STUDY ON EURO 5 SOUND LEVEL LIMITS OF L-CATEGORY VEHICLES

65th GRB meeting

On behalf of the European Commission
GENERAL INFORMATION

› Tender ID:
  › Title: Study on Euro 5 sound level limits of L-category vehicles
  › Tender No: 524/PP/GRO/IMA/16/1131/9316
  › Contract No: SI2.736346 of the Consortium with the European Commission - DG-GROW

› Consortium performing the work:
  › EMISIA - Greece
  › TNO - The Netherlands
  › Ricardo Deutschland GmbH - Germany
  › Heinz Steven Data Analysis and Consultancy (HSDAC) - Germany
BACKGROUND

- L-category vehicles continue to be source of complaints with respect to their (excessive) levels of sound emissions, often perceived as disturbing noise.

- Excessive noise levels constitute a major nuisance for many European cities, contribute in quality of life degradation, and may be harmful for public health.

- Recent advances in regulatory front (UN Regs. Nos. 9, 41, 63, 92 acceded - or to be acceded - by the EU Regulatory context) focused on improvements in the testing procedure and provisions for better market surveillance, enforcement, anti-tampering measures, and replacement silencers.

- Current (Euro 4) sound level limits have been basically transferred from limits already applicable since the 1990’s (Directive 97/24/EC chapter 9) and remain (almost) unchanged for ~20 years.
Specific Contract No. SI2.736346
“Euro 5 sound limits for L-category vehicles”

PROJECT OBJECTIVES

› Investigate the potential for new sound limits of L-category vehicles at Euro 5 step and make a justified proposal, taking into account:

› the citizen’s needs and opinions of interested stakeholders (feedback gathering)
› the evolution of sound levels of approved vehicle types (actual vehicle testing)
› the technical and economic feasibility in the medium term range (cost-benefit analysis)

The new sound limits will be accompanied by an appropriate application timeframe

The ultimate objective is to protect the environment and human health, by providing an improved sound level range for L-category vehicles, and contribute in the reduction of the so-called ‘noise pollution’
PROJECT TASKS AND TIME PLAN

1. Task 1: Estimate of sound level limits for all L-categories (Oct.’16 – Jan.’17)
   a) Feedback gathering – stakeholder survey
   b) Literature review

2. Task 2: Verification of sound level limits (Jan.’17 – Apr.’17)
   a) Actual vehicle testing – sound measurements
   b) Processing of results

3. Task 3: Cost-benefit analysis (Mar.’17 – Aug.’17)
   a) Input data, scenarios, first results
   b) Improvements, final CBA results

4. Task 4: Validation tests (Mar.’17 – Jun.’17)
   a) Additional vehicle testing – sound measurements
   b) Noise Source Ranking (NSR)

5. Task 5: Proposal for limit values and reporting (Jul.’17 – Oct.’17)
   Final sound limits proposed by the study and recommendations
TASK 1: ESTIMATE OF SOUND LEVEL LIMITS FOR ALL L-CATEGORIES

INDICATIVE RESULTS AND FINDINGS FROM THE FEEDBACK GATHERING
OVERVIEW OF THE SURVEY

Objectives

- In-depth understanding of the wishes, demands, and requirements of stakeholders directly involved in the implementation of (possible) new sound limits (manufacturers, authorities, etc.)
- Take into account the opinion of the recipients of possible benefits from improved sound limits (concerned citizens, municipalities, associations, environmental organizations, etc.)

Approach

- Technical questionnaire sent to a large number of various stakeholder groups
- Collection of responses, processing of questionnaires, analysis and main findings

Structure of questionnaire

- Section 1: Technical issues related to sound limits
  - Current status (Euro 4), improved (Euro 5) sound limits, absorbent fibrous materials, ASEP
- Section 2: Contribution of L-category vehicle components to sound emissions
- Section 3: Cost/benefit impact from the expected sound emissions reduction
  - New vehicles, existing fleet
POSITIVE RESPONSES – FILLED IN QUESTIONNAIRES

37 positive responses (satisfactory feedback, considering the technical nature of questionnaire)

Most responses (54%) are from ‘technical’ entities; this enhances the validity of results regarding their technical content.

On the other hand, ‘social’ partners showed their interest despite the technical nature of questions (46% of responses); this shows the continuous interest and necessity to further decrease sound emissions.
COMPLETED QUESTIONNAIRES RECEIVED FROM

- **National responses** (TSs, TAAs, transport departments, market surveillance, enforcement):
  - DE (2), ES (2), NL, SE, IE, CH (2)
  - Outside Europe: CN (2)

- **Industry & manufacturers:**
  - ACEM, ATVEA
  - From IT: Piaggio, ANCMA, Arrow, LeoVince, Termignoni, MIVV, Lafranconi Silenziatori

- **Cities & organizations** (environmental, noise concerned, motorcycle, consumer, other):
  - Budapest, Madrid, Rotterdam (2)
  - ANEC, FEMA, FIA
  - From DE: UBA
    - MOTORRADLAERM.DE - BUND für Umwelt und Naturschutz Deutschland
    - Anwohnerinitiative gegen Verkehrslärm in Hattingen
    - ALD (DE) - Arbeitsring Laerm der DEGA (Deutsche Gesellschaft für Akustik e.V.)

- Anonymous responses: DE (2), FR (2), NL
- 1 individual response
MAIN CONCLUSIONS FROM THE SURVEY

**Social partners**
The majority of social partners (~94%), especially non-bikers and environmental organizations, want a significant decrease in sound limits. However, this percentage is interpreted as a general requirement to reduce the excessive sound emissions (noise) produced by the inappropriate usage of vehicles and rider behaviour (i.e. illegal aftermarket exhaust, tampering, etc.).

**Industrial stakeholders**
Manufacturers have significant concerns about lowering sound limits, as this measure alone is not considered sufficient, if not combined with better enforcement of regulations, anti-tampering measures, and improvements in the test procedures. Furthermore, it entails the risk to drive even more customers to purchase illegal aftermarket systems.

**National technical authorities**
They express an intermediate position (in-between social partners and industry), suggesting a moderate reduction in sound limits, depending on the vehicle type and (possibly) excluding some categories. This reduction should be combined with specific technical improvements in the test procedure (ASEP) in order to be more representative of real-driving conditions.

Lowering the type approval sound limits is not the only problem that needs to be addressed.
TECHNICAL FEASIBILITY FOR LOWER LIMITS

- Current (Euro 4) sound limits remain (almost) unchanged for ~20 years

- Technical knowledge is available and existing technology is mature enough, so that Euro 4 limits are quite easily achievable for most of the L-categories

- Additional technology (possibly) required to achieve lower (Euro 5) limits:
  - Bigger silencers (with potential impact on vehicle package and, perhaps, a problem for small vehicles)
  - Better shielding and covering by silencing foam, new absorber material, modifications of the inlet and exhaust systems
  - Better engine design and optimization for noise and vibration, optimization of combustion process, specific ECU software

- Concerns that specific vehicle categories (super-sport, off-road trial and enduro motorcycles, ATVs) may have additional technical difficulties

- Economic issues: very uncertain parameter
  - Opinion 1: Additional technological improvements may increase the vehicle cost
  - Opinion 2: Currently, a lot of money and effort is spent in sound design; no indication that designing for lower limits is necessarily more costly
ENVIROMENTAL IMPACT FROM LOWER LIMITS

All participants agree that there will be no environmental benefit, if lower limits will not be combined with:

- Better enforcement, effective market surveillance, road-side checks and periodical inspections, etc.

- Anti-tampering measures, i.e., making manipulations more difficult, forbidding certain illegal replacement silencers, etc. More environmentally friendly rider behaviour

- Improvements in the test procedures in order to be more representative of real-driving conditions, sound emissions outside ASEP area, incorporation of ASEP into type-approval procedure (not self-certification), etc.

If the above items will not be in a package together with lower limits, the gap between real-world and type-approval sound emissions will not close
TASK 1: ESTIMATE OF SOUND LEVEL LIMITS FOR ALL L-CATEGORIES

LITERATURE REVIEW – RESULTS FROM THE ANALYSIS OF KBA DATABASE
DISTRIBUTION OF TYPE APPROVAL SOUND LEVELS

L1 VEHICLES

Euro 4 limit
- L1 ≤ 25 km/h
- L1 > 25 km/h

Type approval value in dB(A)

Cum frequency

L1, v_max ≤ 25 km/h
L1, v_max > 25 km/h
DISTRIBUTION OF TYPE APPROVAL SOUND LEVELS
L3, L5, L7 VEHICLES

Euro 4 limit
- L3 80< eng. cap. ≤175 cm³ (EU Reg. 168/2013)
- L3 PMR >50 (UN Reg. 41.04)

Type approval value $L_{drive}$ in dB(A)

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UNDER TASKS 2 AND 4: ACTUAL VEHICLE TESTING – SOUND MEASUREMENTS
OBJECTIVES – SELECTION OF VEHICLES

The objective of including testing of sound levels in the study:

- To establish current sound levels of state of the art vehicle
- Assess the contributions to the sound level of the different sources – vehicle components

Vehicles have been selected with achieved levels under or on the current limit and with recent homologation certificates (no more than 2-3 years)

- Vehicles are tested in production configuration

In the validation tests (Task 4), a Noise Source Ranking (NSR) study (successive physical masking of the different sound level sources) is scheduled to identify and quantify the technical possibilities for sound level reduction on two different L3 vehicles (scooter, motorcycle) and one L7 vehicle (quadricycle)
L1-VEHICLE CATEGORY TESTING

- 3 different vehicles tested according to UN R63
  - L1eB-LS: Scooter 50cc (CVT) with physical restriction to 25km/h (MOFA)
  - L1eB-HS: Scooter 50cc (not restricted)
  - L1eB-HS: Manual 50cc
  > Approval levels are in the process of verification

Acceleration Test

Standing Test
TASK 3: COST-BENEFIT ANALYSIS

PLAN FOR THE CBA MODEL
SOME KEY POINTS ON CBA TO BE PERFORMED

- The main objective is to assess the technical and economic feasibility of lower (Euro 5) limits in the medium term range.

- Input from Task 1 (feedback gathering and literature review) and Tasks 2 and 4 (actual vehicle testing – sound measurements) will be used.

- Different scenarios will be examined (i.e. no change to limits, moderate reduction, ambitious limits), fleet projections (baseline, low/high market growth), urban/non-urban areas.

- Focus on single or individual special noise events, e.g. noisy pass-by vehicles in villages and quiet rural areas, noisy events at night or during weekends/holidays.

- CBA consistent with EU policy of sound emissions control at the source.
NEXT STEPS – PROJECT MILESTONES

› April 2017

    Processed results from vehicle testing

    CBA input data and methodology finalized

› June 2017

    All vehicle testing results finalized

    First results from CBA

› September 2017

    Final limit values proposed by the study and their justification
THANK YOU FOR YOUR ATTENTION