

Proposal for amendments to UN GTR No. 8 (Electronic Stability Control)

The text reproduced below was prepared by the expert from the Republic of Korea, proposing to amendments to UN GTR No. 8 (Electronic Stability Control (ESC)). This proposal is based on the document (ECE/TRANS/WP.29/GRVA/2020/12) which was prepared by the experts from the International Organization of Motor Vehicle Manufacturers (OICA), proposing to amendments to UN Regulation No. 140 (Electronic Stability Control (ESC)).

The modifications to the existing text of the Regulation are marked in bold for new, and strikethrough for deleted characters.

I. Proposal

Paragraph 7.9.4., amend to read:

“7.9.4. The steering amplitude of the final run in each series is the greater of 6.5 A or 270 degrees, provided the calculated magnitude of 6.5 A is less than or equal to 300 degrees. If any 0.5 A increment, up to 6.5 A, is greater than 300 degrees, the steering amplitude of the final run shall be 300 degrees.

If the above calculated steering amplitude of the final run is greater than the maximum operable steering wheel angle determined by design of the steering system, the final angle amplitude for the series test shall be greater than 98% of the maximum operable angle.”

II. Justification

Background

1. UN GTR No. 8 (ESC) prescribes that the “Sine with Dwell” series test of vehicle directional stability performance shall be conducted with (as defined in paragraph 7.9.):

- (a) The initial steering wheel angle amplitude of 1.5A;
- (b) The steering wheel angle amplitude is increased by 0.5A from a test run to next run;
- (c) The final steering wheel angle amplitude of the greater of 6.5A or 270 degrees. If any 0.5 A increment, up to 6.5 A, is greater than 300 degrees, the steering amplitude of the final run shall be 300 degrees, where "A" is the steering wheel angle that produces a steady state lateral acceleration of 0.3 g for the test vehicle, which is determined from the “Slowly Increasing Steer” test.

2. In these test conditions, the normalized angle “A” evacuates the influence of the steering gear ratio in relation to the steering wheel angle and vehicle behaviour. The lower the steering gear ratio is (i.e. the quicker the steering characteristic is), the smaller the angle “A” and steering angle amplitude for each test run are, to provide constant steered wheel angle implying constant lateral movement of vehicle, regardless of the steering gear ratio, for reasonable testing of ESC.

3. However, the final steering wheel angle amplitude is fixed between 270 and 300 degrees, which are absolute values, not the normalized angles that exclude the influence of the steering gear ratio of each vehicle.

Concern for future steering systems

4. There might appear in the future some vehicles which have significantly low steering gear ratio (i.e. quick steering characteristics) and which may not be able to achieve the specified final absolute angle amplitude in the ESC test, then jeopardizing future beneficial improvement of steering equipment e.g. steering-by-wire system.

Justification of the proposal

5. The above proposal would be appropriate because:

(a) In line with the formal proposal for amendment of UN Regulation No. 140 (ESC) submitted by the experts from the International Organization of Motor Vehicle Manufacturers(OICA) (ECE/TRANS/WP.29/GRVA/2020/12), aimed at harmonising the requirements of UN Regulation No. 140 (ESC) with UN GTR No. 8 (ESC), the objective of this proposal is to ensure consistency of UN GTR No. 8 (ESC) with proposed amendment to UN Regulation No. 140 (ESC).

(b) the final steering wheel angle amplitude of 270 to 300 degrees was decided based on the investigation of an average driver's ability to operate steering wheel as fast as possible under the specified "Sine with Dwell" condition. Thus, the decision was based on maximum achievable steering wheel input. The final steering wheel angle amplitude for the series of tests could be decided to be the maximum operable steering wheel angle of the steering system if the maximum operable angle is less than 270 degrees. It is because the maximum operable angle is equivalent to the maximum achievable steering input in this case.

(c) The ESC regulation is not intended to prescribe a maximum operable steering wheel angle. It would not be reasonable to judge that a vehicle equipped with low geared steering system (i.e. quick steering characteristics) is incompliant with the ESC regulation for the simple reason that the operable steering wheel angle is less than 270 degrees, even though it is adequately safe in practical use with technical development and complies with UN Regulation No. 79 steering requirements.

(d) When carrying out ESC test, Steering robot should necessarily be used for ESC test. If the final angle for the series test directly use in steering robot for ESC test vehicles which have significantly low steering gear ratio, the overshoot normally occurs. The overshoot results in excessive moments due to the mechanical limit of steering equipment and causes the steering robot not to complete command input, so the steering robot could stop. Therefore, in order to solve this problem, the final angle should be inputted over 98% of the maximum operable steering angle.
