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World Forum for Harmonization of Vehicle Regulations (WP.29)

Working Party on Brakes and Running Gear (GRRF)
(Fifty-fifth session, 3-6 February 2004,
agenda item 4.)

PROPOSAL FOR DRAFT AMENDMENTS TO REGULATION No. 111
(Handling and stability of vehicles)

Transmitted by the expert from the Russian Federation

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Note: This document is distributed to the Experts on Brakes and Running Gear only.

GE.03-24516

Insert new paragraphs 2.7. and 2.7.1., to read:

"2.7.   "Rollover threshold" means the instant when all the wheels of one side of a vehicle have lost contact with the supporting surface (tilt table platform).

2.7.1.   The inclination angle of the tilt table surface is represented by the symbol "β"."

Paragraph 5.3.1.1., amend to read:

" …..a tilt table angle of $\beta_c = 23°$ has been reached ……. "

Annex 1,

Item 3.2., amend to read:

"3.2.   tank; make, model, effective volume: …………………………………………..."

Item 6.2., amend to read:

"6.2.   mass of vehicle in running order: ………………………………………….... "

Insert a new item 8.1., to read:

"8.1.   Centre of gravity height of the vehicle in running order: …..…………………... "

Insert a new item 11.5., to read:

"11.5.   Electronic Stability Programme (ESP) engaged: ………. yes/not/not applicable 2/"

Annex 3,

Paragraph 5., subparagraph b), amend to read:

"b)   the related method for calculation of the new minimal tilt table angle for the lighter test load is given in the paragraph 7.2."

Insert a new subparagraph c), to read:

"c)   if in case of filling a tank by water, the total vehicle mass and/or axle/bogie load is less than maximum authorized mass of a vehicle, then the total mass of a test vehicle shall be increased by ballasting until it reaches the maximum authorized mass. The ballast shall be attached to the sprung part of a test vehicle in such a way, so the centre of mass of the ballast is coincided with the centre of volume of a tank."

Paragraph 7., amend to read:

"7   TEST PROCEDURE

7.1.   This procedure consists ………

          ……… of stick-slip and hysteresis."

Insert a new paragraph 7.2., to read:

"7.2.   If, during testing of a vehicle, which tank in case of full load (with respect to its mass) is not filled completely (with respect to its volume), the tilt table inclination angle β is less than value of β_c ~~or/and roll angle φ when β = β$_c$) is more than value of φ$_c$~~, the test shall be repeated with the fully filled (with respect to its volume) tank. **1/**

The values of the recorded at the test tilt table inclination angle β_w ~~and roll angle φ$_w$ (when β$_p$ = β$_c$)~~ shall be corrected by using the following formula**e**:

$$\tan \boldsymbol{b}_p = \tan \boldsymbol{b}_w \cdot \frac{A_T \cdot H_w}{A_w \cdot H_g} + \frac{T_T}{2\,H_g}\left(1 - \frac{A_T}{A_w}\right)$$

The value of β_p shall be higher **than or equal**, ~~and the value of φ$_w$ shall be lower than~~ the corresponding critical values $\boldsymbol{b}_c$ ($\beta_p \geq \beta_c$ ~~φ$_p$ ≤ φ$_c$~~). ~~[Note by the secretariat: The text and the formulas are contradictory]~~

In the formulas:

A_T = vehicle mass in case of loading by normal fluid;

A_w = vehicle mass in case of loading by water.

$$A_w = A_T + V_l \cdot \left(\boldsymbol{r}_w - \boldsymbol{r}_T\right)$$

H_g, H_w = height of the vehicle centre of gravity in case of loading by normal fluid and water, respectively;

$$H_w = H_g - V_l \cdot \left(\boldsymbol{r}_w - \boldsymbol{r}_T\right) / C_{ST}$$

T_T = theoretical wheel track at the vehicle cross section at the centre-of-gravity point;

Vt   = effective tank volume;

$$C_{S?} = \frac{A_g}{H_g - H_l}$$

C_{ST} = vertical stiffness of suspension at the centre of gravity point;

A_g = mass of payload;

ρ_T = density of normal fluid;

ρ_W = density of water;

H_l = height of the centre of gravity of the vehicle in running order.

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1/ If a vehicle manufacturer disagrees with the full loading of a tank by water, and the fluid designated for carriage is unsafe, the test can be repeated with a tank filled with the fluid designated for carriage at the facilities of a vehicle manufacturer, who shall provide necessary safety measures."

Annex 4,

Paragraph 7.2., amend to read:

"7.2.   In case of semi-trailers separated from tractors, kingpin effects are calculated by using the following formula:

Kingpin trace width:
$$?_? = \frac{\sum\limits_{i=1}^{n} T_i}{n}$$

The kingpin roll stiffness, which is the roll stiffness of the tractor at the longitudinal position of the fifth wheel/kingpin, will be calculated by using a reference load dependent roll stiffness factor of 4 [**kN**-m/rad]: $C_{DRESK} = A_K \cdot 4$ "

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