce the development of new technology.
3. Manufacturers should be given reasonable time to adopt available technology.
4. The best 80% of vehicles should comply with the first limit value.
5. The noise level connected to the best 20% of vehicles can be considered as a good long term goal.

With respect to interpretation and analysis of available data:

6. The vehicles under discussion comply with COP (current Limit+1 dB); This 1 dB(A) COP margin should be taken in to account also when future limits are evaluated.
7. It is assumed that all test results can be lowered by 1 or 2 dB, without significant changes to the vehicle design. The following reasons have been identified for this:
 - In the informal group statements were made that there is a spread in test surfaces and test sites leading to a spread in noise emission of at least 2 dB(A). The test site of the GIF, which was used for the EU test program, was stated to belong to the noisier test sites: A 1 dB(A) reduction of test values could be found when testing on other test sites.
 - In the informal group statements were made that the vehicles are adjusted to fulfil the current noise test (e.g. electronics engine/gearbox, tyre choice, resonances intake/exhaust). The test vehicles are not adjusted to give low noise test results according to the new method. Once the new method is introduced, vehicles can and will be adjusted to give low noise emission during the new test. It is assumed that this will give another 1 dB(A) reduction of test values.
8. It is assumed that an acoustical improvement of ½ dB per year is technically achievable. This complies with
 - either a ½ dB reduction every year, which is introduced in model year changes;
 - or with a 3 dB reduction in 6 years by means of a complete model change.

With respect to vehicle categories:

9. N1/M2 vehicles >2500 kg can be considered as a different vehicle class (intermediate design between trucks and passenger cars)
10. M1 off road vehicles can be considered as a different vehicle class (off road vehicle noise problem is made plausible by OICA in WP 20; a new definition is considered necessary to separate “real off road vehicles” from “actually on road SUV’s”).
11. No technical reason has been found to treat M1s vehicles and N1/M2-a vehicles differently from normal M1 vehicles.
 - If such a need would exist, OICA would have given a (formal) request and clarification.
 - Table 1 shows that low noise sport cars (69 dB(A)) are available on the market.
 - The current dBase shows higher values compared to normal passenger cars, but these are thought to be caused by higher limit values in the current regulation.
 - Unlike the delivery vans and off road vehicles, sport cars and small duty vehicles have a basic design which is very similar to normal passenger cars (ground clearance, towing capacity, tyres)
 - The method in it self already treats high performance vehicles more moderate than normal vehicles

- The target acceleration is less than linear dependent on the power to mass ratio.
- The acceleration in the test is maximised to 2 m/s², even if the target acceleration of high performance vehicles exceeds 2 m/s².
- Both boundary conditions lead to relatively lower engine speed and therefore lower noise emission.
- In the informal group a statement was made by OICA, confirming that sport cars are treated gentler compared to normal passenger cars.

Taking in to account the above-mentioned considerations, the measured noise data according to Table 1 can be converted into expected future test results for these vehicle types. These data have been given in Table 2.

Table 2: Expected future test results with the new method for proto type vehicles. Data have been derived from Table 1 taking in to account a 1 dB difference between production and proto vehicles as well as a 1 dB difference between used test track and optimal test track. The 1 dB difference due to adjustment to the new method has not been taken in to account in order to keep this estimate on the conservative side.

class	Ltyp_new in dB(A)											no of vehicles
	64	65	66	67	68	69	70	71	72	73	74	
M1	1	2	5	24	21	13	2	2				70
M1s				1	2	1	2	1	1			8
M1o					2		3	4	1			10
N1/M2-a			1	1	2	2	2	1				9
N1/M2-b				2	1	2	3	3	1	1		13
total	1	2	6	28	28	18	12	11	3	1		110

4. Proposals Germany and France versus NL considerations

Table 3 gives the limit proposal of Germany. Based on Table 2, it also gives the percentage of vehicles to be modified due to these limits. In stage 1 all vehicles would pass the new test. In stage 2 and 3 respectively 4,5% and 10% of the vehicles would have to be improved. The timing connected to the different stages is still to be discussed.

Table 3: German proposal for limit values and the percentage of vehicles that has to be modified, taking in to account the above-mentioned data and boundary conditions.

class	German proposal for Limit values			% of vehicles to be modified			
	stage 1	stage 2	stage 3	stage 1	stage 2	stage 3	stage 3
	amount of improvement dB(A)						
	2 dB(A)	1 dB(A)	1 dB(A)	1 dB(A)	1 dB(A)	1 dB(A)	1 dB(A)
M1	71	70	69	-	-	2,9	5,7
M1s	73	72	71	-	-	-	12,5
M1o	72	72	71	-	-	10,0	10,0
N1/M2-a	71	70	69	-	-	11,1	33,3
N1/M2-b	73	72	71	-	-	7,7	15,4
total				-	-	4,5	10,0
enforcement date	X	Y	Z				

France has proposed a limit of 73 dB(A) for M1 vehicles. Higher limits for other classes of vehicles could be discussed. With help of Table 2 it can be seen that 100% of the existing vehicles would pass this limit. The proposal of France does not include any future lowering of limits.

5. Proposal by the Netherlands

The Netherlands holds the opinion that the introduction of a new method can only be justified under the aim of real and better progress. Therefore the Netherlands proposes to introduce a system of limit values similar to that of Germany; with several stages and several vehicles classes. The proposed limit values are however somewhat tighter in order to ensure the enforcement of real progress. The proposal is thought to be technically achievable and aims at the broader application of yet available technology.

The proposal of the Netherlands is given in Table 4. This proposal complies as much as possible the considerations in paragraph 3.

Table 4: Netherlands proposal for Limit values (left) and the percentage of vehicles that has to be modified (right), based on OICA data, corrected for COP and test track (see Table 2).

class	NL proposal for Limit values				% of vehicles to be modified				
	stage 1	stage 2	stage 3	stage 4	stage 1	stage 2	stage 3	stage 4	
	dB(A)	dB(A)	dB(A)	dB(A)	amount of improvement				
					2 dB(A)	1 dB(A)	1 dB(A)	1 dB(A)	1 dB(A)
M1	69	68	67	66	2,9	5,7	24,3	54,3	88,6
M1s**	69	68	67	pm	25,0	50,0	62,5	87,5	-
M1o**	71	70	69	68	-	10,0	50,0	80,0	80,0
N1/M2-a	69	68	67	66	11,1	33,3	55,6	77,8	88,9
N1/M2-b	71	70	69	68	7,7	15,4	38,5	61,5	76,9
total					5,5	12,7	33,6	61,8	87,3
enforcement year*	X+2	X+4	X+6	X+8					

* X is the year of adoption of the regulation by WP29

** categories still to be defined

*** this table is meant for new vehicle types. The transition period for existing types is to be discussed.