

**USA proposed changes for statement of technical rationale and justification:**

- 1) On page 5:
  - a) 2<sup>nd</sup> full paragraph, 4<sup>th</sup> line: delete the words “from FARS.”
  - b) 3<sup>rd</sup> full paragraph, 1<sup>st</sup> line: delete the word “the” before “2000-2004.”
- 2) On page 6:
  - a) 1<sup>st</sup> full paragraph, 5<sup>th</sup> line: delete straight quotation marks after “spinning out” and before and after “plowing out,” replace with curved (normal Times New Roman) quotation marks.
  - b) 4<sup>th</sup> full paragraph, 2<sup>nd</sup> line: delete the word “as” before “‘yaw’ (or heading) control.”
  - c) 2<sup>nd</sup>-to-last line: delete the word “of” after “imagining the view from above.”
- 3) On page 9: 2<sup>nd</sup>-to-last line: delete the additional “o” in “lose.”
- 4) On page 10:
  - a) 1<sup>st</sup> full paragraph, 2<sup>nd</sup> line: delete the words “equipped with ESC” after “ESC-equipped vehicle.”
  - b) Add a period at the end of footnote 1.
- 5) On page 11: 4<sup>th</sup> full paragraph, 1<sup>st</sup> line: move the word “currently” from before “evaluate” to before “insufficient,” so that the sentence reads “However, there is currently insufficient data to evaluate the effectiveness of many of these additional features....”
- 6) On page 12, add periods at the end of all sources listed in footnotes 2 and 3.
- 7) On page 13:
  - a) 1<sup>st</sup> full paragraph, 2<sup>nd</sup> line: delete comma after “ESC.”
  - b) 4<sup>th</sup> full paragraph, 1<sup>st</sup> line: delete the word “that” following “that.”
  - c) Delete periods in “DC” in footnotes 5 and 6.
- 8) On page 14:
  - a) 1<sup>st</sup> full paragraph, delete sentence beginning with “Other topics...” and replace with sentence that reads as follows: “Other topics included making the “ESC System” definition more performance-based, lateral responsiveness criteria, ESC performance requirements, ESC malfunction detection requirements, ESC telltale requirements, system disablement and the “ESC Off” switch, test procedures, and impacts on the aftermarket, among other things.”
  - b) Delete additional paragraph spacing before “a. Applicability.”
  - c) Delete additional paragraph spacing before “*Vehicles with Dual Wheels on the Rear Axle*”

- d) 2<sup>nd</sup>-to-last line: delete parentheses and replace with the following:  
("dualies," typically completed as commercial vehicles).
- 9) On page 16, replace (1) through (6) with the following text:
- (a) That improves vehicle directional stability by at least having the ability to automatically control individually the vehicle brake torques of the left and right wheels on each axle or an axle of each axle group \*/ to induce a correcting yaw moment based on the evaluation of actual vehicle behaviour in comparison with a determination of vehicle behaviour demanded by the driver;
- \*/ An axle group shall be treated as a single axle and dual wheels shall be treated as a single wheel.
- (b) That is computer-controlled with the computer using a closed-loop algorithm to limit vehicle oversteer and to limit vehicle understeer based on the evaluation of actual vehicle behaviour in comparison with a determination of vehicle behaviour demanded by the driver;
- (c) That has a means to determine the value of the vehicle's yaw rate<sup>1</sup> and to estimate its sideslip<sup>2</sup> or sideslip derivative<sup>3</sup> with respect to time;
- (d) That has a means to monitor driver steering inputs; and
- (e) That has an algorithm to determine the need, and a means to modify engine torque as necessary, to assist the driver in maintaining control of the vehicle.

Also add the following text after (e) above:

The ESC system must meet additional specific functional requirements besides the definition, as follows:

- (a) Be capable of applying brake torques individually to all four wheels \*/ and have a control algorithm that utilizes this capability;
- \*/ Dual wheels shall be treated as a single wheel, and a twin axle group shall be treated as a single axle.

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<sup>1</sup> "Yaw rate" means the rate of change of the vehicle's heading angle (measured in degrees/second) of rotation about a vertical axis through the vehicle's center of gravity.

<sup>2</sup> "Sideslip" means the arctangent of the lateral velocity of the center of gravity of the vehicle, divided by the longitudinal velocity of the center of gravity.

<sup>3</sup> Because sideslip and the time derivative of sideslip are intimately mathematically related, when one of these values is known, it is then possible to determine the other. This global technical regulation permits this key value for ESC operation to be determined by either means.

- (b) Be operational over the full speed range of the vehicle, during all phases of driving including acceleration, coasting, and deceleration (including braking), except:
    - (i) When the driver has disabled ESC;
    - (ii) When the vehicle speed is below 20 km/h;
    - (iii) While the initial start-up self-test and plausibility checks are completed, not to exceed 2 minutes when driven under the conditions of paragraph 7.10.2; and
    - (iv) When the vehicle is being driven in reverse.
  - (c) Remain capable of activation even if the antilock brake system or traction control system is also activated.
- 10) On page 17:
    - a) 2<sup>nd</sup> full paragraph, 2<sup>nd</sup>-to-last line: replace “15 km/h” with “20 km/h.”
    - b) 3<sup>rd</sup> full paragraph, last line: delete the word “together” after “in unison.”
    - c) 4<sup>th</sup> full paragraph, 6<sup>th</sup> line: add the word “this” between “of” and “regulation.”
  - 11) On page 18, last paragraph, 6<sup>th</sup> line: add the word “an” between “such” and “approach.”
  - 12) On page 19, 3<sup>rd</sup> full paragraph, 4<sup>th</sup> line: delete the word “only” before “optimize.”
  - 13) On page 20:
    - a) Add a period at the end of footnote 17.
    - b) Footnote 18, 2<sup>nd</sup> paragraph, 2<sup>nd</sup> line: delete the word “NHTSA” and replace with “U.S.”
  - 14) On page 21:
    - a) 1<sup>st</sup> full paragraph, 1<sup>st</sup> line: add the word “no” before the words “good reason.”
    - b) Delete additional paragraph spacing before “*ESC Initialization Period.*”
  - 15) On page 22, 4<sup>th</sup> full paragraph, lines 6, 8, 9, and 10: delete straight quotation marks, replace with curved (normal Times New Roman) quotation marks.
  - 16) On page 23, 2<sup>nd</sup>-to-last line, replace the beginning word of the sentence (“This”) with “The.”
  - 17) On page 24:
    - a) 1<sup>st</sup> line, after the word “reasons,” replace the words “that follow” with the word “below.”
    - b) Delete additional paragraph spacing before “(3) Telltale Specifications.”

- c) Add the phrase “International Standards Organization” before the acronym “ISO,” and add parentheses around the acronym.
- 18) On page 25, 2<sup>nd</sup> full paragraph, lines 2, 3, and 4: delete straight quotation marks, replace with curved (normal Times New Roman) quotation marks.
- 19) On page 26:
  - a) 3<sup>rd</sup> line: replace “ESC”. with “ESC.”
  - b) 2<sup>nd</sup> full paragraph, 6<sup>th</sup> line: delete the acronym in parentheses “(ISO).”
- 20) On page 28, 1<sup>st</sup> full paragraph, lines 5, 6, and 7: delete straight quotation marks, replace with curved (normal Times New Roman) quotation marks.
- 21) On page 31, delete additional paragraph spacing before “*Labeling of the “ESC Off” Control.*”
- 22) On page 32:
  - a) 1<sup>st</sup> full paragraph, 3<sup>rd</sup> line: delete the word “a” before “standardized control labeling.”
  - b) Delete additional paragraph spacing before “*ESC Deactivation on Wheelchair-Accessible Vehicles.*”
- 23) On page 33:
  - a) 2<sup>nd</sup> full paragraph, 1<sup>st</sup> line: add the word “not” between “is” and “thought.”
  - b) 3<sup>rd</sup> full paragraph, last line: after the word “components,” replace the word “is” with the word “in.”
- 24) On page 36:
  - a) 1<sup>st</sup> full paragraph, 7<sup>th</sup> line: add the letter “s” at the end of the word “provision.”
  - b) 1<sup>st</sup> full paragraph, 2<sup>nd</sup>-to-last line: add the letter “s” at the end of the word “provision.”
- 25) On page 37:
  - a) 1<sup>st</sup> line: delete the letter “s” at the end of the word “systems.”
  - b) 1<sup>st</sup> full paragraph, 8<sup>th</sup> line: add the letter “s” at the end of the word “other.”
- 26) On page 38:
  - a) 1<sup>st</sup> full paragraph: rewrite the last sentence to read: “It makes sense to alert drivers to slick road conditions, when the driver is operating the vehicle on the roadway in a generally straight path, but it would not make sense to draw the driver’s attention away from the road when they are in the midst of assessing a crash-imminent situation and attempting to avoid a collision.”

- b) 4<sup>th</sup> full paragraph, 5<sup>th</sup> line: delete the comma between the words “single” and “simulator.”
- 27) On page 39, 2<sup>nd</sup> full paragraph, lines 3 and 5: delete straight quotation marks, replace with curved (normal Times New Roman) quotation marks.
- 28) On page 40, 2<sup>nd</sup> full paragraph, 2<sup>nd</sup> line: add the letter “s” at the end of the word “vehicle.”
- 29) On page 41, 1<sup>st</sup> full paragraph, 9<sup>th</sup> line: add the letter “s” at the end of the word “computation.”
- 30) On page 43:
  - a) 1<sup>st</sup> full paragraph, 2<sup>nd</sup> line: replace “5,500-pound” with “2,495-kilogram.”
  - b) 2<sup>nd</sup> full paragraph, 1<sup>st</sup> line: add the letter “s” at the end of the word “calculation.”
- 31) On page 44, footnote 20, 5<sup>th</sup> line: delete the parenthetical “(elsewhere called limit-handling).”
- 32) On page 45, 4<sup>th</sup> full paragraph: in the sentence that begins with the words “Basalt tile,” delete all words and end the sentence after the word “expensive.”
- 33) On page 46, 1<sup>st</sup> full paragraph, 9<sup>th</sup> line: add the word “a” between the words “Such” and “requirement.”
- 34) On page 47, 4<sup>th</sup> full paragraph, rewrite the sentence that begins “If the condition...” to say “If the condition is not met, the 200 ms validity check is applied the next time steering wheel velocity that exceeds 75 deg/sec is identified.”
- 35) On page 48:
  - a) 2<sup>nd</sup> full paragraph, 13<sup>th</sup> line: add the word “that” between the words “shown” and “the.”
  - b) Delete additional paragraph spacing before “*Use of Interpolation.*”
  - c) 2<sup>nd</sup>-to-last line: delete the comma between “suggested” and “because.”
- 36) On page 49:
  - a) Replace the word “Ambiant” in heading (1) with the word “Ambient.”
  - b) Footnote 21, 2<sup>nd</sup> sentence: rewrite to read “They are referring to a rubber chemistry issue (*i.e.*, that all rubbery polymers turn into glassy solids at characteristic low temperatures, which vary depending on the polymer composition of the tires).”
- 37) On page 50:

- a) 3<sup>rd</sup> full paragraph, 3<sup>rd</sup> line: after the word “speed,” replace the word “to” with the word “of.”
- b) 3<sup>rd</sup> full paragraph, 7<sup>th</sup> line: replace the word “effected” with the word “affected.”

38) On page 51, replace the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> full paragraphs with the following text:

The GTR also provides that the road test surface must produce a peak braking coefficient (PBC) of 0.9 when measured using one of two methods as specified by the respective Contracting Parties.

A) Using an American Society for Testing and Materials (ASTM) E1136-93 (1993) standard reference test tire, in accordance with ASTM Method E 1337-90 (reapproved 1996), at a speed of 64.4 km/h, without water delivery.

B) [Insert... language to be provided by EU and Netherlands]

The intention in specifying a PBC of 0.9 is not to preclude the use of real world test tracks, which may or may not have this exact PBC. In practical terms, when testing for conformity to the requirements, manufacturers may test on a surface with a lower PBC, to test for a worse-case scenario. This would assure positive results when verification for compliance testing is conducted by the administrations on a surface with a PBC of 0.9 or higher. In other words, if the vehicle is able to meet the requirements at a PBC below 0.9, it is considered to be compliant with a PBC of 0.9.

39) On page 52:

- a) 1<sup>st</sup> full paragraph, 3<sup>rd</sup> line: add the letter “s” at the end of the word “specification.”
- b) 1<sup>st</sup> full paragraph, last line: remove the word “the” between the words “in” and “any.”
- c) 2<sup>nd</sup> full paragraph, last sentence: rewrite to read “Therefore, in order to reduce test variability and increase the repeatability of test results, the GTR specifies that outriggers must be used on all vehicles covered by this GTR that fall under SR1 Categories 1-2 and 2, and may be used on Category 1-1 vehicles covered by this GTR which are commonly known as trucks, SUVs, and multipurpose vehicles (MPVs). The GTR also includes maximum mass and roll moment of inertia specifications for outriggers.”
- c) Delete additional paragraph spacing above “f. Test Procedure.”

40) On page 53:

- a) 5<sup>th</sup> full paragraph, 6<sup>th</sup> line: add the word “being” between the words “for” and “incorporated.”
- b) Last paragraph, 1<sup>st</sup> line: delete the “s” at the end of the word “procedures.”

- 41) On page 54:
- 2<sup>nd</sup> full paragraph, first line: replace the capital “U” with a lowercase “u” in the word “Use.”
  - 2<sup>nd</sup> full paragraph, 2<sup>nd</sup>-to-last line: delete apostrophe in the word “vehicle’s.”
- 42) On page 56, last full paragraph, first line: replace the word “affect” with the word “effect.”
- 43) On page 57, 6<sup>th</sup> line: add a space between “7.0” and “mV.”
- 44) On page 57:
- Last full paragraph, second line: add the word “an” between the words “that” and “assessment.”
  - 2<sup>nd</sup>-to-last line: left-align bottom paragraph instead of justify.
- 45) On page 58:
- 2<sup>nd</sup>-from-top line: rewrite sentence to read: “These criteria provide an extremely effective way of objectively assessing whether the lateral stability of an ESC-equipped vehicle is adequate.”
  - 1<sup>st</sup> full paragraph, 1<sup>st</sup> sentence: rewrite sentence to read: “The responsiveness criteria proposed for use in this GTR, that a vehicle with a GVM of greater than 3,500 kilograms must achieve at least 1.83 m (1.52 feet) of lateral displacement when the Sine with Dwell maneuver is performed with normalized steering angles....”
  - 1<sup>st</sup> full paragraph, 6<sup>th</sup> line: add a hyphen between the words “on” and “road.”
  - Footnote 25, 2<sup>nd</sup> line: after the word “maneuver,” replace the word “as” with the word “was.”
  - Delete additional paragraph spacing between 4<sup>th</sup> and 5<sup>th</sup> full paragraphs.
  - Delete additional paragraph spacing at the bottom of footnote 25.
- 46) On page 59, left-align footnote 26 instead of justify.
- 47) On page 61:
- Replace comma at end of footnote 29 with a period.
  - Footnote 30, 2<sup>nd</sup> line: add the word “U.S.” before the word “States.”
- 48) On page 62, 2<sup>nd</sup> full paragraph, 4<sup>th</sup> line: add the word “not” between the words “is” and “appropriate.”
- 49) On page 64, 2<sup>nd</sup> full paragraph, 3<sup>rd</sup> line: move the word “currently” from before “\$479” to between the words “not” and “have.”