

Proposal for assurance of the safety of vehicles and their equipment and systems, including automated/autonomous driving systems in operation

1. Background

Vehicles degrade over the time and it is necessary to assess the impact of degradations, breakdowns, tampering, wear and other events that may impact in vehicle's performance in road safety and environmental protection.

The Type Approval requirements, defined in UN Regulations, aim to last in a reasonable manner as long as the vehicle is used. Nevertheless, it is not considered that in service compliance means keeping the features of vehicles and their equipment and systems as new/approved ones until scrapped. Nor does it deem that compliance with the requirements should be demonstrated with the same procedure as Type Approval. It is supported by the fact that vehicles are operated in wider range of driving conditions, than those tested.

The requirements for the performance of systems and components including automated/autonomous driving systems for in service compliance and in service compliance vehicle assessment methods shall be set assessing additional inputs, as described below.

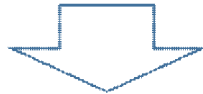
The method described below is appropriate both for mandatory and optional systems and components.

2. Method

The proposed framework of assurance of the safety is based on a risk-analysis approach, which has to be developed for each system of the vehicle. It consists of assessing the possibilities of non-compliance and their impacts. In essence, the chart in the next page shows the rationale.

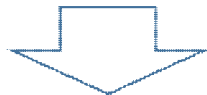
1st: What could go wrong?

- Breakdown
- Wear
- Modification
- Tampering
- ...



2nd: Which may be the consequences?

- Increase of emissions
- Crash
- Increase of crash severity
- Unintentional shutdown
- Lost of comfort
- ...



3rd: How can that be detected?

- Visual checking
- Operational check
- Regulated self-diagnosis
- Non-regulated self-diagnosis
- ...

Once followed the path described, a better rationale will be available to consider if:

- Is it reasonable to check that system/performance during the life of the vehicle?
- If the answer is yes:
 - what are the requirements for in service compliance verification of the performance of equipment and systems in the driving conditions other than those tested during the Type Approval?
 - what are the methods for assessment of the requirements?

- Would be convenient to foresee any kind of provision during the Type Approval?
- Would be convenient to provide the data needed for objective verification of the functionality of the safety and environment related systems?
