



ETRTO comments to TNO Venoliva Final Draft report

Ref. UNECE Informal document GRB-52-07

Introduction

The tyre Industry took in high consideration the final draft of TNO-Venoliva report (Informal Doc. GRB-52-07).

In addition, the analysis of the ACEA/UTAC/TÜV Nord Final report prepared by their consultant UTAC/ TUV NORD is included, in order to highlight some relevant points that are missing in the TNO report.

Due to the short time available after the issue of TNO report, the following remarks by the tyre Industry should be considered as a preliminary step for a further discussion of the report at EC.

For each of the following comment the source page of the TNO report is reported in *Italic*.

Comment N°1: On the relative contribution of the tyre in the new method “B” for the vehicle overall rolling noise emission

A) TNO did not correctly consider the tyres contribution in method B, and their capability to comply to the future type approval requirement to R117.02, for the vehicles in the analysed database

Ref. page 37 of the TNO report:

The rolling noise emission of tyres is subjected to a separate EU Regulation No. 661/2009. This regulation implies that from 1 November 2012 stricter limit values for tyre rolling noise will be in force for new types of tyres and from 1 November 2013 for new types of vehicles. These new requirements will result in an (estimated) average reduction of 3.8 dB(A) of the limit values for car tyres and approximately 3.3 dB(A) for the limit values for truck tyres. From 1 November 2016 the stricter limit values will apply to all new vehicles and all new tyres (see also Appendix E)

The spread of noise emission values in most tyre classes is approximately 5 to 6 dB(A) below the current limit values. The current average of the noise emission is in most cases approximately equal to or slightly higher than the future limit values. This means that the introduction of the stricter limit values will result in the cut-off of the upper half or more of the tyre populations. Assuming that in the long run, new tyres with lower noise emission will be developed, a spread of approximately 5 dB below the future limit will emerge. The average noise emission of tyres may then be 3.3 to 3.8 dB lower than the current values.

TNO neglected that OEMs have started during the Method B monitoring period, to use improved tyres on the way to comply R117.02 or EC 661/2009 in November 2013. So we cannot expect that the tyres may have an *average noise emission potential reduction of 3.3 to 3.8 dB lower than the current values.*

Having to fulfil a limit of 71 dB(A) and knowing that slick tyres radiate sound level at 80 km/h of about 68 dB(A) (for 215 < tyre section width <= 245) it is unthinkable to imagine that a spread of approximately 5 dB below the future limit will emerge.

TNO also doesn't mention that a reduction in the tyre limits according R117 will not have the same effect in level reduction on R51.03. The tyre rolling noise is speed dependent and can be estimated by the formula:

$L_{50} = L_{80} - a \log(80/50)$; where "a" is the slope of the linear relationship for each tyre between 50kph and 80 kph.

If we consider an average slope equal to 32, it is clear such slope depends on the features of the tyre to fulfil the OEM requirements and typical values for "a" are between 25 and 45 which results in a level reduction from L_{80} to L_{50} in the range from 5.0 dB to 9.0 dB.

Two tyres with noise level at 80 km/h can perform at 50 km/h a noise difference of 4 dB! It is scientifically not correct to ignore this speed dependence and conclude from the new tyre noise limits in R117 to the tyre noise performance at 50 km/h in R51.03.

For M1/N1 vehicles, if going to higher acceleration than $2m/s^2$ at least 1 dB torque influence has to be considered for the tyre and in many cases this will not be sufficient.

B) **Ref. page 11 of the TNO report:**

In method A the minimum required tyre tread depth is 1.6 mm, whereas in method B the tread depth has to be at least 80% of the full depth. This can result in an increase of several dB of the tyre-road noise component, especially for tyres with a rough tread pattern.

This extremely relevant point is reported without any scientific approach for quantifying its impact in the analysis of the limits or options for R51.

C) The questions which the TNO report should answer cover, among many other points, the effectiveness of the new method B in comparison to the current:

Ref. page9 of the TNO report:

- a. What will be the effectiveness of the new method B in comparison to the current method A, in terms of:
 - practical applicability;
 - representativeness of the test results for the noise emission of road vehicles under urban driving conditions;
 - significance of the test method: to what extent can the new test method prevent that the noise emission under different operating conditions than the test conditions exceeds the test results significantly;
 - possibilities to prevent adaptation of the vehicle and its engine control unit to the test conditions;
 - control of the selection of test tyres

- The Tyre industry has not found in the TNO interim report any analysis regarding the last point. No study is reported on the effect of tyre selection and its impact on coherency with the UNECE Reg. 117 amendments and EC R661/2009. This is a major issue, as in principle any tyre type approved according to the EC 661/2009 and UNECE R117.02 is allowed to fit a new type approved vehicle and all throughout its lifetime.
- The Tyre industry has demonstrated to the UNECE Ad hoc WG members for the amendment of R51 (ref. to doc. CRP 003 of GRB Informal Group 2nd - March 2003) that the tyre contribution in the method B can be much higher than the power train for M1 category vehicles

Comment N°2: On the coherency between UNECE R117.02 tyre minimum requirements and the proposed limits for amending R51.03 for vehicle noise emission regarding M1, N1 and M2 < 3.5 t vehicles.

To be in line with EC 661/2009/ and UNECE R117.02 tyre minimum requirements, the following steps have to be taken into account for the categories M1 vehicle and C1 tyre:

- To transpose the current tyre/road sound emission limits to 50 kph;
- To add the sound increase due to the tyre torque effect to the limits;
- To allow for tyre section width as in the transposed 2001/43/EC directive into ECE Regulation 661/2009 on tyre/road sound emission;

Tyre under ECE R51 condition alone - estimation										
M1 CAT. VEH; C1 CAT TYRES		R117.02 entry into force 2012	CONVERSION OF TYRE CONTRIBUTION IN R51.03					TNO Policy Option		
Tire width		Limit at 80 km/h	Maximum test result under R117	Average expected level at 50 km/h	Mean Torque effect + 1.0 dB	Overall expected tyre level under R51.03	Estimated R51 level with 50 % vehicle contribution	OPTION 4 01/2014	Option 5 STEP1 2013	OPTION 5 STEP 2 2015
C1	mm	dB(A)	dB(A)+1.9	dB(A) -6.5	dB(A) + 1.0	dB(A)	dB(A)			
Slick	> 215 ≤ 245	68	69,9	63,4	64,4	64,4	67,4	69	70	68
A	≤ 185	70	71,9	65,4	66,4	66,4	69,4			
B	> 185 ≤ 215	71	72,9	66,4	67,4	67,4	70,4			
C	> 215 ≤ 245	71	72,9	66,4	67,4	67,4	70,4			
D	> 245 ≤ 275	72	73,9	67,4	68,4	68,4	71,4			
E	> 275	74	75,9	69,4	70,4	70,4	73,4			

Table 1 - Comparison of R51.03 equivalent tyre noise limits and TNO proposed values

- The tyre contribution at 50 kph depends on uncertainties coming from different slopes of the linear relationship for each tyre between 50kph and 80 kph (from 25 to 45 with an average of 32) and different torque (up to 3 dB).
- It is well admitted and proved by OICA data and test demonstration done by the Tyre Industry that the tyre contribution in the new test procedure lies between 25%-75% with an average value of 50% tyre/ power train relative contribution.
- It is not conceivable that the limits in step 1 of option 5 at 70 dB(A) excludes 50% of the vehicles type approved in the monitoring phase.
- Comparing the TNO policy options 4 & 5 with the tyre contribution for method B (see table 1), it is evident that the proposed limits are not coherent with the new rolling sound prescriptions for R117.02 that will enter into force in 2012 for new tyre type approvals. **Only for slick tyres the proposed limits can be fulfilled if the vehicle contribution is 50%.**

As a consequence, vehicle noise limits such as 68 or 69 dB(A) cannot be transposed the same way for a vehicle equipped with narrow and wide tyres without imposing a double legislation on the tyre.

In the policy options there is no distinction based on the tyre size.

Eventually, TNO policy options take in no account the tyre rolling noise allowances for extra-load tyres which are commonly used and snow.

Comment N°3: On the time span required for the technical evolution when proposing a step wise approach.

A step wise approach is more favourable for competitive products because it motivates research and development. The TNO step wise approach cannot be considered as technical evolution because the time span is too short when compared to the average vehicle or tyre line evolution of 5 to 6 years.

- Generally speaking, the Tyre industry welcomes a step wise approach because it is more favourable to accompany the evolution of competitive products because it motivates research and development.
- The two step approach as proposed by TNO is too rapid. The development of a new more performing tyre to accompany the vehicle requirements should be a minimum of five years i.e. 2017.

Comment N°4: On the database involved in TNO analyses about M3 and N3 heavy vehicles

- In the TNO report the tyre torque effect on the drive axles was not deeply analysed. The “OICA” proposal and its rationale as given in the GRB 52-*Informal doc. GRB-52-04* is justified as was fully understood and shared by the GRB delegates
- According to tyre industry additional subcategories should be introduced within N3 to consider that power train for M3 is derived from N3. It emerges that TNO treated M3 vehicles as M1 vehicles and this is not realistic especially when M3 are derived from N3 vehicles.
- Still some concerns arise on the number of data elaborated for category M3 vehicles (*Ref. page 12 - table2 of TNO report*) and N3 vehicle (table 4 of page 17)