

VEHICLE

Consider in parallel all the PART 3. sheets
Driver, Enforcement, Vehicle, Immission, Tyres/roads

DESCRIPTION / DEFINITION:

- **VEHICLE** (in the context of sound) means the sound produced by any means of transport resulting from its operation in traffic, including effects from alterations over its lifetime.
- **Keywords:** Age, PTW, Mass, Power, category, market penetration, sound, NORESS, xEVs, minimum sound, abatement measures.

GENERAL FINDINGS/STATEMENTS FROM THE PRESENTATIONS/REPORTS

The sound that each individual vehicle produces in the overall traffic is very variable and has many dependencies.

The putting on the market of the vehicle marks the handover of the vehicle from the manufacturer responsibility to the user.

1. Before the vehicle is put on the market:

This is the manufacturer's responsibility to meet the Type Approval requirements with the Authorities.

The sound from a vehicle and the potential and cost of reducing the sound emissions depends on the vehicle (sub-)categories as well as the propulsion type. Different vehicles have different dominant sound sources, which vary depending on vehicle speed. Customer expectation and needs is also a factor that can influence the sound performance of a vehicle.

The test procedure for Urban sound (L_{Urban}) in the UN Regulations provides a good match with driving conditions observed in Urban conditions. However, a mismatch with real world traffic sound is noticed as this test procedure only covers a part of all conditions the vehicle can operate in. To cover for real-world driving conditions outside of Urban conditions, the ASEP (Additional Sound Emission Provisions) part of the regulations have been strengthened: RD-ASEP (Real-world Driving ASEP) now covers a much wider testing area than the Urban sound test procedure, it includes testing all gears and a much wider speed and engine rotational speed (rpm) range, encompassing a comprehensive span of driving conditions as well as being more robust against possible abuse of regulatory gaps or 'grey zones'.

2. After the vehicle is put on the market:

The results from tighter test procedures and limits are not always clearly noticeable on the roads because it takes time for the new vehicles to penetrate the market. But also, other effects like rough road surfaces, or the fitment of louder replacement tyres can fail to materialise the effects from Type Approval strengthening.

Other means like lower speed limits or smoother road surfaces are considered as measures that can bring more immediate benefits to reduce annoyance from traffic sound.

Technical advancements in vehicle technologies have already produced moderate improvements in real world traffic sound.

Vehicle fleet Electrification will bring further progress, but less than expected due to

- the need of specific tyres especially because of increasing weight of the vehicles including the batteries, and
- new safety devices such as AVAS (Acoustic Vehicle Alert system)

which must be carefully considered in order to ensure that they do not neutralize these improvements in Urban areas.

Other traffic sound nuisances perceived by citizens are the 'single events'.

The manufacturer has little control over these and also Type Approval regulations cannot solve the above phenomena.

Only local enforcement can address these issues.

There is no single solution available to address sound caused by traffic. A holistic approach is needed: improving regulatory test procedures with balanced sound level limits, improving local circumstances (e.g speed limits or smoother road surface), as well as addressing single events by suitable enforcement measures. Advancements need to be reflected in traffic sound modelling so that effectiveness of a measure can be adequately judged

NEEDS & QUESTIONS FOR FURTHER CONSIDERATION FROM THE ORIGINAL PRESENTATIONS/REPORTS:

- A Holistic approach to traffic sound is needed, there is no single solution, a combination of complementary measures is necessary, and also other sound sources need to be considered in the overall sound picture.
- The Effects of previous measures (e.g., the introduction of Phase 3) need to be studied and understood before deciding next measures.
- Consider measures to address single events and/or manipulations (e.g., set up a database, set up a roadside check procedure, adjust the type-approval test method as 'RD-ASEP' ...)
- Consider alternative measures that impact all vehicles with immediate effect. (e.g., speed limits, silent road surface asphalt, geofencing, ...).
- Consider the effects of increasing electrification on the overall traffic.
- For new technologies like AVAS, consider the balance between safety and environmental, as well as customer acceptance.
- Investigate if (approved) aftermarket mufflers excessive sound is caused by incorrect Type Approval or because of differences between the approved muffler and production mufflers.

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