The consolidated

F/D-ASEP-Proposal

February 2008

At the recent ASEP-IG meeting in Ann Arbor France and Germany presented the latest version of the F/D-ASEP proposal with two options for the definition of the anchor point.

The group decided not to discuss pro's and con's of the two options in the plenum. Instead the group asked France and Germany to investigate both options, make a choice, and report to the group.

France and Germany met, chose and now report:

F/D chose Option 1, i.e. the anchor point is defined as the WOT-level that gives (at the reference point defined by n_{ref} and v_{ref}) a test result equal to the limit value:

$$L_{ref} = (LV - k_p \times L_{crs,50}) / (1 - k_p)$$

with $k_p = 1 - a_{urban}/a_{wot}$

The main advantages of this choice are:

- The anchor point and thus the ASEP-limit curve can be calculated independently of data from Annex 3.

- The uncertainty in the determination of the limit curve is lower by a factor of two compared to Option 2 (see the French presentation on uncertainties in Ann Arbor).

In addition France and Germany chose a value of 2 dB(A) for the overall additional margin applied to the ASEP-limit curve. This additional margin is understood to reflect a reasonable range of deviations of the specific car under investigation from the idealized noise model underlying the F/D-proposal.
Most prominently this can be deviations of the effective engine speed of Annex 3 from the reference engine speed of Annex 10.

Step 1:

determine the power-to-mass-ratio pmr and calculate a_{urban}, a_{WOT}, k_p and n_{ref}

$$a_{urban} = 0.63\ ms^{-2} \times \log_{10}(pmr) - 0.09\ ms^{-2}$$

$$a_{wot} = 1.59\ ms^{-2} \times \log_{10}(pmr) - 1.41\ ms^{-2}$$

$$k_p = 1 - a_{urban}/a_{wot}$$

$$n_{ref} = n_o + (S - n_o) \times 2.2 \times pmr^{-0.43}$$

Step 2:

measure $L_{crs,50}$

The cruise-by level should be measured in the highest gear used in Annex 3 (i.e. gear i for single gear tests and gear i+1 otherwise).

Step 3:

calculate the anchor point L_{ref}

$$L_{ref} = (LV - k_p \times L_{crs,50}) / (1 - k_p)$$

where LV is the limit value of Annex 3.

Step 4:

calculate the limit curve $L_{ASEP}(n,v)$

$$L_{ASEP}(n,v) = L_{ref} - \Delta + 10\ dB \times \log_{10}\left\{ (10^{\Delta/10dB} - 1) \times 10^{\Gamma_n \times (n - n_{ref})/10dB} + (v/v_{ref})^{\Gamma_v/10dB} \right\} + 2\ dB$$

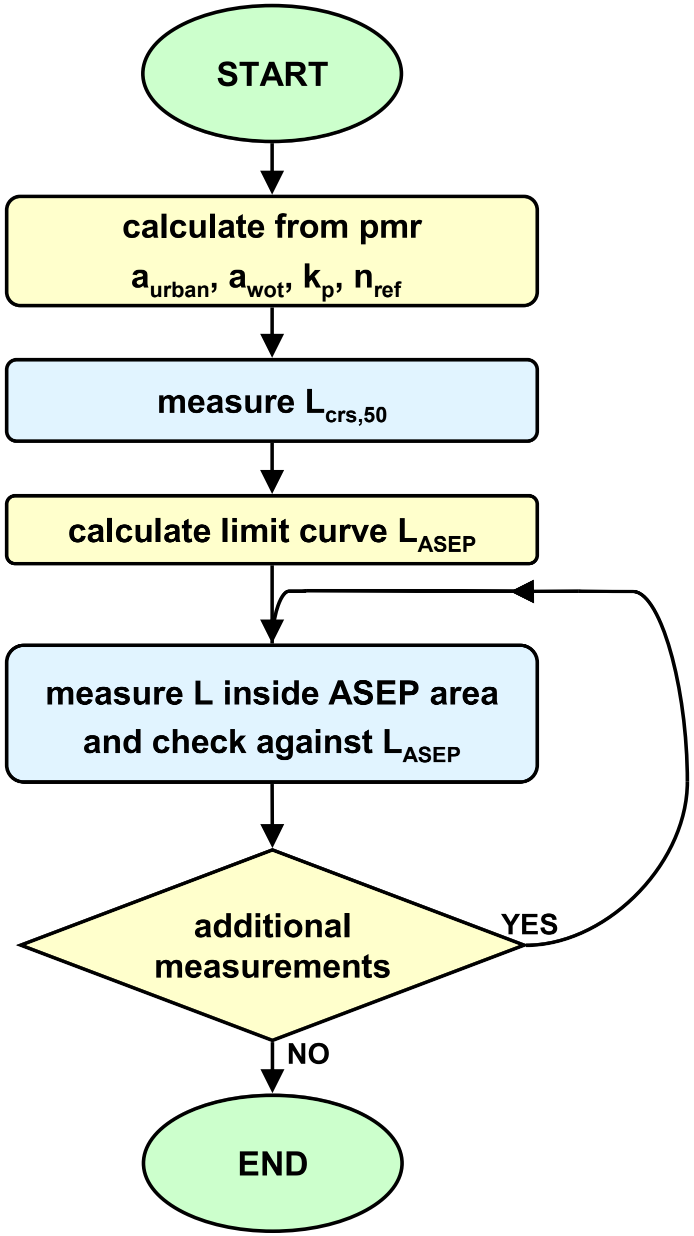
with

$\Delta = MAX(2\ dB(A)\ ;\ L_{ref} - L_{crs,50})$

$\Gamma_n = 4\ dB(A) / 1000\ rpm$ for $n \le n_{ref}$

$\Gamma_n = 5\ dB(A) / 1000\ rpm$ for $n > n_{ref}$

$\Gamma_v = 34\ dB(A)\ ;\ v_{ref} = 50\ km/h$


START
calculate from pmr
a_{urban}, a_{wot}, k_p, n_{ref}
measure $L_{crs,50}$
calculate limit curve L_{ASEP}
measure L inside ASEP area
and check against L_{ASEP}
additional
measurements
YES
NO
END

Summary:

The proposed ASEP limit curve is simple to apply. For a given vehicle, no measurements in addition to those required for Annex 3 are needed to calculate the ASEP-limit curve and to perform ASEP-tests.

The limit curve forms an upper bound for all operating conditions in the control range as it was derived for WOT operation (i.e. the worst case).

Acceptable deviations of individual cars from the idealized noise model the limit curve is based on are accounted for by an overall margin of 2 dB(A).