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PROPOSAL FOR DRAFT AMENDMENTS TO REGULATION No. 95  
(Lateral collision protection)

Transmitted by the Expert from Switzerland

Note: The text reproduced below was prepared by the expert from Switzerland in order to introduce a sound exposure limit for airbag deployment and to allow the measurement of the sound exposure level (SEL).

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

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**A. PROPOSAL**

The list of contents, insert a new paragraph 6., to read:

" .....

6. Information for users of vehicles equipped with side airbags .... "

Paragraphs 6. to 11. (former), renumber as paragraphs 7. to 12.

Text of the Regulation,

Insert new paragraphs 2.15. to 2.17., to read:

- "2.15. "Airbag" means a device installed to supplement safety-belts and restraint systems in power-driven vehicles, i.e. systems which, in the event of a severe impact affecting the vehicle, automatically deploy a flexible structure intended to limit, by compression of the gas contained within it, the gravity of the contacts of one or more parts of the body of an occupant of the vehicle with the interior of the passenger compartment.
- 2.16. "Side airbag" means an airbag assembly intended to protect the driver in his seat or other occupant(s) in seats other than the driver's in the event of a lateral collision.
- 2.17. "Sound exposure level (SEL)" means the energy-equivalent level (Leq) measured or calculated for one second."

Insert new paragraphs 5.4. to 5.4.3., to read:

- "5.4. Sound exposure limit for airbag deployment
- 5.4.1. The sound exposure level measured at the position of the driver's ears or other occupant's ears shall not exceed a sound exposure level (SEL) of 125 dB(A).
- 5.4.1.1. The arrangement and installation of the side impact dummy according to annex 6 for measuring the sound exposure level shall be carried out in accordance with paragraph 5.1.1. and in accordance with the procedure described in annex 7.
- 5.4.1.2. The measurements shall be taken at the position of the "outside" ear of the dummy (the ear outwards the centre of the vehicle) either on the driver's side or on the side opposite the driver.
- 5.4.2. The measurements shall be taken using measuring microphones capable of handling at least up to 170 dB Peak level and a precision integrating sound level meter (at least class 1 according to IEC 804 1/).
- 5.4.3. The windows and the rooftop of the vehicle shall be closed and the ventilation in the middle position.

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1/ International Standard No. 804 of the International Electrotechnical Commission, Central office, Rue de Varembé 3, CH-1202 Geneva"

Insert new paragraphs 6. to 6.3., to read:

- "6. INFORMATION FOR USERS OF VEHICLES EQUIPPED WITH SIDE AIRBAGS
- 6.1. The vehicle shall carry information to the effect that it is equipped with side airbags for seats.
- 6.2. For a vehicle fitted with a side airbag intended to protect the driver, this information shall consist of the inscription "AIRBAG" located on the specific part which the side airbag is built in; this inscription shall be durably affixed and easily visible.
- 6.3. For a vehicle fitted with one or more side airbags intended to protect one or more occupants other than the driver, this information shall consist of the inscription "AIRBAG" located on the specific part which the side airbag is built in; this inscription shall be durably affixed and easily visible."

Paragraphs 6. to 11. (former), renumber as paragraphs 7. to 12.

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## **B. JUSTIFICATION**

Deployment of airbags in passenger cars has been shown to be potentially harmful for hearing and has caused permanent hearing damage in several cases. The impulse noise caused by airbag deployment exceeds current impulse noise exposure limits.

In order to facilitate the application, the sound exposure limit as well as the requirements for the measuring equipment and evaluation should be kept as simple as possible, and well-established standardized parameters should be used.

Effects reported for airbag deployment included permanent ringing (tinnitus) or hearing loss at high frequencies. Both effects are located in the inner ear. Rupture of the ear drum has not been reported, and if it ever happened would be curable.

Therefore it is sufficient to fix an exposure limit for the prevention of permanent damage to the inner ear. As an approximation of the transmission characteristics of the outer and middle ear A-weighting is appropriate.

The sound exposure level (SEL) is the energy-equivalent level (Leq) measured or calculated for one second. Precision integrating sound level meters display the SEL directly. Unlike peak levels the SEL is a phase-independent (root mean square; RMS) value and therefore much more stable even in the presence of interfering reflections (from windows etc.).

The proposed sound exposure limit (SEL) of 125 dB(A) is based on the evaluation of 600 cases of permanent hearing damage due to military impulse noise. The limit of 125 dB(A) SEL is identical to an energy-equivalent level (Leq) of 80 dB(A) calculated for 8 hours.

More advanced methods based on mathematical models of the ear may be more precise, especially regarding the protective effect of low frequencies. But the low-frequency content of the airbag noise is very variable as it depends on the interior volume of the car and the state of windows or rooftop (open or closed) during airbag deployment.

Therefore we propose the simple assessment of airbag noise as described above.

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