Transmitted by the expert from Germany

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The French/German ASEP proposal

05.09.2006
The Noise model

- \( L_{\text{tyre}} = L_{\text{tyre\_ref}} + a \cdot \log(v/v_0) \)
  - \( L_{\text{tyre\_ref}} = L_{\text{tyre}}(v_0) \)
  - \( v_0 = 50 \text{ km/h} \)

- \( L_{\text{prop}} = L_{\text{prop\_ref}} + b \cdot (n - n_0) \)
  - \( L_{\text{prop\_ref}} = L_{\text{prop}}(n_0) \)
  - \( n_0 \) is determined by engine speed in gear i of Annex 3 at 50 km/h
  - \( L_{\text{prop\_ref}} \) is determined by \( L_{\text{wot}} \) of annex 3 in gear i
  - \( b = 6/1000, \) if \( n > n_0 \)
  - \( b = 3/1000, \) if \( n < n_0 \)

- \( L_{\text{prop\_ref}} \) is calculated using the following equation:
  - \( L_{\text{prop\_ref}} = 10 \cdot \log(10^{0.1 \cdot L_{\text{wot}}}) - 10^{0.1 \cdot L_{\text{roll\_50}}}) \)

- \( L_{\text{ASEP\_F}}(v, n) = 10 \cdot \log(10^{0.1 \cdot (L_{\text{prop\_ref}} + b \cdot (n - n_0))} + 10^{0.1 \cdot L_{\text{tyre\_ref}} + a \cdot \log(v/v_0)}) \)
  + 2 dB(A)

It is an open question whether \( n \) and \( v \) should be related to the microphone plane PP’, to \( L_{\text{max}} \) or to the end of the test track BB’.
Test track

IFM, Institute for Vehicle Technology an
Results for vehicles with manual transmission

Vehicle 118

Graph showing the relationship between distance in meters and velocity in kilometers per hour, as well as engine speed in revolutions per minute. The graph highlights the performance of vehicle 118 over a specific distance range.
Propulsion noise limit curve

reference point, 2988 min⁻¹, 74 dB(A), no extra tolerance

power to mass ratio index = 220, idling speed = 1000 min⁻¹, rated speed = 8000 min⁻¹
Example

veh 5, 5-speed manual, power to mass ratio index 59.19

L_{max} in dB(A) vs. v(L_{max}) in km/h

- gear 2, right, n > n_{limit_asep}
- gear 2, left, n > n_{limit_asep}
- gear 2, right
- gear 2, left
- gear 3, right
- gear 3, left
- L_{asep_F}, gear 2
- L_{asep_F}, gear 3
- L_{max_i}
Test area limitations

- Vehicle speeds between 20 km/h (v_AA’) and 70 km/h (v_BB’)

- Engine speeds at BB’ up to $2.6 \times \text{pmr}^{0.29} (s - n\_idle) + n\_idle$, but not more than $0.9 \times (s - n\_idle) + n\_idle$
  
  - with $s$ – rated engine speed in min$^{-1}$,
  - $n\_idle$ – idling speed in min$^{-1}$
  - \text{pmr} = \frac{Pn}{(m0 \text{ in kg} + 75) \times 1000}$
  - \text{pmr} is the power to mass ratio index. This is the rated power of the vehicle (Pn) in kW divided by the kerb mass of the vehicle (m0) in kg + 75 (to account for the mass of the driver) and multiplied by 1000.
Engine speed limitation

vehicles with manual transmission

compact cars like Smart

GTI class like VW Golf

(power to mass ratio in kW/t)

n_norm_95_ave_in_use
n_norm_95_high_in_use
n_norm_i
n_norm_max_BB'

Engines speed limitation
GRB 0906

Thank you for your patience