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Informal document GRB-61-17
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agenda item 9)



Draft interstate standard
“Automotive vehicles. Internal noise. Admissible levels and test methods”

Developer: Testing centre FSUE “NAMI”

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Historic reference

(regulatory requirements for automotive vehicles)

1965 – 2000

- ON 025 304-67 Vehicles and road-trains. Noise measurement methods.
- GOST 19358-85 (ST EIC 4864-84) External and internal noise of vehicles.
- ISO 5128-80 Acoustics-Measurement of noise inside motor vehicles
- TRANS/SC1/WP29/R.235 UNECE Draft regulation on internal noise (April 13,1981)
- GOST 27435-87 Vehicles internal noise. Admissible levels and test methods.
- GOST R 51616-2000 + (amendment No.1, 2009)
Is used as obligatory in the national vehicle certification system and covers all vehicle categories intended for operation on roads of Russia.

Historic reference

(regulatory requirements for driver's workplace and interior environment)

- GOST 12.1.003-83 (latest issue of 2008) Occupational safety standards system. Noise. General safety requirements (**method reference is GOST R 51616**)
- Admissible levels, set in SN 2.2.4/2.1.8.562-96 (GOST 12.1.003.-83)
 - 60 dB(A) (PS65) for busses and passenger vehicles (driver's place + passengers)
 - 70 dB(A) (PS 65) for cargo vehicles (driver's place + operator)
 - limiting values in octave bands
 - These norms characterize admissible harm which can be put on a driver under the condition of constant noise influence during a labor shift
- Health regulations on occupational health of drivers No.4616-88
- SN 2.2.4/2.1.8.562-96 Noise at workplaces, in residential and public buildings.
- Lack of the standardized test methods in sanitary standards and the standards "Occupational safety standards systems" results in ambiguity of interpretation of assessment results of the normalized indicators entered by these normative documents and impossibility to carry out comparative tests.
- OST 37.001.492-93 Vehicle internal noise. Determination methods of equivalent levels.

Hygienic regulation

(regulatory requirements for driver's workplace and interior environment)

- Federal Law No. 52-FZ of 30.03.1999
“On Sanitary and Epidemiological Welfare”
- HYGIENIC REQUIREMENTS FOR PHYSICAL FACTORS OF INDUSTRIAL AND NATURAL ENVIRONMENT. Sanitary Rules and Regulations (SanPiN) 2.2.4/2.1.8.....-15 ??????
- GOST 12.1.003-..... 2015 ????

Technical regulation

(regulatory requirements for driver's workplace and interior environment)

Federal Law No. 184-FZ of 27.12.2002 “On Technical Regulating”

The technical regulation — is the document (regulatory legal act) establishing requirements **obligatory** for application and execution to objects of technical regulation (products) unlike ISO, GOST, TU and other standards having voluntary application.

***Technical Regulation on Safety of Wheeled Vehicles
(Enforced by the Governmental Decree No. 720 of 10.09.2009)***

List of standards:

- ***GOST R 51616-2000 (+ Amendment No.1, 2009)***

Technical regulation

(regulatory requirements for driver's workplace and interior environment)



Customs Union

Technical Regulation of Customs Union on Safety of Wheeled Vehicles (CU TR 018/2011) (Approved by the Decision of the Customs Union Commission No. 877 of 09.12.2011)

List of standards:

- GOST R 51616-2000 (amendment No.1, 2009)
- STB GOST R 51616 -2002 (amendment No.1, 2010)
- **Draft interstate standard GOST.....- 2015 – to be developed**

Technical regulation

(External noise - CU TR 018/2011)

Annex 2

- Item 7 - Regulation No. 9-06
- Item 23 Regulation No. 28-00
- Item 33 Regulation No. 41-03
- Item 41 Regulation No. 51-02 (+ 3dBA is permitted for all-wheel-drive vehicles of N2G,N3G, M2G, M3G categories)
- Item 52 Regulation No. 63-01
- Item 88 Regulation No.117-02 (stage 2 from 2017)

Annex 3 Paragraph 2 Table 2.1 - Limiting values for sound level (CU TR 018/2011)

Vehicle	Admissible sound level, dB A
1. Vehicles of M₁ category with wagon-type or bonneted body layout	79
2. Vehicles of M₁ category, except those provided in paragraph 1	77
3. Vehicles of M₂ and M₃ categories in which the case of the engine or its greater part is located in the front part of the vehicle relative to a vertical plane perpendicular to the axis of motion and passing through its geometrical center - at the driver's seat and the passenger area	79
4. Vehicles of M₂ and M₃ categories, except those provided in paragraph 3 - at the driver's seat	77
5. Vehicles of M₂ and M₃ categories, except those provided in paragraph 3, types II, III and C – in passenger area	79
6. Vehicles of M₂ and M₃ categories, except those provided in paragraph 3, types I and A – in passenger area	81
7. Semitrailers (category O), intended for passengers carriage	79
8. Vehicles of N₁ category with technically admissible maximum weight no more than 2 tons	79
9. Vehicles of N₁ category, except those provided in paragraph 8	81
10. Vehicles of N₂ and N₃ categories with a berth	78
11. Vehicles of N₂ and N₃ categories, except those provided in paragraph 10	81
12. Quadricycles (categories L₆, L₇) with closed body	86

Annex 3 Paragraph 2 Table 2.1 - Limiting values for sound level (CU TR 018/2011)

Notes:

- 1. For all-wheel drive vehicles of cross-country capacity of M₁G category the excess of admissible sound levels of no more than 2 dB A is allowed.**
- 2. For all-wheel drive vehicles of cross-country capacity of M₂G, M₃G, N₁G, N₂G, N₃G categories the excess of admissible sound levels of no more than 1 dB A are allowed.**
- 3. For vehicles of M₁ category with technically admissible maximum weight up to 2 tones with power-to-rate ratio more than 75 kW/t in acceleration mode the excess of admissible sound levels of no more than 4 dB are allowed.**
For vehicles of M₁ category with power-to-rate ratio more than 110 kW/t the admissible sound levels are set only for testing mode at a constant speed.
In case if sound levels measured at the moment of acceleration exceed the permissible values provided in the table 2.1 then these values shall be specified in vehicle's operation manual.
Vehicles to which the above is applied, shall not serve for public use (for example, as a taxi) that shall be also specified in the vehicle accompanying documentation for the buyer.
- 4. For the duty-type vehicles (the motor caravan, the armored vehicle, the funeral services vehicle, the ambulance vehicle and etc.) based on category M vehicles, the sound level shall not exceed the admissible levels established for the basic vehicle. For the same vehicles based on category N vehicles, the sound level shall not exceed 79 dB A.**
- 5. For specialized passenger vehicles in a case when the cabin (the driver's seat) and the passenger compartment are structurally divided the following standards shall be used: to the driver's seat the table 2.1 levels of paragraphs 10 or 11 shall be applied, to the passenger compartment – the levels of paragraph 3.**

Annex 3 Paragraph 2 Table 2.1 - Limiting values for sound level (CU TR 018/2011)

2.2. At the expiration of air from pneumatic devices of the braking system after their operation the sound level in the passenger compartment of the vehicle shall not exceed 70 dB A.

2.3. During the work of heating and ventilation systems the power sum of sound level of those systems and the sound level in a cabin (the passenger compartment) at the motion of vehicles of M₂, M₃, M₂G and M₃G categories shall not exceed the admissible levels specified in table 2.1. As for the vehicles of other categories sound levels of heating and ventilation systems shall not exceed the admissible levels specified in table 2.1

2.4. When checking the inner noise level of the vehicle in the course of control of the objects of conformity assessment, the increase of not more than 1 dB of admissible sound levels established for a particular type of vehicle is allowed.

Terms of development of the standard



- **The Eurasian Interstate Council for Standardization, Metrology and Certification (EASC)**

Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan

- **Draft interstate standard GOST**

February 2015 – completion of discussion

May 2015 – final edition

The objective and goals of the draft standard development

- Provision of regulatory base of the Technical Regulation On Safety of Wheeled Vehicles
- Establishment of uniform requirements for internal noise measurement for vehicles within the to methods of measurement of internal noise of automotive vehicles within the ICS (**the Interstate Council for Standardization, Metrology and Certification**)

Tasks to be solved in the course of the draft standard development

- Taking into consideration in the test methods the development of automotive vehicles at an invariance of the fundamental test principles under GOST R 51616 (ISO 5128);
- The establishment of new limiting values of admissible levels taking into account the development of automotive vehicles and gradualness of terms of their introduction within ICS;

Test methods

- Acceleration
- Constant speed
- Noise of the stationary vehicle (ventilation, engine noise, noise of pneumatic systems)

Basic test methods

The internal noise shall be measured under **intense acceleration of the vehicle** at a high gear. The maximum speed at the end of acceleration corresponding $0.9n_{nom}$ doesn't exceed 120 km/h, as well as at constant speeds on the highest gear.

Additions and refinements introduced into the methodology

- The arrangement of microphones measurement points are more precisely defined. Requirements for arrangement and adjusting of seats are defined.
- The procedure of noise measurement of the air expiration from pneumatic devices after their operation is specified.
- Regulation of the heating system noise. Change is included following the increased responsibility connected with transportation of people, and also the existence of big number of noise sources (heaters, air conditioners).

Additions and refinements introduced into the methodology (Noise measurement at the moment of acceleration)

Vehicles with manual gearbox having manual control and vehicles with automatic transmission with the possibility of forced gear selection.

- For vehicles of M1, M2 and N categories, in case the speed at the end of acceleration (V_k) does not exceed 100 km/h, additional tests shall be conducted. Changes shall be introduced for full coverage of the most common driving modes peculiar to this vehicle category and for vehicles comparison in identical speed limits.
- In case when the engine speed at the maximum power exceeds 6000 min⁻¹, acceleration to the engine speed shall be applied corresponding to 80% of the engine speed at which the maximum engine power is declared, but not less than 5400 min⁻¹.

Additions and refinements introduced into the methodology (Noise measurement at the moment of acceleration)

- **Vehicles with automatic transmission with no possibility of forced gear selection.**

The changes introduce more comprehensive and specific testing methodology, having a clear sequence of test actions, eliminating ambiguity and different interpretations of the vehicle mode.

Additions and refinements introduced into the methodology (constant speed)

- The drive mode for vehicles with automatic transmission is concretized.
- The vehicle speed regime has been specified.

New admissible levels

- The admissible levels according to GOST R 51616 can be interpreted as maximum admissible. And they are **technically achievable**.
- The proposed new levels are based on statistic data, obtained from processing of tests results of a large number of objects of various categories and also taking into account that rationing has to reflect the latest developments in automotive industry and to be the tool for competitive fight.
- The proposed norms are more strict but not obligatory.

Admissible levels of internal vehicle noise (draft)

Vehicle	Admissible sound level, dB A	
	Before 1 January [2018]	After 1 January [2018]
1. [Vehicles of M ₁ category with wagon-type or bonneted body layout]	79	78
2. Vehicles of M ₁ category except those provided in paragraph 1	77	[76/73 ^[1]]
^[1] – [vehicle's length does not exceed 4.6 m, vehicle's width does not exceed 1.7 m]		
For other vehicle categories – minus 1 dB after 1 January [2018]		

Admissible levels of internal vehicles noise (draft)

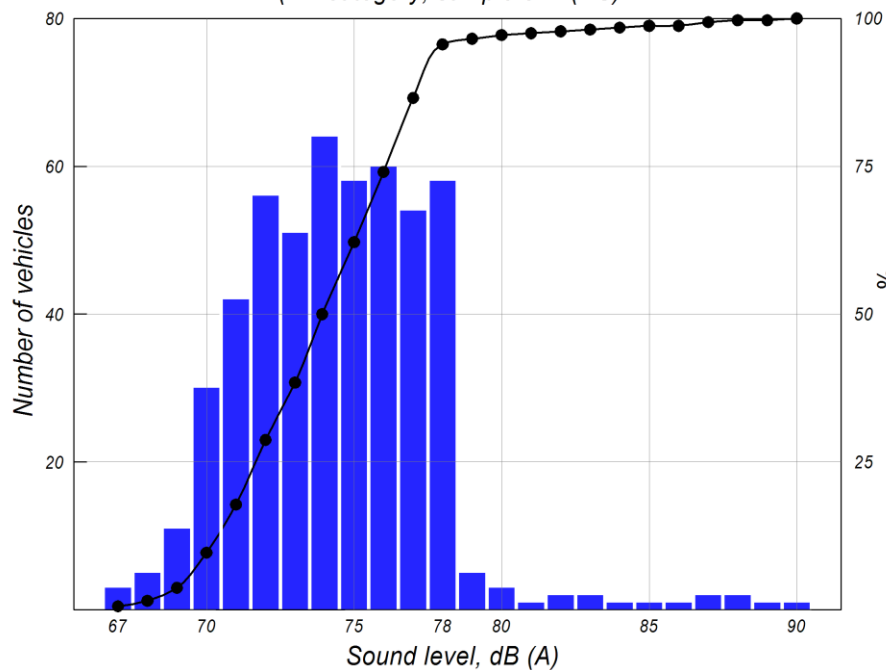
- For (**all-wheel drive**) vehicles off-road capacity of **[M1G]** M2G, M3G, N1G, N2G and N3G categories the excess of admissible sound levels of no more than 1 dB A is allowed.
- For vehicles of M1 category with technically admissible maximum weight up to 2 tones with power-to-rate ratio more than 75 kW/t in acceleration mode the excess of admissible sound levels of no more than 4 dB A is allowed.
- For vehicles of M1 category with power-to-rate ratio more than **[125]** **[number of seats is four or less and the R-point of less than 450 mm above the ground]** the admissible sound levels are set only for testing mode at a constant speed.
- In case if sound levels measured at the moment of acceleration exceed the admissible values provided in table 1, then these values shall be specified in vehicle operation manual.

Statistics for internal noise levels

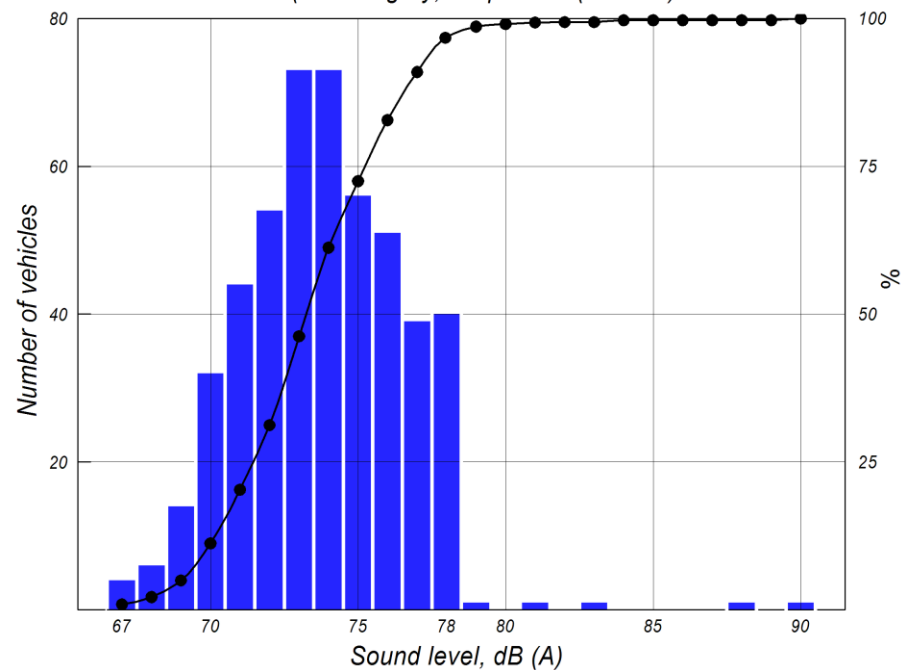
Data before 2008

M1 category

Histogram of sound levels distribution at driver's seat at the moment of acceleration according to GOST R 51616 (M1 category, sample 514 (DS))



Histogram of sound levels distribution in passengers' compartment at the moment of acceleration according to GOST R 51616 (M1 category, sample 491 (interior))

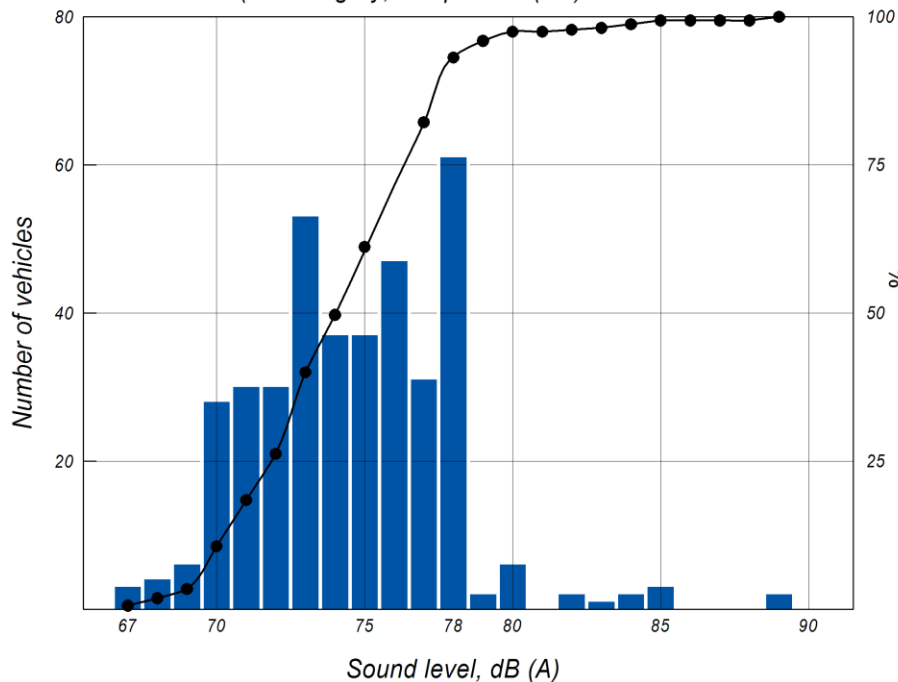


Statistics for internal noise levels

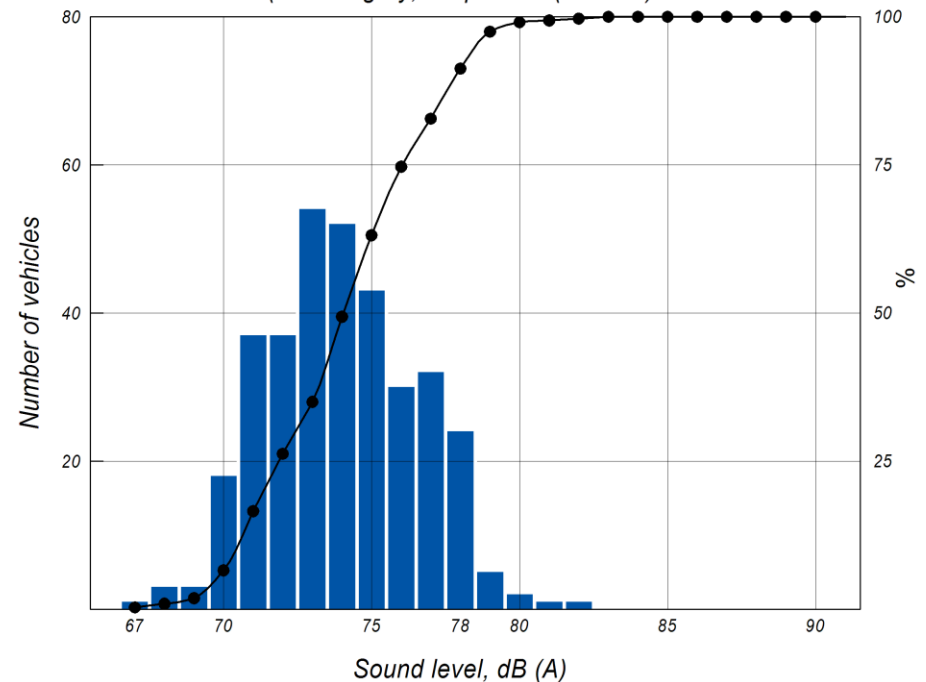
Data from 2008 till 2013

M1 Category

Histogram of sound levels distribution at driver's seat at the moment of acceleration according to GOST R 51616 (M1 category, sample 385 (DS) 2005-2008



Histogram of sound levels distribution in passangers' compartment at the moment of acceleration according to GOST R 51616 (M1 category, sample 375 (interior) 2005-2008

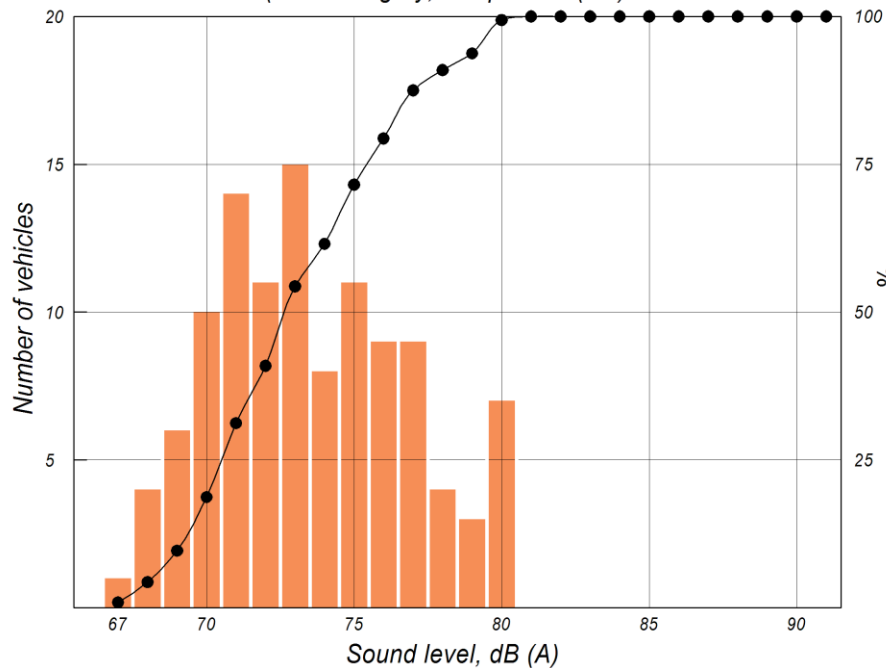


Statistics for internal noise levels

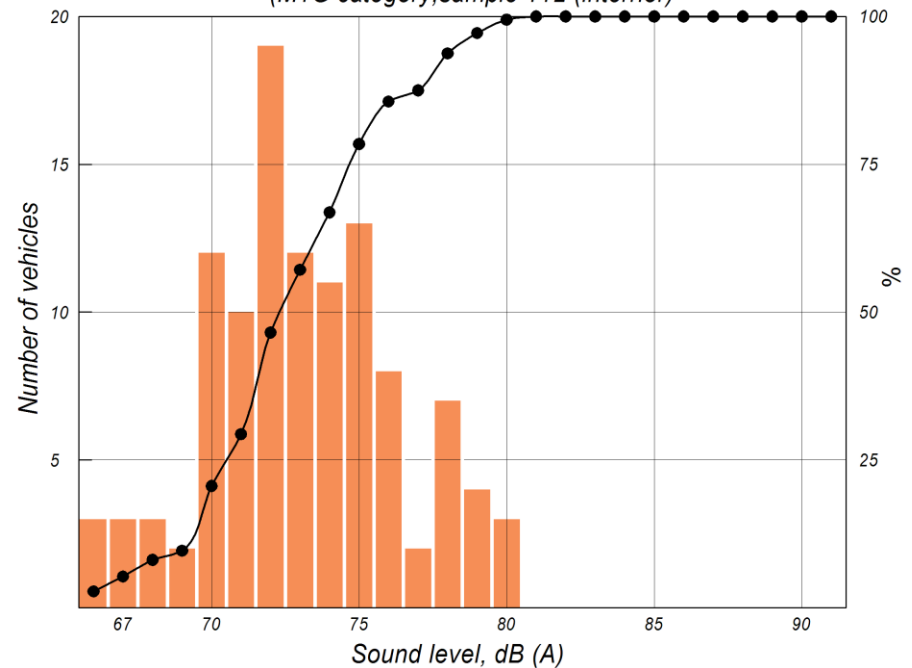
Data before 2008

M1G category

Histogram of sound levels distribution at driver's seat at the moment of acceleration according to GOST R 51616 (M1G category, sample 112 (DS))



Histogram of sound levels distribution in passengers' compartment at the moment of acceleration according to GOST R 51616 (M1G category, sample 112 (interior))

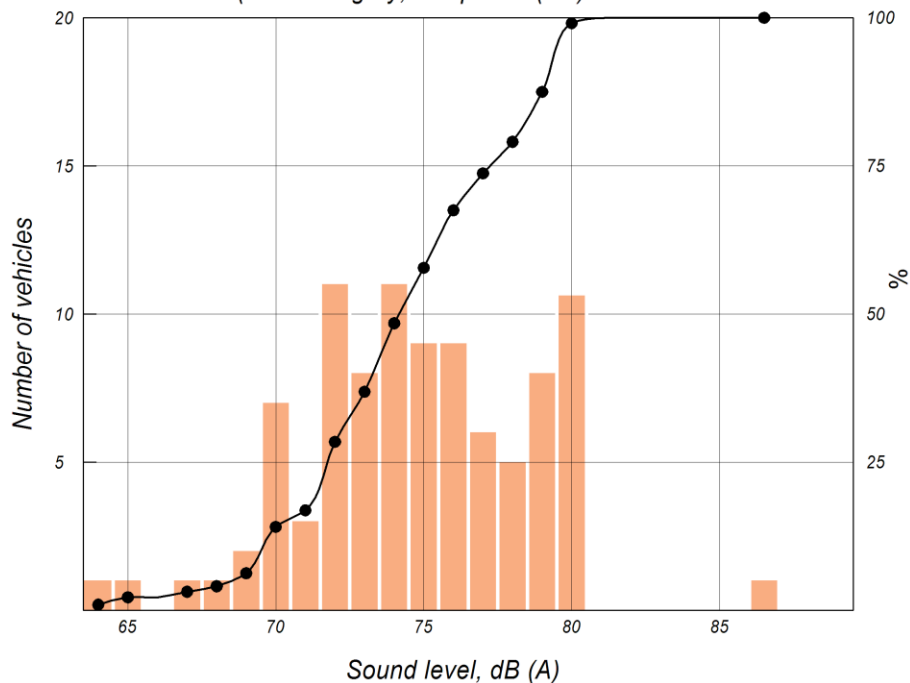


Statistics for internal noise levels

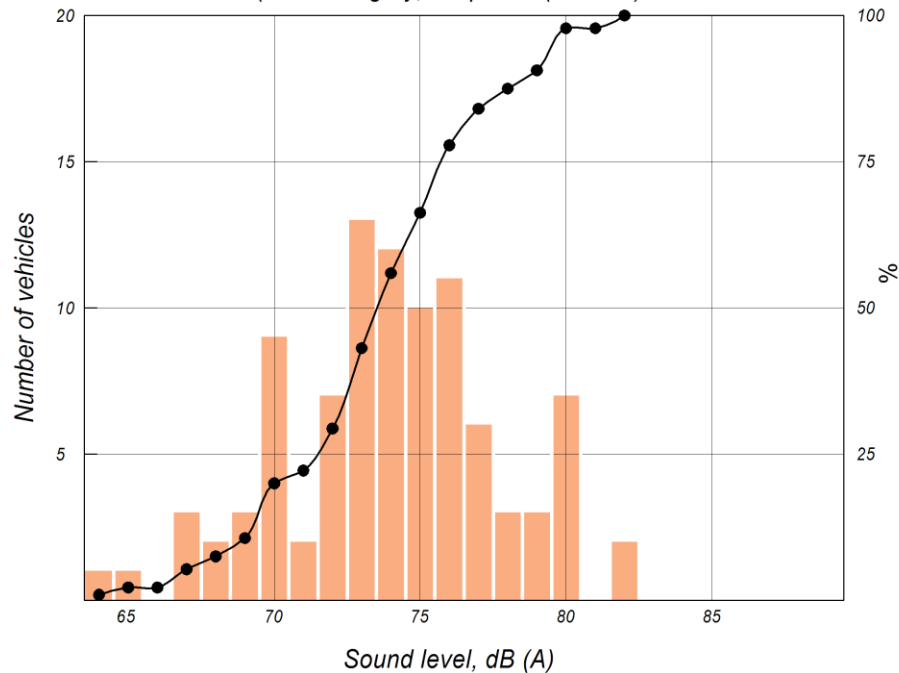
Data from 2008 till 2013

M1G Category

Histogram of sound levels distribution at driver's seat at the moment of acceleration according to GOST R 51616 (M1G category, sample 95 (DS) 2005-2008



Histogram of sound levels distribution in passengers' compartment at the moment of acceleration according to GOST R 51616 (M1G category, sample 95 (interior) 2005-2008



Conclusion

- The admissible values for internal noise obligatory for application established by the Customs Union Technical regulation came into force from 01.01.2015 (Annex 3 paragraph 2)
- GOST requirements are obligatory regarding testing methodology only (before the release of GOST ICS, GOST R 51616 as amended in 2009 is valid)

- Thank you for your attention!