



Informal document GRVA-18-17*
18th GRVA, 22 Jan -26 Jan 2024,
Provisional agenda item 6(b)

Proposal for amendments to UN-R79 to provisions on Full Power Steering

Submitted by the experts from CLEPA and OICA



R79 Amendments to Steer-by-Wire*

Concept of proposed amendments to UN-R79:

Amend para. 5.3.3.4.: Failure of energy transmission
Clarifying requirements depending on intended speed

New para. 5.3.3.6.: Failure of energy source of control transmission
Alternative requirements to para. 5.3.3.3.

Amend para. 5.4.2.1.1.: Red Warning
Clarifying requirements in case of multiple redundancy level

** steer-by-wire systems fully rely on electrical control, without mechanical steering column and steering forces are provided solely by one or more energy supplies.*



Proposal to amend 5.3.3.4.

Today

5.3.3. Full power steering systems
5.3.3.4. In the event of a **failure within the energy transmission**, with the exception of those parts listed in paragraph 5.3.1.1., there shall not be any immediate changes in steering angle. *As long as the vehicle is capable of being driven at a speed greater than 10 km/h the requirements of paragraph 6. for the system with a failure shall be met after the completion of at least 25 "figure of eight" manoeuvres at 10 km/h minimum speed, where each loop of the figure is 40 m diameter.*

The test manoeuvres shall begin at an energy storage level given in paragraph 5.3.3.5.

Intended operational speed?

>10 km/h

<=10 km/h

Proposal

The requirements of paragraph 6. for the system with a failure shall be met either...

...after the completion of at least 25 "figure of eight" manoeuvres

or

...until the vehicle speed is reduced and limited to 10 km/h or below



Motivation for new alternative 5.3.3.6.

- Current Steer-by-wire requirements (5.3.3.3.) specify that 25 figures of 8 must be feasible upon a **failure of the energy source**
- “25 figures of 8” is almost 40 minutes of successive curves at 10km/h, representing energy for hundreds of kilometers on a motorway
- This represents a huge amount of energy to be secured to supply steering and also other systems
- Modern technologies for energy and power circuit management systems ensure a reliable monitoring of available energy
- The intention of the proposal is to guarantee the vehicle will automatically come to a safe state ($\leq 10\text{km/h}$ or standstill) before all the energy is “burnt” and in turn optimizing (reducing) the amount of energy to be secured in case of a **failure of the source**

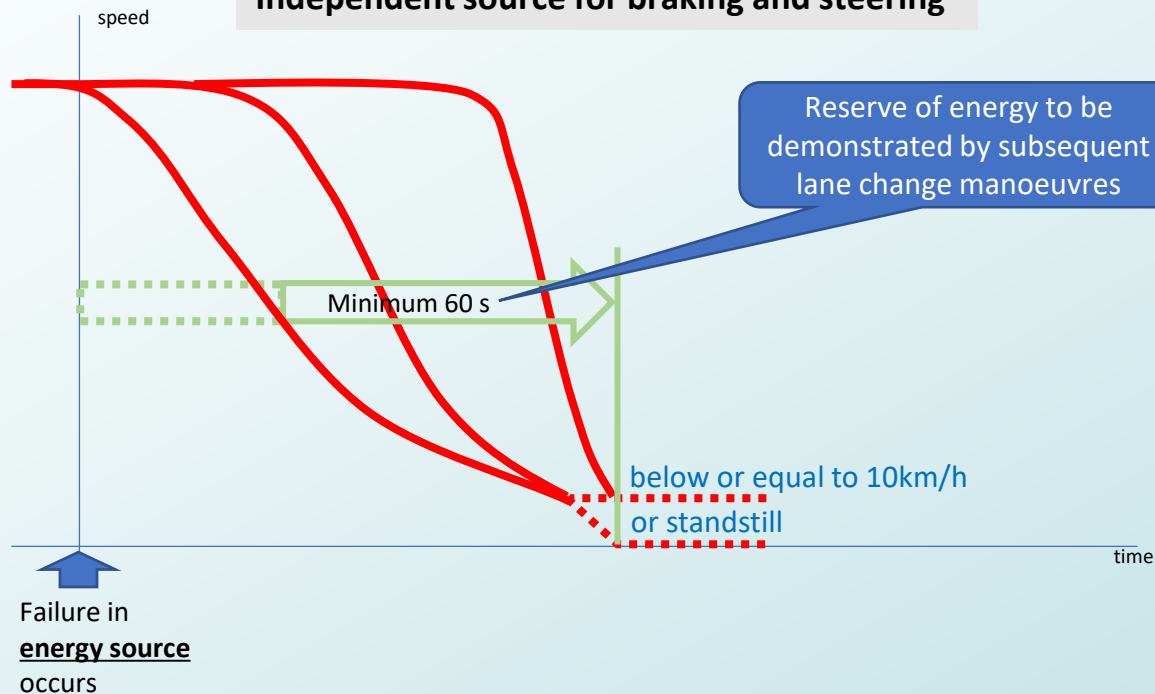


Explanation of alternative concept

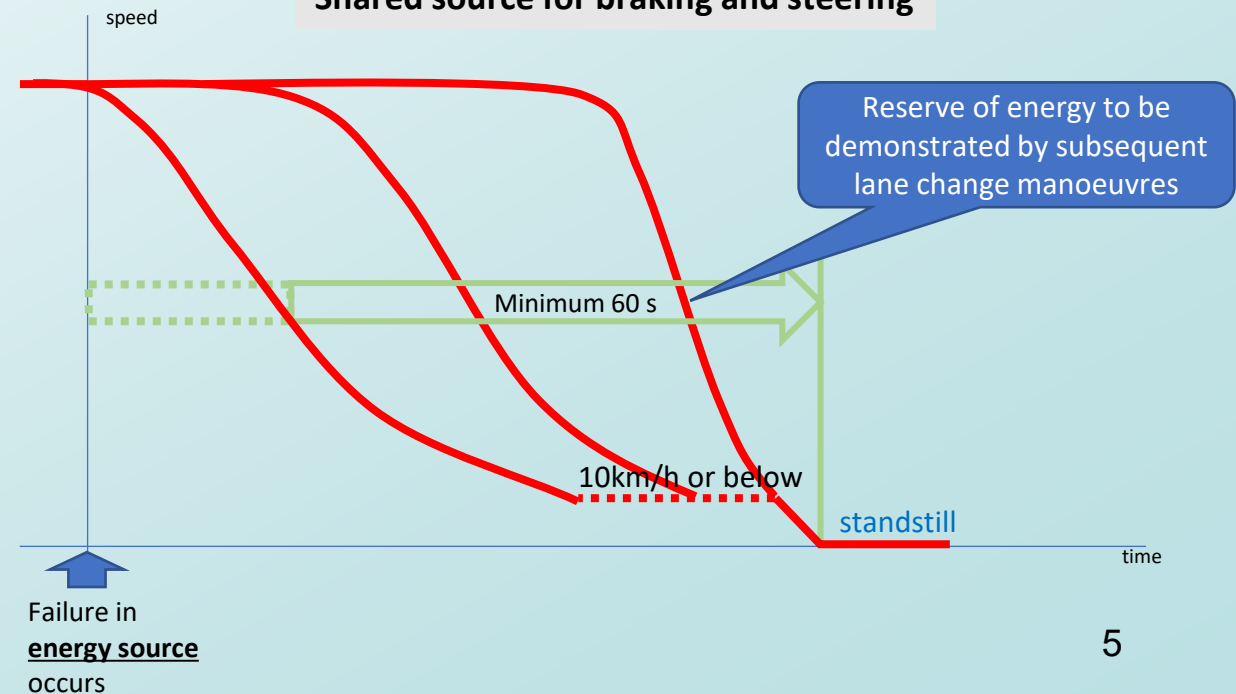
5.3.3. Full power steering systems
5.3.3.3. In the event of a failure of the energy source of the control transmission, it shall be possible to carry out at least 24 "figure of eight" manoeuvres, where each loop of the figure is 40 m diameter at 10 km/h speed and at the performance level given for an intact system in paragraph 6.
The test manoeuvres shall begin at an energy storage level given in paragraph 5.3.3.5.

Alternative approach

Independent source for braking and steering

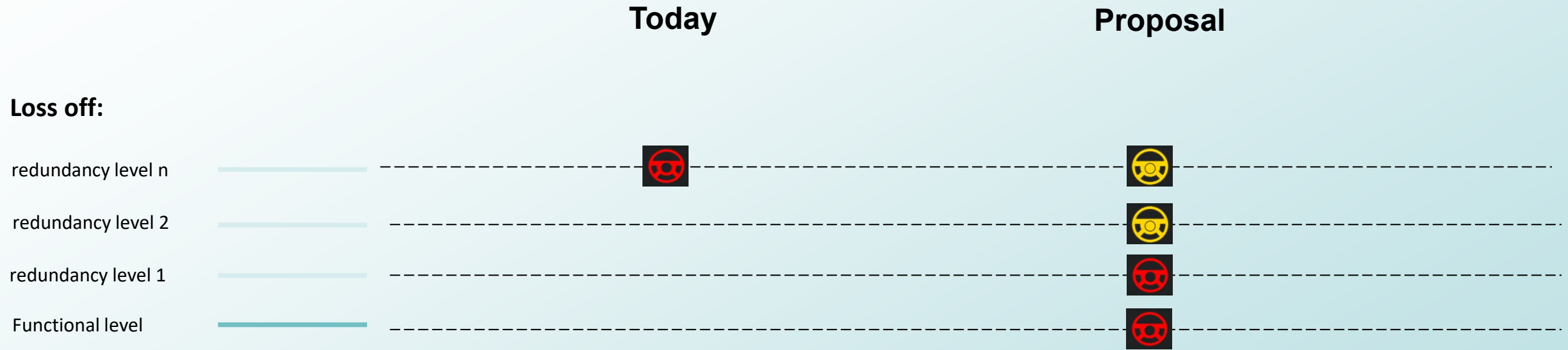


Shared source for braking and steering





Proposed red warning concept (Para. 5.4.2.1.1.)



Industry target and proposed way of working

- Industry targets a synchronized adoption with EMB R13/R13H amendment, since addressing similar technologies (electrification of braking and steering)
- Target lead-time / WoW proposal
 - First presentation at GRVA – Jan 2024
 - Technical meeting(s) with industry and interested CPs
 - Review and improvement of the proposal at GRVA-19 in Troy – US
 - Technical meeting(s) with industry and interested CPs
 - **Endorsement at GRVA-20 of September 2024**



Backup



“Figure of eight” manoeuvre

- 10km/h
- at the performance level given in paragraph 6

