

**NON CONSOLIDATED OICA COMMENTS ON EVSC #2
(DOCUMENT 05-38)**

Annexe 21

Paragraph 2.1.1. :

- Amend second paragraph, to read: "... the function shall have the ability to automatically control **the speed of any individual wheel** by selective braking ..."
- Amend third paragraph, to read: "... the function shall have the ability to automatically control **the speed of any individual wheel** or multiple wheel speeds by selective braking ..."

Justification: The current wording could permit a system which controls only the speed of the front wheels. Accident studies showing the safety benefit of ESC are established with current ESC systems which control the speed of all individual wheels.

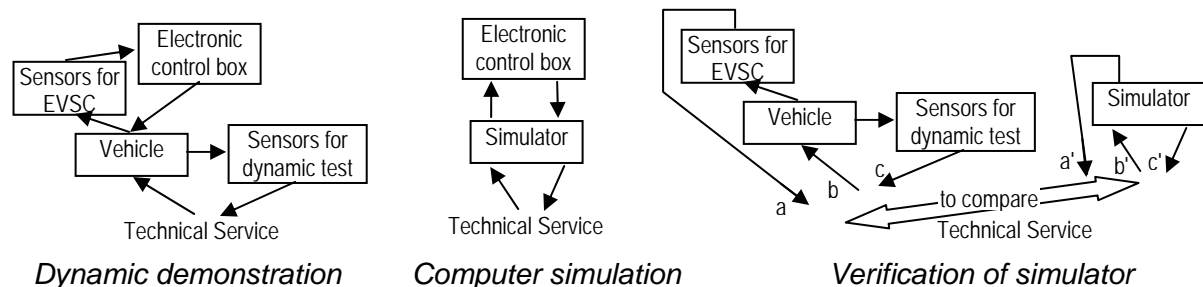
- Add the following at the end of the second paragraph: "The function shall assist the driver in maintaining the vehicle/the trailer in the direction intended by the driver."
- Add the following at the end of the third paragraph: "The function shall assist the driver to stabilise the vehicle/the trailer in the case of potential roll-over."

Justification: Without this amendment, annexe 21 would not contain any criteria ensuring that the system improves safety and works correctly as defined in the definition part of UN/ECE R13. For example, it would be possible to approve a system with poor sensors (mainly yaw speed sensor) which in some situations increases under-steer behaviour of an already under-steering vehicle.

Paragraph 2.1.3.

- Amend the paragraph which mentions the computer simulation, to read: "a computer simulation, together with data which verifies the simulation model against ~~a practical test~~ **the real vehicle behaviour and the real sensor characteristics.**"

Justification: In the case of a computer simulation, not only the electronic control box but also the performance of the sensors used by the stability system have to be considered.



Verification of simulator means that for a given input $b=b'$, the differences $\Delta a=a'-a$ and $\Delta c=c'-c$ are below a given threshold (see §4.2 of Appendix 1).

Appendix 1

Paragraph 1.1.1.:

- In the paragraph "Suspension parameters", delete "principal of suspension", "height of roll centre" and "suspension kinematics" and add "axle's kinematics and compliance" to the preceding paragraph "Axle/wheel parameters".

Justification: The axle's kinematics and compliance include all these three parameters and are more precise for a simulation than for example the height of the roll centre that may vary during the tests and that has no rigorous definition under severe lateral accelerations. Common software tools like Hardware in the loop (HIL) from IPG do not use the height of the roll centre. Such a tool should not be excluded.

- In the paragraph "Tyre parameters", amend the parameter "relaxation length" to read "relaxation lengths for cornering and braking" and delete the parameter "lateral stiffness".

Justification: it is consequent to give the relaxation lengths for cornering and braking. The lateral stiffness is already included in the cornering characteristics and the relaxation lengths (relaxation length is the ratio between cornering stiffness and lateral stiffness).

- Amend the paragraph "Brake system parameters", to read: "dynamic characteristics of brake system (command, transmission, brake proper)"

Justification: not only the dynamic characteristics of the callipers and pads should be taken into account but the entire brake system including command and transmission.

Paragraph 1.1.2.:

- Delete point a) ("software model of the vehicle stability function").

Justification: when the manufacturer does not use the electronic control box in a hardware-in-the-loop configuration (point b), how can he prove the correlation between a software model of the vehicle stability function and the real electronic box?

Paragraph 4.1.1.:

- Amend the last paragraph, to read: "During the test(s) the following motion variables as appropriate shall be recorded or calculated in coherence with ISO 15037 Road vehicles -- Vehicle dynamics test methods -- Part 1: General conditions for passenger cars or Part 2: General conditions for heavy vehicles and buses (depending on the vehicle category):"

Justification: The precision of the recorded or calculated values has to be specified.

- Replace "roll angle" by "wheel load or wheel lift".

Justification: This variable is only relevant for roll-over stability. With a very stiff suspension, the roll angle does not indicate very well the roll-over risk. Wheel load or wheel lift are more pertinent.

Paragraph 4.2.:

- Tolerances should depend on the purpose of the simulated test. For roll-over stability, precision has to be high on wheel load but yaw rate is not very important. For directional stability, a precise yaw rate is very important but wheel load is less important.
- Are the given tolerances of 5 and 10% valid for all motion variables listed in the preceding paragraph? The tolerances defined in ISO 15037 could give an orientation.
- Concerning the tolerances of the stability system's sensors (see Δa in justification of para. 2.1.3. of Annexe 21), two alternatives are possible:
 - Either the simulator includes the simulation of the stability system's sensors and a threshold for Δa has to be validated.
 - Or the simulator does not include the simulation of the stability system's sensors and absolute tolerances (to be defined) have to be certified by the manufacturer or supplier.

Remark: manufacturers consider that the first option is the best one but they do not ignore that current software tools may not offer this possibility.

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