

TRANS/WP.29/GRB/2002/\_\_\_\_  
26 February 2002

ENGLISH ONLY

ECONOMIC COMMISSION FOR EUROPE

INLAND TRANSPORT COMMITTEE

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.)

ISO/TC 43/SC 1/WG 42

Report of the activities of the working group on the development of a vehicle test more  
representative of urban driving.

REPORT OF THE ISO/TC 43/SC 1/WG42  
STATUS OF THE DEVELOPMENT OF AN ADVANCED URBAN DRIVING  
PROCEDURE

The ISO/TC 43/SC 1/WG 42 has continued the development of an advanced urban driving procedure. The working group (WG) has evaluated a number of issues related to the basic operating parameters of the procedure. The WG has reached consensus on a number of points however a few items need to be evaluated further to complete the formulation of the first official committee draft. The WG has approved a resolution to move this ISO 362 Part 1 to the next stage (stage1) to continue the development and define the time frame for completion. The issues remaining will be resolved within the next year to provide a Draft International Standard, early in 2003.

The WG has reached a significant impasse on the purpose of the procedure and the capability to provide substantial change in some classes of vehicles and some operations. The group is therefore considering a resolution to proceed with two parts to the procedure (Part1 and Part2).

The Part1 procedure includes operations for all road vehicles from motorcycle through heavy trucks. Since motorcycles are covered under separate UN Regulations, this report will focus only on the applicability to passenger vehicles and trucks.

The Part1 procedure is based on the initial data developed by RWTÜV Fahrzeug GmbH (formerly FIGE). This work was further expanded by A.C.E.A. based on the premise that urban traffic is frequently driven under a partial throttle, partial engine load condition on arterial residential streets at speeds near 50 km/h. Data from 50 vehicles tested, predominately equip with manual transmissions, show the vehicles were operated in 3<sup>rd</sup> and 4<sup>th</sup> gear for a higher percentage of driving than in 2<sup>nd</sup> which has been the traditional ISO 362 test. In addition to the higher gear usage the data showed that under actual in-use conditions, the acceleration rate is lower than the high rate developed in 2<sup>nd</sup> gear.

The WG has developed ISO 362 Part1, with these principle features:

- Simulation of actual urban driving.
- Target acceleration in one or two gears based on the vehicles power to weight ratio.
- Cruise under light engine (driveline) load similar to urban constant speed driving.
- Acceleration under wide open throttle to reproduce a worst case event, and most accurately evaluate the effectiveness of powerplant silencers.
- Combining the results of the two operating modes to rate the vehicles urban sound level.

Specific evaluations have shown that reductions in vehicle noise level based on the results of the Part 1 test procedure are indicative of similar noise level reductions at other operating conditions. Simulations by RWTÜV Fahrzeug GmbH, presented here at the GRB, have demonstrated that the ISO Part1 procedure will help to reduce overall vehicle noise levels better than other proposals reviewed by the ISO WG. These findings have

been confirmed by Japan, at last September's GRB meeting, and also by Porsche through the evaluation of several product specific simulations.

Measurement uncertainty is one area of ISO 362 Part 1 that requires additional review. There are many factors which influence measurement uncertainty including: instrumentation, road surface variations, atmospheric effects, etc. As you will recall, the ISO proposed a revision of Regulation 51 which reduced the allowable variation due to instrumentation. The UN GRB subsequently approved the changes on 29 February 2000. In addition the test road surface is under review by ISO/TC 43/SC 1/WG 42 which could help improve the site to site surface uniformity. Additional work is required to understand and quantify the environmental influence on this new test procedure. Another factor to consider is the controls set on test operating conditions, that must be defined to ensure consistent vehicle operation from test to test.. As an example the vehicle test speed is set at 50 +/- 1 km/h. This speed tolerance may be adequate, but should be confirmed with actual test data. All operating condition tolerances must be balanced against the ability to actually perform the test. To arbitrarily set a more restrictive limit may look technically better but if it results in a higher rejection rate it may not improve overall measurement variability

The proposed truck segment of the ISO 362 Part 1 procedure, developed through the input of the ACEA truck working group, utilizes a wide open throttle test. The operating conditions proposed for the truck procedure have been modified to reflect actual in-use conditions. One of the major issues, nearing resolution, is the requirement for vehicle loading during the test. At the last GRB meeting, Japan showed that the loading of some classes of trucks is beneficial to improve correlation to actual in use operation. Tyre/road noise and rate of acceleration for trucks are also influenced by cargo load. The application of loading requirements may require that existing truck classes be sub-divided for testing purposes to provide a better definition of the correct load. New truck classifications must distinguish between trucks that are used primarily as passenger vehicles and trucks that are used for the cartage of goods or freight. These issues will be evaluated further before the draft international standard is proposed.

The WG is considering a resolution to develop ISO 362 Part 2 . The ISO362 Part2 procedure is intended to address a concern that the vehicle test speed, and acceleration rate as defined in the Part1 procedure, may not adequately reflect vehicle noise levels at lower speeds. These concerns are based on the analysis by some WG members who feel that the FIGE and ACEA data used for Part 1, show different results when analyzed on a time basis rather than on a distance basis (as was used for Part1). Additionally, there are concerns that vehicle evaluations at a speed of 50 km/h do not differentiate between some classes of vehicles. At this time it is uncertain if the lower speed operation actually reflects a global problem.

One technical concern of the Part 2 proposal is the requirement for partial throttle testing. Data from as early as 1973, in the US, and again in 1999 and 2000 show a significant

increase in measurement variability for operations at partial throttle. One researcher suggested that electronic vehicle engine controls could be programmed to perform a partial load /partial throttle test. To date this technology does not exist. The working group will continue reviewing the Part2 proposal.

The objective of ISO 362, is to develop a procedure which provides the most representative method to quantify vehicle sound levels in urban operation. The existing EU and UN tyre regulations will deal with high speed tyre/road noise.

In addition to the work on the ISO 362 Part1 & Part2 procedure, WG42 is also reviewing the test road surface requirements documented in ISO 10844. A draft for an improved, more representative, test surface is being evaluated, as well as, testing requirements for surface characterization.

The WG is also reviewing the operating mode for the ISO 5130 procedure, which is the measure of vehicle noise when stationary. While the initial intention was to evaluate the exhaust system it is obvious, that for rear engine vehicles, the measurement outlined in the procedure also includes engine noise. Review of the required operating conditions is also underway. Initially the procedure required operating the vehicle at  $\frac{3}{4}$  S (rated engine speed), this condition may not be possible with today's modern engines, which often have engine speed limiters to prevent engine and transmission damage when the engine is not loaded. These limiters are typically set to speeds lower than  $\frac{3}{4}$  S, so provisions for this must be included.

ISO continues to work to develop procedures that measure vehicle quantities in a realistic useful procedure. The target for completion of ISO 362 Part 1 is now fixed and the pressure to resolve the remaining questions has increased. We are committed to completing this work on time.