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**Progress on the development of new global technical regulations
or on amendments to established global technical regulations –
Gtr on Pole Side Impact (PSI)**

Proposal to develop a new global technical regulation on pole side impact referred to the Working Party on Passive Safety

Technical sponsor: Australia *

The text reproduced below was adopted by the Executive Committee (AC.3) of the 1998 Global Agreement at its twenty-ninth session, in June 2010.. It is based on document ECE/TRANS/WP.29/2010/81, which had been submitted by Australia, not amended (ECE/TRANS/WP.29/1085, para. 99). It is referred to the Working Party on Passive Safety (GRSP). This document shall be appended to the global technical regulation in conformity with paragraph 6.2.7. of the Agreement.

* In accordance with paragraph 6.2.7. of the 1998 Agreement (ECE/TRANS/180), the proposals to develop global technical regulations or their amendments shall be appended to them in the Global Registry. The present document is submitted in conformity with that mandate.

I. Key points and proposal

1. Data from Australian States suggests that fatalities from side impacts account for 20 to 25 per cent of the Australian road toll:
 - (a) There are indications that nearly half of these fatalities result from impacts with narrow objects, principally poles and trees.
 - (b) Over the last 10 years, single vehicle fatality rates have decreased at a much lower rate than road fatalities.
2. The experience of other countries coincides with that of Australia, indicating that pole side impacts and side impacts require extensive and collective international action.
3. This need is underlined by the fact that there is wide variation internationally between current side and pole side crash tests used both in regulation and new car assessment programs.
4. Similarly a number of different crash dummies are being used in side impact tests, with concerns over their biofidelity and measurement of injury criteria.
5. This means not only a lack of consistency for motorists and industry but raises concerns about the effectiveness of crash tests in predicting real world injury outcomes.
6. Progress in development of the WorldSID provides a unique opportunity to improve the international crash test regime for side impacts, improving the safety of motorists and minimising costs to consumers and industry.
7. Australia proposes the development of a global technical regulation (gtr) to provide an international pole side impact standard. The development process should include consideration of existing pole side impact test protocols in United States of America Federal Motor Vehicle Safety Standard (FMVSS) No. 214, the perpendicular pole test used by several new car assessment programs and an offset perpendicular pole test, as canvassed by the Advance Protection Systems (APROSYS) project.
 - (a) A pole side impact standard is likely to produce benefits for side impacts generally by driving improvements in head protection.
8. This work could be conducted under the auspices of the Working Party on Passive Safety (GRSP) and proceed in close conjunction with the proposed further work on WorldSID dummy (see Informal Document No. WP.29-150-04/Rev. 1).
9. An option to enable early progress and adoption of the gtr would be to focus the standard on the WorldSID 50th Male dummy, while the WorldSID 5th Female dummy remains under development.

II. Background

10. Between 1999 and 2008 road fatalities in Australia decreased from 9.3 to 6.9 per 100,000 people. In the same period there was a much smaller decrease in single vehicle crash fatalities from 3.4 to 3.3 per 100,000 people, meaning that single vehicle crash fatalities increased as a proportion of road fatalities from 37 to 47 per cent, signalling the need for increased action on single vehicle crashes.
11. In Australia, poles and trees are the most commonly hit objects in fatal single vehicle crashes. In New South Wales (Australia's most populous state), a pole or tree was the first object hit in 24 per cent of fatal road crashes in 2008. In Western Australia,

collisions with poles and trees were the primary cause of 21 per cent of fatal crashes and over 11 per cent of serious injury crashes in the ten year period between 1995 and 2004.

12. Side impacts accounted for approximately 24 per cent of the road toll of the Australian state of Victoria between 2000 and 2007. Data from Western Australia suggests a similar figure.

13. The experience of a number of other countries with regard to side impact and narrow object impact fatalities appears similar to that of Australia. For example, 25 per cent of road fatalities in the United Kingdom in 2008 were from side impacts, and over 10 per cent were from impacts with narrow objects. In New Zealand 24 per cent of fatalities in light four wheel vehicles in 2008 involved crashes where the vehicle struck a pole, post or tree. In the United States, nearly 20 per cent of fatal road crashes in 2008 involved side impacts and about 10 per cent involved impact with narrow objects. APROSYS cites 14 per cent of road fatalities in France in 2004 as occurring in vehicle impacts with narrow objects.

14. Impacts with narrow objects such as poles and trees are particularly likely to cause serious head injuries when the impact is from the side and closely aligned with a vehicle occupant. The risk of head injury can be reduced by ensuring that effective energy absorption (i.e., a curtain airbag) prevents hard contact between an occupant's head and any intruding narrow object. From experience, Regulation No. 95 does not generally require any countermeasure for head protection. A well developed pole side impact regulation / test method would promote improved head protection. This could also improve side impact compatibility, particularly for multiple vehicle side impacts between high-fronted vehicles, such as SUVs, and smaller passenger vehicles.

15. Currently EuroSID 2 (ES-2) is used in pole side impact testing by both the Euro and Australian new car assessment programs. ES-2re is specified for use in the FMVSS No. 214 pole test. However, both the WorldSID taskforce and NHTSA have conducted research that has shown the WorldSID 50th Male dummy to be considerably more biofidelic than both ES-2 and ES-2re. On the 10 point ISO TR9790 biofidelity rating scale, the WorldSID taskforce found the WorldSID 50th Male dummy to have a rating of 7.6, ES-2 a rating of 4.7, and ES-2re a rating of 4.2.

16. Pole side impact research in Australia has shown that the injury risk predicted by the WorldSID 50th Male and ES-2 in full-scale vehicle crash tests can be dramatically different. Most notably, for one vehicle model, the WorldSID 50th Male was observed to bottom out the head curtain airbag, making hard contact with the pole. In contrast, the ES-2 head avoided hard contact with the pole. For the same vehicle and impact conditions, the WorldSID 50th Male recorded a HIC36 of 2942 while ES-2 recorded a HIC36 of 809. The difference in the head response of the two dummies is believed to be largely due to differences in shoulder design. Given that the WorldSID has been demonstrated to be the most biofidelic side impact dummy, it is probable that some vehicles predicted to perform adequately in crash tests conducted with ES-2, may not offer the same level of protection to actual vehicle occupants involved in pole/tree side impact crashes. A technical paper including this Australian Government research was presented at the 2007 Enhanced Safety of Vehicles Conference (07-0255).

17. The ES-2 was originally developed for mobile deformable barrier (MDB) to vehicle side impact conditions, and pole side impact conditions are somewhat different. In order to achieve maximum benefit from any pole side impact evaluation, the most biofidelic dummy should be used to ensure the level of protection offered to vehicle occupants is as close as possible to that predicted under full-scale pole side impact conditions. For this reason WorldSID is likely to be the most technically suited dummy for a pole side impact global technical regulation.

18. Australia fully supports the proposal from the United States of America, as detailed in informal document No. WP.29-150-04-Rev.1 and distributed for consideration as ECE/TRANS/WP.29/2010/82, to establish an informal group to develop the WorldSID 50th Male and 5th Female dummies.
