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**ECONOMIC COMMISSION FOR EUROPE**

INLAND TRANSPORT COMMITTEE

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

Working Party on Brakes and Running Gear (GRRF)

(Fifty-fourth session, 6-8 October 2003,  
agenda item 4.)

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

Transmitted by the Expert from the Russian Federation

Note: The text reproduced below was prepared by the expert from the Russian Federation following the recommendation of GRRF at its fifty-third session. It is based on a document distributed without a symbol (informal document No. 19) during the fifty-third session (TRANS/WP.29/GRRF/53, para. 26). The proposals contained in informal document No. 19 have been divided into two parts. The first part, referring to specifications concerning tilt angle for the tilt-test, is reproduced below.

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

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 " $\beta$ ".

Paragraph 5.3.1.1., amend to read:

" .....a tilt table angle of  $\beta_c = 23^\circ$  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 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  $\beta$  is less than value of  $\beta_c$  or/and roll angle  $\varphi$  when  $\beta = \beta_c$  is more than value of  $\varphi_c$ , the test shall be repeated with the fully filled (with respect to its volume) tank.

The values of the recorded at the test tilt table inclination angle  $\beta_w$  and roll angle  $\varphi_w$  (when  $\beta_p = \beta_c$ ) shall be corrected by using the following formulas:

$$\tan \beta_p = \tan \beta_w \cdot \frac{A_T \cdot H_w}{A_w \cdot H_g} + \frac{T_T}{2 H_g} \left( 1 - \frac{A_T}{A_w} \right)$$

$$\varphi_p = \varphi_w \cdot \frac{A_T}{A_w} \cdot \frac{H_g}{H_w}$$

The value of  $\beta_p$  shall be higher, and the value of  $\varphi_w$  shall be lower than the corresponding critical values ( $\beta_p \geq \beta_c$   $\varphi_p \leq \varphi_c$ ). [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.

$$A_w = A_T + V_l \cdot (\rho_w - \rho_T)$$

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

$$H_w = H_g - V_l \cdot (\rho_w - \rho_T) / C_{ST}$$

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

$V_t$  = effective tank volume;

$$C_{ST} = \frac{A_g}{H_g - H_l}$$

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

$A_g$  = mass of payload;

$\rho_T$  = density of normal fluid;

$\rho_w$  = density of water;

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

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: 
$$T_K = \frac{\sum_{i=1}^n T_i}{n}$$

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 **[m/rad]**:  $C_{DRESK} = A_K \cdot 4$ "

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