

ASEP Stringency analysis

Issued by the Netherlands

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Introduction

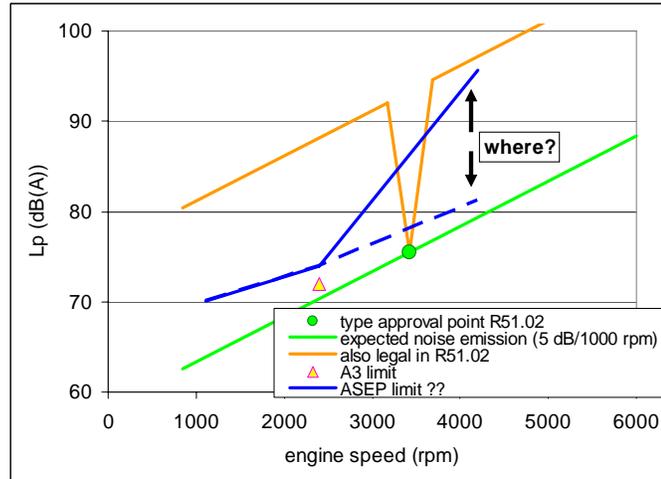


Fig. 1: main question: where to draw the ASEP limit line

The most important remaining question for ASEP is: where to draw the ASEP limit line and how stringent should ASEP be (see fig 1). This stringency depends directly on the four coefficients X, Y, Z and Bonus(Y/N), with which the ASEP limit line is constructed from the Anchor point. These XYZ coefficients exist in both ASEP methods, although they have a different meaning (see fig 2).

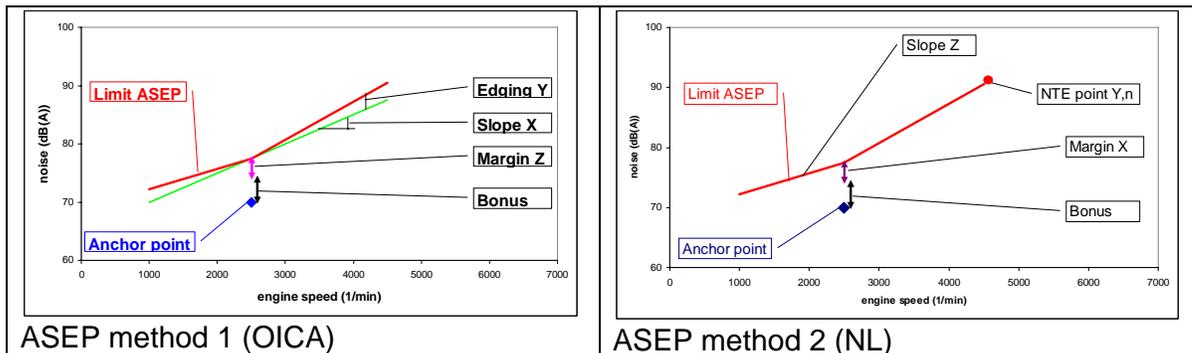


Fig. 2: the coefficients X, Y and Z determine the position of the ASEP limit line

In order to facilitate this discussion a sensitivity analysis has been made on the ASEP vehicle dBase. All vehicle noise values have been compared to the ASEP limits of the two ASEP methods, while varying the XYZ coefficients. The outcome of these calculations has been ranked in three categories: pass (more than 1 dB under the limit), border case (within 1 dB from the limit) and fail (more than 1 dB over the limit). These calculated results have been compared to the judgement of three expert(groups) as they were available from the ASEP IG papers.

Results

The full analysis results are given in table 2. The colours in the tables correspond to the judgement: green = uncritical/pass; yellow = border case; red = concern/fail. The calculated values in the table give the difference between the limit line and the highest measured noise

value relative to the limit line. A positive value means that the vehicle passes with a margin of x dB(A). A negative value means that the vehicle fails the ASEP limit by x dB(A).
 At the bottom of table 2 a rating has been given to the variants. The target is to match colours: Vehicles of concern should fail the limit, uncritical vehicle should pass and border case vehicles should be judged as border case. At the very last row of table 2 the average percentage of correct judgements is given. This percentage can be used as a first qualifier of the variants.

A summary of the outcome has been depicted in table 1 for two concrete proposals:

- ASEP method 1 with the limit proposal as given informally/oral by Japan and France in the 16th ASEP IG meeting
- ASEP method 2 with limit proposal as given in formal document ECE-TRANS-WP29-GRB-2009-05e by the Netherlands.

Table 1: summary of stringency analysis for two concrete proposals

judgement by experts	judgement by ASEP proposal	ASEP method 1 + limit proposal J/F		ASEP method 2 + limit proposal NL	
		Bonus	Y	Bonus	Y
		Slope	6	Δ L	8
		Edging	1	Sl. Below A.	3
		Margin	2	Margin	2
uncritical vehicles	% pass	95	88		
	% bordercase	5	11		
	% fail	0	1		
bordercase vehicles	% pass	80	20		
	% bordercase	13	40		
	% fail	7	40		
vehicles of concern	% pass	71	0		
	% bordercase	21	0		
	% fail	7	100		
	average % "correct" judgement	39	76		

Finally the analysis gives in the two most right columns of table 2 some information on the KBA proposal both with respect to its stringency as well as with respect to its ability to solve a second category of vehicles of concern as marked in blue in the VOC list of the Netherlands. The noise emission of these vehicles is currently of no concern, but with ASEP proposal 1 there is significant room to increase the noise emission.

Analysis and conclusions

- Looking to table 1 the following conclusions can be drawn:
 - ASEP method 1 with the J/F proposal for ASEP limits is less stringent than ASEP method 2 with the NL proposal for ASEP limits. This means that:
 - The percentages of Vehicles Of Concern (VOC) that fail the ASEP limit is significantly less in proposal 1 than in proposal 2 (resp. 7% and 100%).
 - The percentage of "collateral damage" (uncritical vehicles which do not pass the limit (easily)) is significantly less in proposal 1 compared to proposal 2 (resp. 5% and 12%)

- The average percentage of “correct” judgements in proposal 2 is almost twice as high as in proposal 1 (resp 76% and 39%).
- Looking to table 2 the following conclusions can be drawn:
 - For both methods multiple variants can be found which have either a high percentage in Vehicles Of Concern that fail (=high %”Hits”), or which have a low percentage of Uncritical vehicles that fail. (=low % “Collateral Damage”).
 - The amount of variants which have a high % “Hits” and a low % Collateral Damage” is small: 2 variants for method 1 and 8 variants for method 2 have been highlighted as “reasonable” with an average percentage of correct judgement >70%.
 - The variant with the highest % of correct judgements is method 2 with $\Delta L=9$, Margin=3 and SI.Below = 3. This variant detects 100% of the VOC and has a Collateral Damage of only 1%.
 - In all cases the % correct judgements of Method 1 is higher with the Bonus-for-silent-vehicles than without.
 - The performance of method 2 is not very sensitive to the coefficients. A small deviation in coefficients gives comparable % correct judgement. The performance of method 1 is much more sensitive to the coefficients.
 - The KBA proposal prevents a noise increase for 10 out of 13 of the vehicles which are marked by NL as “high potential to increase the noise emission compared to R51.02”. 3 of these vehicles of concern are not solved with the KBA proposal.
 - The KBA proposal prevents a noise increase, but does not add much stringency in itself. Most vehicles failing the KBA criterion already fail the limits of Annex 3 and ASEP.

Follow up

The Netherlands is willing to contribute to a further analysis. Elements that can be explored are:

- effect of other Annex 3 limits;
- dominance of Annex 3 limit versus ASEP limit
- further variants of method 1 (eg lower slope and higher margin)
- mergers of method 1 and 2
- compromises as mentioned in the chairman report

