

GRBIG-ASEP-02-002

Additional Sound Emission Provisions

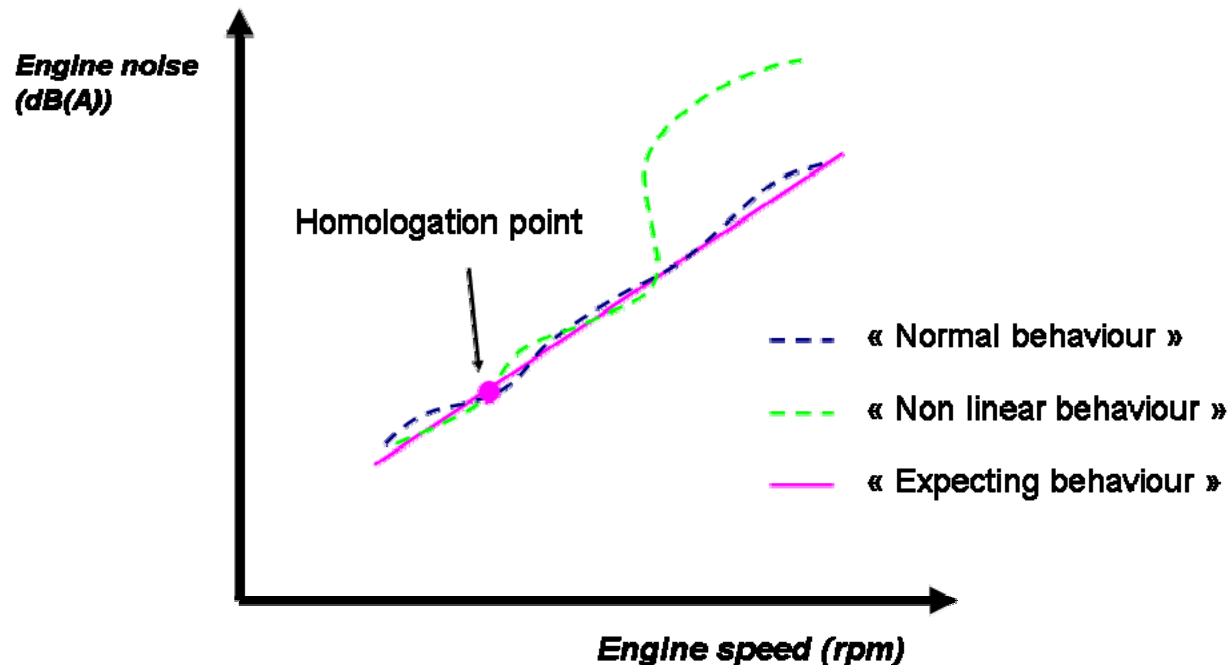
Proposal from France

- New test method of ECE51 represents the actual behaviour of today's cars in urban traffic
- But this new procedure does not cover almost all realistic behaviours in urban traffic (higher engine speed)
- Most of vehicles under normal driving conditions does not differ significantly from a "normal behaviour"
- But what is a "normal behaviour" and how can we identify it ?

“Normal behaviour”

- « Non linear » noise causes can be identify on engine (intake system, switches, exhaust system, controlled valves, adaptive software, ...)
- *Tyre/road doesn't make « non linear » noise*

→ Engine ONLY need to be studying IN CASE OF DOUBT



Experimental approach and ASEP limit curve

- Tests made on full throttle condition on ISO 10 844 test track
- Engine noise is given by : $L_{\text{engine}} = L_{\text{vehicle}} - L_{\text{tyre}}$
- Limit is given by the homologation point and Engine noise behaviour

Homologation point :

- Engine noise :
 $L_{\text{wot rep eng}} = L_{\text{wot rep}} - L_{\text{tyre}(50 \text{ km/h})}$

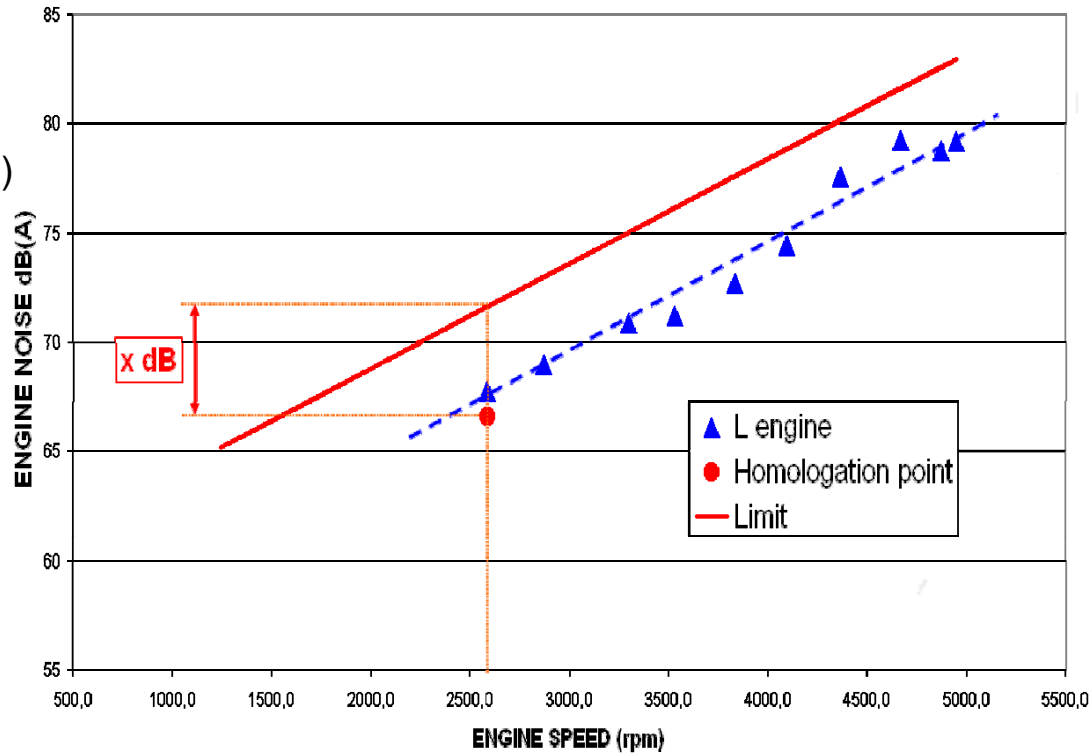
- Engine speed
 $N_{L90} = 1,6509 \times \text{PMR}^{-0,3166}$

Engine noise behaviour : 5 dB / 1000 rpm

Limit :

$$0,005 \times (N - N_{L90}) + L_{\text{wot rep eng}} + x \text{ dB}$$

Engine noise emission



Limit curve of engine speed, speed and acceleration

Off Cycle Emission need to cover high engine speed and urban traffic behaviour :

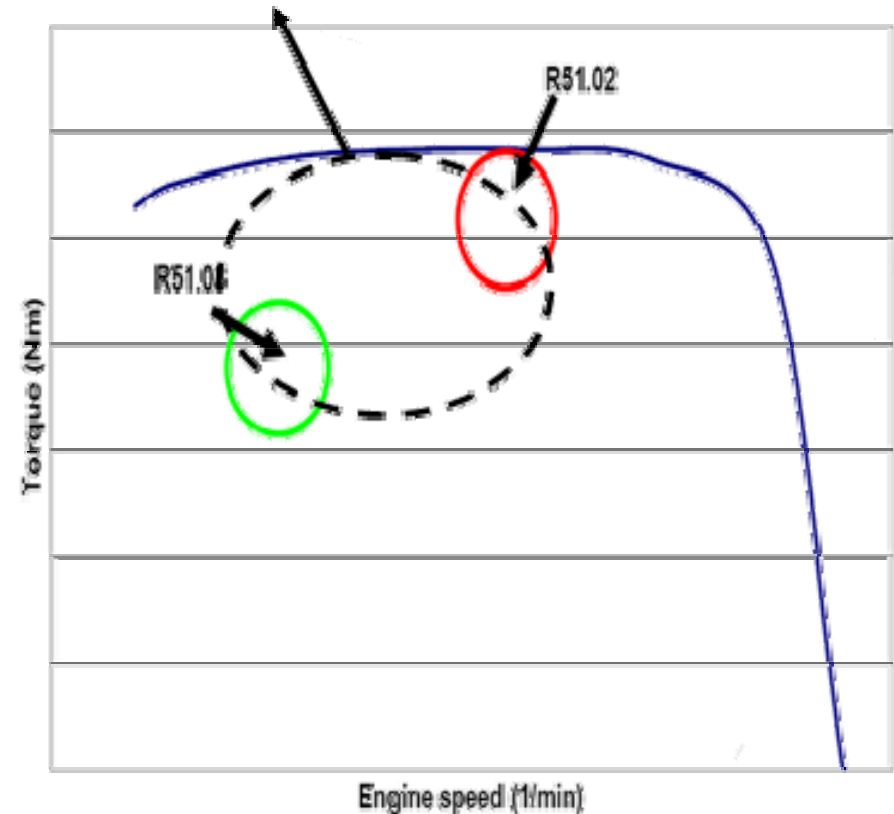
- Engine speed from N_{L90} to N_{max}
- Speed from 20 to 70 km/h
- Acceleration under a_{max}

Off Cycle Emission shall identify « non linear » noise :

- Tyre noise must to be significantly lower than Engine noise

→ *Gear ratio is chosen in this range*

Off Cycle Emission



2 practical approaches to determine Engine noise :

Several points



- Few Pass by to cover N_{L90} to N_{max}
- Few Coast down to qualify Tyre noise

Continuous line



- One Pass by to adjust $L_{wot}(7.5m)$ to $L_{wot}(2.5m)$
- One Pass by to cover N_{L90} to N_{max}
- Few Coast down to qualify Tyre noise

Explicit criteria and informations on the method

- Globally applicable
- Performance based on realistic behaviours in urban traffic (high engine speed and urban speed and acceleration)
- In technology neutral : No definitive choose of gear
- Repeatable / reproducible
- Fitness for purpose : To identify « non linear » noise
- Relative limit based on Annexe 3 : L wot rep

1. **Gear selection : Variable**
2. **Entry speed : from 20 to 70 km/h**
3. **Target acceleration : No target acceleration**
4. **Maximum engine speed : to be define**
5. **Exit speed : Variable**
6. **Wide open throttle**
7. **Mulitple test conditions : Yes**
8. **Engine speed range : N_{L90} to N_{max}**
9. **Relating to “doubt” ?**
10. **Work load Only few passes need to be done**