Submitted by the expert from OICA

Informal document **GRPE-85-09**
85th GRPE, 11-14 January 2022
Agenda item 3.(a)

# Proposal for a new Supplement to the 05/06/07 series of Amendments to UN Regulation No. 83

This document aims to correct the recursive formula of the 05, 06 and 07 series of amendments to UN Regulation No. 83 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 6;* amend to read:

"6. Remarks

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

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

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

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

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

Table App2/1 …"

## II. Justification

This proposal addresses the correction of the recursive formula for $V_n$ of paragraph 6 in Appendix 2 of the 05, 06 and 07 series of amendments of UN Regulation No. 83. Remark/Info: Chinese law (GB19233-2020) has already implemented this formula.

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Example for Justification:

The formula for $V_n$ from Paragraph 4 delivers other results than the current recursive formula of paragraph 6 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 formula of paragraph 4 (cells marked light grey). The proposed and corrected recursive formula delivers identical results.

| | | | | **Paragraph 4** | **Paragraph 6** | **Paragraph 4** | | | **Paragraph 6** | | | **Paragraph 6 corrected** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Test no. | Limit Value | Measured value | $d = x_i - L$ | $\bar{d}_n = \frac{1}{n}\sum_{i=1}^{n} d_i$ | $\bar{d}_n = \left(1-\frac{1}{n}\right)\bar{d}_{n-1} + \frac{1}{n}d_n$ | $V_n^2 = \frac{1}{n}\sum_{i=1}^{n}\left(d_i - \bar{d}_n\right)^2$ | $\frac{\bar{d}_n}{V_n}$ | Result [pass, fail, another measurement] | $V_n^2 = \left(1-\frac{1}{n}\right)V_{n-1}^2 + \left[\frac{\bar{d}_n - d_n}{n-1}\right]^2$ | $\frac{\bar{d}_n}{V_n}$ | Result [pass, fail, another measurement] | $V_n^2 = \left(1-\frac{1}{n}\right)V_{n-1}^2 + \frac{\left(\bar{d}_n - d_n\right)^2}{n-1}$ | $\frac{\bar{d}_n}{V_n}$ | 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 |