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Quiet road transport vehicles

Proposal for guidelines on measures ensuring the audibility of hybrid and electric vehicles

Submitted by the expert from Japan *

The text reproduced below was prepared by the expert from Japan proposing a first set of requirements to ensure in real traffic the audibility of hybrid and electric vehicles. These requirements recently entered into force in Japan. This proposal is based on Informal document No. GRB-52-03 distributed at the fifty-second session of the Working Party on Noise (GRB) (see ECE/TRANS/WP.29/GRB/50, para. 31).

* In accordance with the programme of work of the Inland Transport Committee for 2006–2010 (ECE/TRANS/166/Add.1, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

I. Proposal for guidelines on measures ensuring the audibility of hybrid and electric vehicles

A. Requirements for Approaching Vehicle Audible Systems

1. Definitions

"Approaching Vehicle Audible System" is a sound generating device designed to inform pedestrians and other vulnerable road users about a vehicle's approach. Such system is intended to be installed in a vehicle that satisfies the requirements given in paragraphs 2. and 3. below.

2. Operation conditions

(a) Sound generation method

The Approaching Vehicle Audible Systems (AVAS) should automatically generate a sound in the minimum range of vehicle speed from starting up to 20 km/h and during reversing. In the case, the host vehicle is equipped with an internal combustion engine, however, the systems do not need to generate a sound while the engine is in operation.

For vehicles having a reversing sound warning device, it is not necessary for the Approaching Vehicle Audible Systems to generate a sound during backup.

(b) Pause switch

The AVAS may have a switch to stop its operation temporarily ("pause switch").

If a pause switch is introduced, however, the vehicle should also be equipped with a device for indicating the pause state of the vehicle-approach informing device to the driver in the driver's seat.

The AVAS should remain capable of re-operating after stopped by a pause switch.

If fitted in the vehicle, a pause switch should be located in such a position that the driver will find and manipulate it with ease.

3. Sound type and volume

(a) The sound to be generated by the Approaching Vehicle Audible Systems should be a continuous sound easily reminding the pedestrians and other vulnerable road users of an approaching vehicle. However, the following and similar types of sounds are not acceptable:

- (i) Siren, chime, bell and melodious sounds
- (ii) Alarm sound
- (iii) Animal and insect sounds
- (iv) Natural sounds generated by waves, winds, streams
- (v) Other sounds not commonly associated with a vehicle

(b) The sound to be generated by the AVAS should be easily indicative of vehicle behaviour, for example, through the automatic variation of sound volume or tune in synchronization with vehicle speed.

(c) The sound volume of the AVAS should not exceed the volumes generated by passenger cars, trucks and other vehicles powered exclusively by an internal combustion engine and running at a speed of 20 km/h in their practical uses.

B. Method of Promotion for Vehicles in Service

For wider use of AVAS in vehicles already in service, the installation in vehicles of devices satisfying at least the requirements of A.3.(a) and (c) above should be permitted as a simple type of vehicle-approach informing device, provided that in the case of driver-operated devices a continuous sound conforming to A.3.(a) above is generated for a minimum of 5 seconds by one operation and that the operation tool is located in such a position that the driver will find and manipulate it with ease. Specific requirements such as sound limit values will be established later, after in-depth examination.

C. Future Status of the Guideline

This guideline will be reviewed to suit technological development in the future.

II. Justification

1. Promotion the wider use of hybrid, electric and other similar vehicles (hereafter "Hybrid Vehicles") is considered necessary for the evolution of Japan into a low-carbon society. Within the automotive fleet the total number of Hybrid Vehicles has rapidly increased over the recent years and is predicted to continue their market penetration in the future.

2. However, concerns have been raised by road users, groups of visually disabled citizens and some automotive experts about the risk associated with the structural quietness of Hybrid Vehicles.

3. In order to effectively cope with the vehicle quietness issue reported by "the study committee on the quietness of Hybrid Vehicles", the experts from Japan propose in this document new requirements on measures ensuring the audibility of hybrid electric vehicles, electric vehicles and fuel cell vehicles which are all capable of running exclusively on motor power. In the case of the hybrid electric vehicle, these requirements are applicable only when the vehicle is running on electric motor mode only (i.e. with its internal combustion engine at stop).

Annex

Comments by the Chair of the Committee at the Completion of the Report on the Measure Regarding the Quietness of Hybrid Vehicles, etc.

1. The study committee was established in fiscal year 2009 and I assumed the chairmanship of the committee to address the concern relating to vehicles powered exclusively by the electric motor (e.g., hybrid vehicles in the electric motor mode and electric vehicles), which had been raised by visually-impaired people, etc. pointing out the danger of excessive quietness of these vehicles. It is reasonable to think that, in roads where both pedestrians and vehicles are present, the drivers should pay their best attention while driving so as not to cause any sense of danger in pedestrians. However, different traffic situations would lead to different cases, and in reality the drivers' driving is not always ideal in certain situations. While it is an important task to improve traffic manners, it is difficult to do so instantly and simultaneously nationwide. On the other hand, the numbers of quiet vehicles have been increasing sharply since last year, and a measure for these vehicles is urgently needed. After discussing the measure to be taken, the committee arrived at the conclusion that the safety of visually-impaired pedestrians, who would be at the highest risk if no measures were taken, should be the priority.

2. We solicited public comments for one month and received 408 comments. While there were comments urging us to implement the measure as early as possible, we also received a number of comments opposing the measure to generate sound in vehicles. When issues like this are discussed, it is often the case that people with opposing opinions express them strongly. Hence, I do not believe that the conclusion should simply be based on the majority's opinion. The opposing comments that we received included those criticizing the measure to add sound to otherwise nicely quiet vehicles despite the fact that such vehicles had long been desired, those suggesting a measure to use the so-called soft horn, and those stating that some portable terminal that would alert completely-blind pedestrians of vehicles' approaching should be developed and given to those pedestrians. Our conclusion is that the sound meeting certain requirements should be made available at the vehicle side and, in principle, be permanently on so that the visually-impaired pedestrians can instantly grasp the positional relationship between vehicles and themselves.

3. We also studied various methods, other than the one using sound, for visually-impaired pedestrians to perceive an object that weighs 1 ton or more travelling on public roads (in terms of the distance and direction). And we found none of them practical at present. Also, in order for blind people to feel safe on roads, they need to know audibly not only the vehicle's approaching but also its departing. For this reason, it is not sufficient to generate the sound only temporarily. On the other hand, the drivers may experience psychological burdens if the sound is permanently on even in situations where it is absolutely unnecessary. Thus, we decided to include the temporary-off switch in the system.

4. While keeping the vehicles quiet enough not to cause another noise problem as well as minimizing the level of the sound that would transmit into the vehicle compartment, we are working toward providing an effective measure for the visually-impaired, although it may not work for those who are busy talking on the cell phone.

5. We have been criticized that this discussion was started all of a sudden and that scholars and bureaucrats who are not well informed of the real-world occurrences are trying

to come up with a solution hastily. However, the fact is that the basic research on this issue had already been launched jointly by Ministry of Land, Infrastructure, Transport and Tourism and Japan Automobile Manufacturers Association. There were times when Japan was watching how the United States of America (U.S.A.) would address this issue, but with the above-mentioned background where there have been rapid increases in the numbers of those excessively quiet vehicles in Japan, it was decided to advance Japan's own measure and then reflect the Japanese solution in internationally-harmonized regulations. (U.S.A. has the Americans with Disabilities Act (ADA), which prohibits discrimination against people with disabilities.) Therefore, some measure shall be taken there as well. In Japan, too, a new law was enacted requiring barrier-free services to be provided, such as the chime and audio guidance for the blind at public transportation facilities.)

6. The study committee was not only composed of scholars such as experts on visual impairment and human factors technologies, but its members also included representatives from Japan Federation of the Blind, a consumer organization, manufacturers (hybrid vehicle developers as well as experts on audible systems), etc., making it possible to reach the conclusion that is based on various viewpoints. I would also like to note that the study committee meetings were fully open to the public and our discussions were heard by many people from the general public.

7. As a specialist in the vibration noise, I had helped the government develop the measures against the noise problems caused by replacement mufflers. More recently, to address safety issues, I have been involved in drafting of recommendations on how to achieve "zero accident" at the Science Council of Japan as well as creating of database containing 30,000 cases of near misses recorded by event data recorder at the Society of Automotive Engineers of Japan. Thus, I have seen data on various traffic environments. In addition, as the leader of New Energy and Industrial Technology Development Organization (NEDO) "Barrier-Free Project for Disabled Persons and Other Users", I conducted experiments with about 200 visually-impaired participants at the 2005 World Exposition, Aichi, Japan. Regardless of my abilities, I am experienced in addressing various safety and barrier-free issues and would like to mention that the composition of members of the study committee was most appropriate for discussing this issue.

8. Finally, I would like to express my hope that the measure regarding the quietness of hybrid vehicles, etc., which has been studied and is to be implemented soon, will be used widely and effectively in Japan as well as in the world through its incorporation into international regulations, as those vehicles are expected to increase worldwide.
