Submitted by the experts from Germany

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Agenda item 6. (a)

Proposal for amendments to the 03 series of amendments to UN Regulation No. 79 (Steering equipment)

This document proposes amendments to the 03 series of amendments to UN Regulation 79.

Proposed changes to the current text of the regulation are marked in **bold** for new text.

I. Proposal

Paragraph 5.6.4.7., amend to read

"5.6.4.7. Critical situation

A situation is deemed to be critical when, at the time a lane change manoeuvre starts, an approaching vehicle in the target lane would have to decelerate at a higher level than 3m/s², 0.4 seconds after the lane change manoeuvre has started, to ensure the distance between the two vehicles is never less than that which the lane change vehicle travels in 1 second.

The resulting critical distance at the start of the lane change manoeuvre shall be calculated using the following formula:

$$S_{critical} = (v_{rear} - v_{ACSF}) * t_B + (v_{rear} - v_{ACSF})^2 / (2 * a) + v_{ACSF} * t_G$$

Where:

v_{rear}	is	The actual speed of the approaching vehicle or 130 km/h whatever value is lower	
v_{ACSF}	is	The actual speed of the ACSF vehicle	
a	=	3 m/s²	(Deceleration of the approaching vehicle)
t_B	=	0.4 s	(Time after the start of the lane change manoeuvre at which the deceleration of the approaching vehicle starts)
t_G	=	1 s	(Remaining gap of the vehicles after the deceleration of the approaching vehicle).

If the manufacturer considers additional influencing parameters when identifying the critical situation (e.g. acceleration of the ego-vehicle and/or deceleration of the approaching vehicle), the formula may be modified and the modification shall be declared to and assessed by the Technical Service. It shall remain ensured that an approaching vehicle would not have to decelerate at a higher level than 3m/s², 0.4 seconds after the lane change manoeuvre has started, to ensure the distance between the two vehicles is never less than that which the lane change vehicle travels in 1 second. The modified formula used by the manufacturer to identify the critical situation shall be part of the type approval documentation."

II. Justification

Systems already in use today were brought to market based on exemption approvals in the EU. These systems show a good and safe performance. With regular approvals according to UN Regulation No. 79/03 the systems would have to be modified in way which would step back technology. No safety aspect could be seen to justify this. Therefore a proposal is made to accommodate the current text of UN Regulation No. 79 and make it fit for actual technology.

The current formula for the calculation of $s_{critical}$ does not take the actual dynamic behaviour of the vehicles into account, therefore resulting in required gaps that under some traffic conditions don't usually occur.

It should be possible to consider a more dynamic calculation of the critical distance as long as the safety principle to not force an approaching vehicle to decelerate more strongly than $3m/s^2$ is not violated.

Since there are different ways of addressing the dynamic behaviour of the vehicles with regard to the original formula, we propose, provided the safety principle is maintained, to allow the manufacturer to specify its own formula, instead of aiming to define a specific more complex formula in the regulation.