

Background

Noise levels for motor vehicles have been reduced several times in the recent past. The last reduction in 1995, however, did not have the expected effect and subsequent studies showed that the test methods did not reproduce the real life driving habits of motorists realistically. It was therefore decided to develop a new test cycle and better approximate real-life driving in the noise test cycle before adopting a new reduction of the noise limits.

The UNECE Working Group on Noise then developed a new test method which was published in 2007. Over a period of three years, this new method has been used on a provisional basis in parallel with the existing test method in order to get practical experience with the application of this new method, to evaluate its qualities and to establish a database with measurement results. During the monitoring period, the type-approval authorities were obliged to execute the noise emission tests according to both methods and to submit the results of both tests to the European Commission. This allowed the EU to build a data base of comparative test results to evaluate the qualities of the new test method and quantify the discrepancies between the two methods. Depending on the vehicle class, the results of the new procedure were found to be up to 2 dB(A) lower than those obtained under the old method.

The EU Commission then commissioned TNO with an impact assessment based on the results of the data from the test period considering five strategic options for the noise testing procedure and the relevant limit values (VENOLIVA – Vehicle Noise Limit Values – Comparison of two noise emission test methods).

Based on the results of the study, the EU Commission Proposal for a Regulation now submitted to consultation aims at bringing the type approval requirements relative to the sound levels of motor vehicles and their exhaust systems up to the state of the art. In particular, the Proposal introduces to the EU type approval procedure a new test method for measuring noise emissions as well as additional sound emission provisions and defines lower noise limit values. In addition, it aims at ensuring road safety by introducing requirements regarding the minimum noise of electric and hybrid vehicles. When adopted, the new EU Regulation will repeal EU Directive 70/157/EEC and its amendments.

Key Points of the Proposal for a Regulation

- **New test method for measuring vehicle noise**

Under the new method, the test setup and test track are identical with those under the current protocol. However, in the new test procedure, the vehicle's operating mode will not be defined by the vehicle's speed when entering the test plane and the gear selected, but rather by its speed when traversing the test plane and the median acceleration required. The target acceleration is a function of the vehicle's mass-to-performance ratio. These amendments are expected to yield relatively technology-neutral requirements and prevent manufacturers from using gear numbering tricks or selective performance capping. In addition, the new test method includes one constant speed test.

The type-approval value will be a weighted average of the levels measured in the accelerated test and the constant speed test, the weighting depending on the vehicle's power-to-mass ratio. The averaging of the acceleration and constant-speed levels aims at ap-

proximating the new method type-approval value to the partial load levels typical of real-life road traffic rather than the worst-case value it is under the current testing procedure.

Annex II of the Proposal details the measuring methods and instruments.

- **New vehicle noise limit values**

The Proposal calls for lower limit values light and medium-weight vehicles in two phases of 2 dB(A) each and for heavy vehicles in a first 1 dB(A) phase and a second 2 dB(A) phase.

For new model type approval (M_1) the limit value will be 70 dB(A) in phase 1 (starting two years following the Regulation's publication) and 6 dB(A) in phase 2 (starting five years following the Regulation's publication). To the registration, sale and operation of new vehicles, the 68 dB(A) limit value will not apply before Phase 3 (starting seven years following the Regulation's publication). This represents an additional transition period of two years.

To passenger cars (M_1) with a PMR exceeding 150 kW/t, new limit values of 71 and 69 dB(A) respectively will apply. The same higher limit values are also applicable to M_1 SUVs with a gross vehicle weight rating exceeding 2 t.

Annex III of the Proposal provides a comprehensive overview of all the proposed limit values for any vehicle class.

- **Additional sound emission provisions**

To ensure that there is reasonably little variance between a vehicle's noise emissions under actual on-road driving conditions and the expectations based on the results of the type approval test for the specific vehicle, Annex VIII of the Proposal defines "Additional Sound Emission Provisions" (ASEP). These are preventive requirements, meant to cover a vehicle's operating conditions in real-life road traffic outside the type approval driving cycle. They represent an extension of the noise requirements from the test point relevant in the type approval test to a control range applicable to a wider range of operating conditions.

It is not mandatory for vehicle manufacturers to actually have the ASEP tests carried out when applying for type approval, but they are required to sign a statement of compliance as set out in Appendix 1 to Annex VIII. They declare – "in good faith, after having performed an appropriate evaluation of the sound emission performance of the vehicle" – that under typical on-road driving conditions, the sound emissions of the specific vehicle type will not vary "in an unreasonable manner" from the test result (Article 8). The type-approval authority may ask for additional information about the statement of compliance and carry out the ASEP tests.

- **Minimum sound levels for hybrids and electric vehicles (audibility)**

The increasing use of hybrid and electric vehicles helps reduce air pollution and traffic noise significantly. But these positive environmental benefits have produced the unintended consequence of removing a source of audible signal helping blind and visually impaired persons to detect the approach, presence, direction or departure of road vehicles. Electric or hybrid passenger cars are in fact hardly audible at speeds up to 20 kph, where the rolling noise of tyres is very low. A working group on the necessity and technical aspects of acoustic warning devices for silent vehicles was set up by UNECE in January 2010.

Taking into account the inquiries conducted by this group, Annex IX to the Proposal defines the requirements for “Approaching Vehicle Audible Systems” (AVAS), with which electric or hybrid vehicles could be equipped to give an acoustic warning and alert other road users when they approach or reverse silently. The sound to be generated by the AVAS should be readily associated with vehicle operation. Sounds as emitted by sirens/car horns, alarms systems etc. must not be used. Melodies or animal sounds are likewise inappropriate. Under Article 9 of the Proposal, the fitting of such systems will be voluntary and remain an option under the discretion of the vehicle manufacturers.

ADAC Position

Since the current mandatory noise limit values were adopted in 1995, the potential to reduce vehicle missions and hence road traffic noise emissions has long lain dormant. ADAC welcomes the EU Commission’s Proposal for a Regulation on the sound level of motor vehicles – COM (2011) 856 fin. Essentially this goes for the proposed new test method and limit values.

From an environmental and health perspective, it seems appropriate to move the introduction of phase 2 limit values forward: i.e., the three-year transition period between phase 1 (1st level limit values for the type approval test of new vehicle types) and phase 2 (2nd level limit values for the type approval test of new vehicle types) specified in Annex III should be reduced to two years. A shorter transitional period seems very realistic, since many of the new vehicles (passenger cars) produced in Europe today comply with 1st or even 2nd phase limit values. In addition, the transition period of two years between phase 2 (2nd level limit values for the type approval test of new vehicle types) and phase 3 (2nd level limit values for the registration, sale and operation of new vehicles) defined in Annex III should be reduced to one year. This period would seem sufficient and in line with the transitional periods regularly defined in other EU Regulations (e.g. for emission limit values). The reduction of noise emissions from road traffic intended by the Proposal could be realised two years earlier.

Passenger car limit values under the Proposal for a Regulation COM(2011) 856 fin.

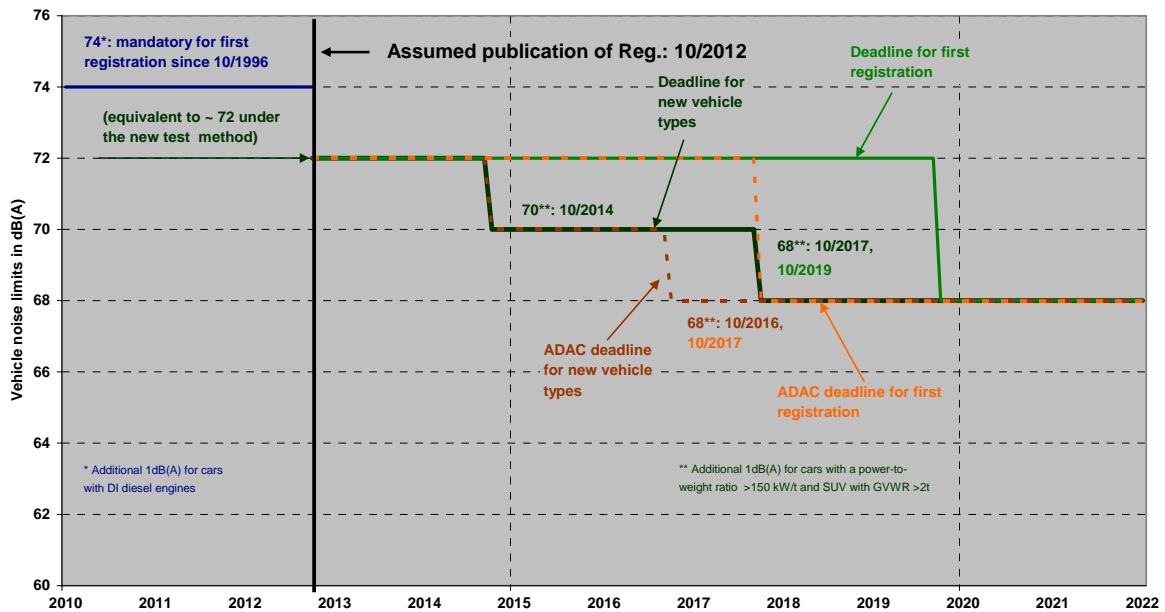


Figure 1: Proposed car limit values and ADAC position

Considering the lengthiness of the legislating process and long development cycles in the automotive industry, a further more long-term and more ambitious limit value level should be added to the limit values proposed here. The present Proposal for a Regulation has only the Article 7 revision clause to introduce a further limit value later on. However, defining the next level of limit values as early as possible would present greater noise reduction potential and allow the automotive industry the required perspective for planning.

The planned revision clause (Article 7) should also be used to monitor whether the Additional Sound Emission Provisions (ASEP) are adequate in achieving their goal of producing the envisioned noise emission reductions under real on-road driving conditions. We must bear in mind that operating conditions will continue to occur in everyday traffic – for instance full-throttle acceleration – which are not covered by the control range. This operating mode may not be very frequent in everyday road traffic but it does present a huge annoyance potential when it occurs and moreover a considerable publicity potential as an extremely negative example of road traffic noise pollution.

The considerable advantages presented by the silent electric vehicles should not be jeopardised too easily. Therefore the introduction of more and more electric road vehicles must necessarily be accompanied by an information and education campaign focusing on safety aspects to make the public aware of the new aspect in the perception of vehicles.

A vehicle’s noise emissions within the urban speed range result from the noise generated by the engine and power train and the rolling noise generated by the wheels. In traditional motor vehicles and below approx. 30 to 50 kph engine noise is dominant. The only other relevant source of noise is the sound generated by the tyres. In electric vehicles, the power plant and train are permanently silent with only the tyres generating the usual amount of noise.

From a safety point of view, there are three relevant speed levels:

- Quick flowing traffic: Over about 30 kph, electric vehicles are not significantly more silent than compact passenger cars with petrol engines. The rolling noise generated by the tyres is enough to make them heard.
- Walking pace: On parking lots, when reversing/driving out of parking spaces or gateways etc., electric vehicles (like many of today's hybrid cars) are considerably more silent. However, in such situations, drivers must be particularly alert and careful anyway.
- Slow-moving traffic: At 10 to 30 kph, we have a problem. When rolling slowly towards a traffic light or slowly cruising a residential street in search of an address, some electric vehicles may be so silent that pedestrians and cyclists fail to notice them. Road users must be aware of this potential source of risk – just as electric car drivers must be aware of the possibility of being more easily overlooked.

Electric vehicle drivers, pedestrians and cyclists alike must be made aware of the unusual acoustics of electric cars:

- Buyers of electric cars must be adequately educated with sales materials, notices in the owner's manuals and last but not least by the sales staff on the fact that their vehicles emit hardly any warning sounds and that they must be particularly aware of potential errors by the other road users.
- Public relations campaigns from road safety organisations, trade and public benefit associations, the police and local governments must prepare pedestrians and cyclists for the new situation.
- Particularly vulnerable groups such as the elderly and children must be made aware of the need to be particularly careful and alert.
- Also the scope of this problem and the potential solutions require further investigation.