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Proposal from the European Commission for Battery Durability GTR

PART A: Verification of SOCR/SOCE monitors

In order to verify the SOCR/SOCE monitors, the values for range and battery energy shall be measured at the time of the verification and the related values from the monitors read.

The SOCR$_{measured}$ monitor shall be monitored during Phase 1 in order to inform the setting of MPR for this metric.

Both range and battery energy shall be measured during Part A according to the range test procedure defined in the relevant legislation.

An adequate number of vehicles (at least 3 and not more than 16)) shall be selected from the same monitor family for testing following a vehicle survey (see annex 1) containing information designed to ensure that the vehicle has been properly used and maintained according to the specifications of the manufacturer. The following statistics shall be used to take a decision on the accuracy of the monitor.

For evaluating the SOCR/SOCE monitors normalised values shall be calculated:

$$x_i = \frac{SOC_{read,i}}{SOC_{measured,i}}$$

Where

$SOC_{read,i}$ is the SOCR/SOCE monitor read from the vehicle i and

$SOC_{measured,i}$ is the measured SOCR/SOCE monitor of the vehicle i.

For the total number of N tests and the normalised values of the tested vehicles, $x_1, x_2, \ldots x_N$, the average X_{tests} and the standard deviation s shall be determined:

$$X_{tests} = \frac{(x_1+x_2+x_3+\cdots+x_N)}{N}$$

and

$$s = \sqrt{\frac{(x_1 - X_{tests})^2 + (x_2 - X_{tests})^2 + \ldots + (x_N - X_{tests})^2}{N-1}}$$

For each number of tests $3 \leq N \leq 16$, one of the three following decisions can be reached, where the factor A shall be set at [1.01]:

(i) Pass the family if $X_{tests} \leq A - \left(t_{P1,N} + t_{P2,N}\right) \cdot s$

(ii) Fail the family if $X_{tests} > A + \left(t_{F1,N} - t_{F2}\right) \cdot s$

(iii) Take another measurement if:

$A - \left(t_{P1,N} + t_{P2,N}\right) \cdot s < X_{tests} \leq A + \left(t_{F1,N} - t_{F2}\right) \cdot s$

where the parameters $t_{P1,N}$, $t_{P2,N}$, $t_{F1,N}$, and t_{F2} are taken from the Table 3.

Table 3
Pass/fail decision number for the sample size

Tests (N)	PASS		FAIL	
	$t_{P1,N}$	$t_{P2,N}$	$t_{F1,N}$	t_{F2}
3	1.686	0.438	1.686	0.438
4	1.125	0.425	1.177	0.438
5	0.850	0.401	0.953	0.438
6	0.673	0.370	0.823	0.438
7	0.544	0.335	0.734	0.438
8	0.443	0.299	0.670	0.438
9	0.361	0.263	0.620	0.438
10	0.292	0.226	0.580	0.438
11	0.232	0.190	0.546	0.438
12	0.178	0.153	0.518	0.438
13	0.129	0.116	0.494	0.438
14	0.083	0.078	0.473	0.438
15	0.040	0.038	0.455	0.438
16	0.000	0.000	0.438	0.438