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World Forum for Harmonization of Vehicle Regulations (WP.29)

Working Party on Noise (GRB)

(Thirty-sixth session, 26 February - 1 March 2002,
agenda item 2.1.)

REPLIES TO THE QUESTIONNAIRE
CONCERNING THE DEVELOPMENT OF REGULATION No. 51

Addendum 1

Transmitted by the secretariat

Note: The text reproduced below was compiled by the secretariat and it contains the replies of the experts from the Russian Federation, Slovakia, ISO/TC43/SC1/WG42 and OICA to the questions which had been formulated by GRB at its thirty-fourth session. The replies are reproduced as received and are additional to those published in TRANS/WP.29/GRB/2001/5. Although all the replies were already considered by GRB during the thirty-fourth session, document TRANS/WP.29/GRB/2001/5/Add.1 is being published in order to complete the record as a reference for GRB in defining the conditions and requirements for the development of Regulation No. 51 (TRANS/WP.29/GRB/33, para. 15 and annex 3).

Note: This document is distributed to the Experts on Noise only.

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QUESTIONS CONCERNING THE DEVELOPMENT
OF A TEST METHOD FOR UPDATING REGULATION No. 51
AND THE REPLIES PROVIDED BY VARIOUS EXPERTS

Question 1: **WHICH NOISE SOURCE SHOULD BE ADDRESSED?**

- MAINLY PROPULSION NOISE?
- PROPULSION AND TYRE ROLLING SOUND EMISSION?
- MAINLY TYRE ROLLING SOUND EMISSION?

Replies:

Russian Fed.: Mainly proportion noise in case of necessary application of the Regulations in regard to the noise generated due to the contact of the tyre with the road surface.

Slovakia: Propulsion and tyre rolling sound emission, because the noise in urban conditions is a combination of both sources. The tyre rolling sound emission is especially addressed by another Regulation, but the limitation of tyre/road noise this way only is not sufficient to content the influence on urban traffic noise.

ISO/TC43/SC1/WG42: ISO is working on developing a procedure to measure the total vehicle including propulsion and tyre/road noise.

OICA: Propulsion and tyre/road noise shall be addressed since the aim of the new test method is to reproduce real world urban traffic conditions.

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Question 2: **IS IT MEANINGFUL TO INCLUDE A CONSTANT SPEED TEST
IF THE RESULT IS DOMINATED BY TYRE ROLLING SOUND EMISSION?**

Replies:

Russian Fed.: The test procedure should include the test with fully open throttle (WOT) at constant speed.

Slovakia: Yes, it is. Both test procedures are important to work up to receive the final representative vehicle noise level.

ISO/TC43/SC1/WG42: The majority support a constant speed. Constant speed represents a component of the total noise.

OICA: Yes. Depending on the vehicle category, a combination of a constant speed test with a WOT test will give a correct distribution of the noise sources, which are relevant in real urban traffic.

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Question 3: **IS IT MEANINGFUL TO INCLUDE TYRE ROLLING SOUND EMISSION
IF THE MANUFACTURER CAN CHOOSE THE TEST TYRE?**

Replies:

Russian Fed.: The tyres shall be certified in regard to acoustic parameters in accordance with the separate Regulations, and, as well, according to either ECE Regulations Nos. 30 or 54. The vehicle manufacturer himself may choose the tyre model for the vehicle submitted for approval.

Slovakia: Yes, it is. But the manufacturer should accept defined conditions for the tyre selection. As selection criterion we can choose either the most frequently used type of tyre or the type with the highest width. Usually the most frequently used tyre type for a particular vehicle type is the one fitted in series production.

ISO/TC43/SC1/WG42: The tyre is part of the total system but some manufacturers have a wide variety of tyre sources so the measure of one tyre may not always be representative of all possible combinations.

OICA: Yes. Tyre road noise is part of the whole noise produced by a vehicle. In addition, the vehicle presented for type approval is equipped with type approved tyres, by choice of the manufacturer, and corresponds to the specification of the vehicle that will be on the market.

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Question 4: **WHAT TYPE OF ROAD SHOULD BE ADDRESSED?**
- RESIDENTIAL STREETS?
- URBAN MAIN STREETS?

Replies:

Russian Fed.: On urban main streets as well as on residential streets.

Slovakia: We recommend to focus on the urban main streets. The noise annoyance on the residential streets will be subsequently reduced too.

ISO/TC43/SC1/WG42: The primary goal of the latest proposal is to represent a measure of urban (residential) driving.

OICA: Urban main streets. Because 73 per cent of the population live around urban main streets, which cover 67 per cent of the whole length of the road network, according to the official FIGE-TÜV statistics performed in 1997. Residential areas will also benefit from this.

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Question 5: **WHAT VEHICLE SPEED RANGE SHOULD BE USED?**

Replies:

Russian Fed.: 25-60 km/h

Slovakia: The range should be between 30 and 70 km/h. The speed most frequently used in our cities is around 60 km/h. Higher speeds are not significant for urban driving conditions and are not important for vehicle noise limitation.

ISO/TC43/SC1/WG42: The current proposal is focused on test speeds up to a target speed of 50 km/h.

OICA: Around 50 km/h for passenger cars, referring to FIGE study, and around 35 km/h for heavy trucks.

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Question 6: **HOW SHOULD THE TARGET ACCELERATION BE DEFINED?**

Replies:

Russian Fed.: The acceleration shall be chosen on the basis of relation between engine power and vehicle mass and the statistical conditions of driving in urban traffic.

Slovakia: We have no information.

ISO/TC43/SC1/WG42: The concept of target acceleration has been developed to represent the operation in actual traffic.

OICA: The target acceleration should be derived from real world traffic statistics, according to the power to mass ratio of the vehicle. Abnormal driving behaviour shall not be addressed.

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Question 7: **WHAT LIMIT OF ACCELERATION WOULD AVOID AN EXCESSIVE TORQUE GENERATED NOISE OF TYRES?**

Replies:

Russian Fed.: No information available.

Slovakia: We have no information.

ISO/TC43/SC1/WG42: Current values are nominally 2 m/s². This is applied to the passenger cars and trucks that are derivatives of passenger cars (similar engines and transmissions). However, the value for heavy trucks and motorcycles are more representative of their specific product type.

OICA: The upper acceleration limit is 1.8 m/s² for passenger cars at 50 km/h. No value can be defined for heavy commercial vehicles because it depends on the power to mass ratio of the loaded vehicle.

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Question 8: **IF A PARTIAL LOAD TEST IS USED FOR THE VEHICLE, IS THERE A NEED FOR AN ADDITIONAL TEST FOR THE ACOUSTIC PERFORMANCE OF SILENCERS?**

Replies:

Russian Fed.: Yes.

Slovakia: No, an additional test for silencers is not necessary if the acceleration is in sufficiently wide range.

ISO/TC43/SC1/WG42: Acoustic silencers for intake and exhaust systems are best rated under a wide-open throttle condition. Other tests may not be as efficient in classifying these components.

OICA: No, the vehicle should be tested in total. The proposed inclusion of a WOT test will enable to detect any silencer failure.

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Question 9: **IS A FIXED VEHICLE SPEED SUITABLE FOR THE ACCELERATION TEST SINCE THE GEARSHIFT BEHAVIOUR IS ENGINE SPEED RELATED RATHER THAN VEHICLE SPEED RELATED?**

Replies:

Russian Fed.: Yes.

Slovakia: We have no information.

ISO/TC43/SC1/WG42: For passenger cars and light trucks that are derivatives of passenger cars the total vehicle noise is addressed with a fixed vehicle speed. It is also more robust in adapting to future vehicles. However, trucks and motorcycles have slightly different characteristics that are likely to include both engine speed criteria and vehicle speed limits.

OICA: Yes, for passenger cars, but no for heavy commercial vehicles, where noise is primarily influenced by the engine speed.

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Question 10: **WHAT IS THE FINAL TARGET FOR REGULATING VEHICLE NOISE? - WHEN IS THE VEHICLE SUFFICIENTLY SILENT? - WHAT ARE THE SAFETY RELATED LIMITS?**

Replies:

Russian Fed.: The goal of the regulatory specification is the reduction of negative influence of traffic noise on the environment. However, the real achievable noise levels and costs for their approaching should be taken into account.

Slovakia: The vehicle noise can be reduced and should be reduced more and more. The safety related limits can be achieved by other technical tools. The limits might be rather environmental effect related.

ISO/TC43/SC1/WG42: The goal of the revision of ISO 362 is to develop a method that will result in quantifying the vehicle in urban traffic. If effective, the method will identify in means that will reduce traffic noise.

OICA: The final goal is to achieve traffic noise reduction. One of the actors in this scope will be the vehicle, but not the only one.

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Question 11: **ARE ADDITIONAL SPECIFICATIONS NECESSARY TO AVOID TEST CYCLE BY-PASSING?**

Replies:

Russian Fed.: Yes.

Slovakia: Yes, they are. But we have no information how. The current possibility to test vehicle noise according to by-passing cycle should be saved in the future parallel to the indoor test. Additional specifications should be exactly determined and considered.

ISO/TC43/SC1/WG42: Every method that has a sole purpose of reducing the measured level but without a benefit to the community is not acceptable.

OICA: No. If the test method focuses on the use of the vehicle under real urban traffic conditions it is not in the interest of the manufacturers to bypass regulations.

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Question 12: **HOW TO HANDLE THE ADOPTION OF NEW LIMITS WITH NEW TEST PROCEDURES?**

Replies:

Russian Fed.: For new test method it is necessary to develop new level of noise limits. Those limits should be based on statistical data, taking into account the noise level of the most "silent" vehicles, and should be introduced with certain transitional period of 3-5 years.

Slovakia: To use the new test method to obtain average noise level values by current vehicle types, then reduce them and adopt as new limits for type approval in the next 5 years.

ISO/TC43/SC1/WG42: ISO does not establish limits. Its focus is rather on the best technical measurement of a product.

OICA: The adoption of new limits can be achieved in two steps:
1) Benchmarking of the values obtained by the old respectively the new procedure for a selected range of vehicles;
2) Adaptation of the limits in relation to results and indications of the governmental noise policy programmes.

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Question 13: **IS THERE AN ENVIRONMENTAL ADVANTAGE OF AVERAGING TEST VALUES?**

Replies:

Russian Fed.: No.

Slovakia: Not directly. The response of averaging test values has no direct and momentary influence on the environment. With regard to long period of replacement of vehicles in use, the effect will be achieved only much more later in the future.

ISO/TC43/SC1/WG42: The question is somewhat ambiguous, however, the majority of the members agree that averaging the individual runs of a cycle is most representative of that cycle. The majority also considers the combining multiple related tests as a single value represents valid rating. However, some are concerned with this technique.

OICA: According to the answer of question No. 2, these two conditions, WOT and constant speed, reproduce an urban driving behaviour. For passenger cars, none of the two conditions is statistically meaningful, if considered separately.

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Question 14: **WHEN THE TYRE ROLLING SOUND EMISSION INFLUENCE THE TEST,
SHOULD THE LIMITS BE DEPENDENT ON THE WIDTH OF THE TYRES?**

Replies:

Russian Fed.: No.

Slovakia: No.

ISO/TC43/SC1/WG42: ISO does not establish limits. Its focus is rather on the best technical measurement of a product.

OICA: The answer depends on the results of the necessary benchmark investigations proposed under question No. 12.

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Question 15: **WHAT SHOULD BE TEST CONDITIONS AND ACCURACY?**

Replies:

Russian Fed.: Ambient air temperature: 0 to +30 °C
Road surface temperature: -5 to +40 °C
Vehicle speed: ±1 km/h
Engine speed: ±2 per cent
Barometric pressure: 970 to 1030 mbar
Wind velocity: not more than 4 m/s
Road surface: according to ISO 10844 with
 established upper limit of
 texture depth

Slovakia: We have no information to exactly define the edge conditions and accuracy. It needs more studying, but the order should be following: first to define the accuracy for the noise level in dB(A) and then for other conditions (°C, %, etc.)

ISO/TC43/SC1/WG42: ISO is working diligently at attempting to minimize the variation of each test cycle. By identifying tolerance for the variables that can be controlled, the ISO establishes a measurement uncertainty for the test technique. If the variables are random and uncontrollable the ISO may establish a range for the variable, which tends to restrict the influence of the variable. The ISO 362 15-06-98, Third Edition, indicates the expected measurement uncertainty on a single test site. It also refers to the increase of the measurement uncertainty if specific variables change beyond a suggested limit.

OICA: Test conditions and accuracy must be related to the best existing technological levels. This deems to be well covered by ISO-WG42, where vehicle and instrumentation manufacturers, universities, research institutes and test executors are represented.
