Submitted by the expert from OICA

Informal document **GRPE-85-15**
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Agenda item 3.a.

Proposal for a new Supplement to the 02 and 03 series of Amendments to UN Regulation No. 154

This document aims to correct the recursive formula of the 02 and 03 series of amendments to UN Regulation No. 154 in the procedure for verifying the conformity of production requirements if the production standard deviation given by the manufacturer is either not satisfactory or not available.

The modifications to the current text of the Regulation are marked in bold for new or strikethrough for deleted characters.

I. Proposal

APPENDIX 2 -Paragraph 2.1.2., Case B, of 02 and 03 series; amend to read:

"…

Remarks

the following recursive formulae are useful for computing successive values of the test statistic:

$$\bar{d}_n = \left(1 - \frac{1}{n}\right)\bar{d}_{n-1} + \frac{1}{n}d_n$$

~~$V_n^2 = \left(1 - \frac{1}{n}\right)V_{n-1}^2 + \frac{\left[\bar{d}_n - d_n\right]^2}{n-1}$~~

$$\boldsymbol{V_n^2 = \left(1 - \frac{1}{n}\right)V_{n-1}^2 + \frac{\left(\bar{d}_n - d_n\right)^2}{n-1}}$$

$$\left(n = 2, 3, \ldots;\ \bar{d}_1 = d_1;\ V_1 = 0\right)$$

II. Justification

This proposal addresses the correction of the recursive formula for V_n of paragraph 2.1.2 in Appendix 2 of the 02 and 03 series of amendments of UN Regulation No. 154. Remark/Info: Chinese law (GB19233-2020) has already implemented this formula.

Example for Justification:

The explicit formula for V_n from same Paragraph delivers other results than the current recursive formula if n is greater than 2 (see example in table below, font in bold). The example even shows that the current recursive formula results in a pass decision for n = 5 although one more vehicle is required for fulfillment according to the explicit formula (cells marked light grey). The proposed and corrected recursive formula delivers identical results.

				explicit	**recursive**	**explicit**			**recursive**			**recursive corrected**		
Test no.	Limit Value	Measured value	$d = x_i - L$	$\bar{d}_n = \frac{1}{n}\sum_{i=1}^{n} d_i$	$\bar{d}_n = \left(1 - \frac{1}{n}\right)\bar{d}_{n-1} + \frac{1}{n}d_n$	$V_n^2 = \frac{1}{n}\sum_{i=1}^{n}(d_i - \bar{d}_n)^2$	$\frac{\bar{d}_n}{V_n}$	Result [pass, fail, another measurement]	$V_n^2 = \left(1 - \frac{1}{n}\right)V_{n-1}^2 + \left[\frac{\bar{d}_n - d_n}{n-1}\right]^2$	$\frac{\bar{d}_n}{V_n}$	Result [pass, fail, another measurement]	$V_n^2 = \left(1 - \frac{1}{n}\right)V_{n-1}^2 + \frac{(\bar{d}_n - d_n)^2}{n-1}$	$\frac{\bar{d}_n}{V_n}$	Result [pass, fail, another measurement]
1	100	98	-0,020202707	-0,020202707	-0,020202707	0	0	- - -	0	0	- - -	0	0	- - -
2	100	101	0,009950331	-0,005126188	-0,005126188	0,000227301	-0,340011391	- - -	0,000227301	-0,340011391	- - -	0,000227301	-0,340011391	- - -
3	100	99	-0,010050336	-0,006767571	-0,006767571	**0,000156923**	-0,540244204	another measurement	**0,000154228**	-0,544942398	another measurement	**0,000156923**	-0,540244204	another measurement
4	100	101	0,009950331	-0,002588095	-0,002588095	**0,000170096**	-0,198441852	another measurement	**0,000133139**	-0,224298872	another measurement	**0,000170096**	-0,198441852	another measurement
5	100	95	-0,051293294	-0,012329135	-0,012329135	**0,000515628**	-0,54295556	another measurement	**0,000201399**	-0,868767594	pass	**0,000515628**	-0,54295556	another measurement