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STRENGTHENING THE ENVIRONMENTAL AND ROAD SAFETY ASPECTS OF THE EU ROADWORTHINESS PACKAGE

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1. GENERAL REMARKS

Roadworthiness testing is part of a wider regulatory scheme, governing vehicles throughout their lifetime to fulfil **whole life compliance**. This scheme covers vehicle type- or individual approval, performed before the vehicle is permitted to enter the single market via registration, its use on the roads, and until it is considered as an "end-of-life vehicle" and scrapped or exported.

During the type- or individual approval, compliance with a high level of safety and emission requirements must be secured before the vehicle gets an authorisation to be used on public roads. The coordination between type-approval and the roadworthiness package needs to be considered.

The targed of roadworthiness testing is to check the proper functionality of safety relevant components and systems as well as identifying vehicles that no longer provide the level of environmental protection expected for the vehicle type. New technologies in road transport are increasingly based on IT, sensors and communication systems, which raises issues related to the consistency of vehicle IT systems. Consequently, relevant vehicle data and embedded systems in vehicles must be in the focus of road transport policies, too.

EU regulations and directives provide for a comprehensive list of requirements for road safety and the emission behaviour of new vehicles. This especially leads to adjusting and developing appropriate inspection methods for existing and new technologies also within periodical tests, to ensure the safety within the whole lifecycle. In all cases, the relevant necessary vehicle data for those inspection methods shall be defined along with the method and made available by the manufactures (output as well as input if necessary, e. g. triggering actors or test sequences).

However, since many relevant components of vehicles during their service life continuously deteriorate, it is necessary to carry out periodic vehicle inspections in Europe. Inspections shall be adapted to the level of susceptibility to defects as well as the potential for tampering of safety or emission relevant systems in order to ensure long-term road safety and low emissions.

When assessing road safety in the implementation report of the Roadworthiness Package,[1] different road traffic conditions and the related increased risk to road safety in the individual Member States must be taken into account.

[1] Implementation report on the road safety aspects of the Roadworthiness Package; https://oeil.secure.europarl.europa.eu/oeil/popups/ficheprocedure.do?lang=&reference=2019/2205(INI)

2. PERIODIC TECHNICAL INSPECTION DIRECTIVE 2014/45/EU

2.1. MAKING PROGRESS IN THE HARMONISATION OF THE SINGLE MARKET RULES

The latest review of the Roadworthiness Package has already led to a partial harmonisation of vehicle inspection rules across the EU Member States. Yet, there are still certain discrepancies in the way States have implemented the Directives into their national legal systems (status of inspection centres, testing tools, provision of relevant PTI data, etc.).

In order to ensure better consistency of laws, standards and practices within the EU, it would be useful to consider an increase of harmonisation of the minimum level requirements in the upcoming review of the Roadworthiness Package.

This would result in an overall improvement in vehicle inspection around europe and still allowing Member States to improve their systems individually. It would make sense to discuss which additional test methodes in each member state have been found to improve road safety and environmental protection to evaluate the harmonization of those methods within the EU.

2.2. REQUIREMENTS FOR THE QUALIFICATION (QUALITY) OF INSPECTORS

Automotive engineering is experiencing rapid technical progress, influenced in particular by the increasing use of embedded systems and electronics, connectivity and alternative drivetrain concepts. Overall, the complexity of vehicle systems continues to increase.

This also creates demanding technical challenges for vehicle inspection. To make this possible, high quality standards are required, especially for inspectors and inspection organisations. In particular, tools and methods defined at EU level should therefore be used to enable every tester to perform the necessary tests. Additional training may be required to master these tools and methods. This needs to be taken into account when defining the expected initial and continuous training of the examiners. In addition to ongoing quality monitoring, regular additional training will be required for vehicle inspectors to understand and evaluate new vehicle systems and interrelationships between those systems (e. g. advanced drivers assistant systems, hydrogen and electric vehicles, connectivity etc.).

It is crucial that roadworthiness testing is carried out by well-educated and trained inspectors. It is proposed to strengthen the system to ensure independency of assessments as well as to further eliminate potential conflicts of interest. The impartiality of inspectors shall be part of the training.

2.3. PREVENTING CONFLICTS OF INTEREST OF INSPECTORS

An objective vehicle inspection requires the impartiality of inspectors and inspection organisations, avoiding conflicts with vehicle manufacturing, trade, maintenance. Therefore, the persons (and their organisations in the broad sense)

entrusted with the performance of regular vehicle inspection must maintain impartiality in the assessment from manufacturing, trade, leasing, maintenance or repair of vehicles and vehicle parts. This strict regulation guarantees the independence of vehicle inspection and the necessary confidence of vehicle owners in correct vehicle inspection.

Current schemes used in some of the European Countries in which authorities guarantee the independence of vehicle assessment by segregation of functions and strengthen supervision and sanction, could also be considered as sufficient to ensure the proper evaluation of vehicles.

2.4. TESTING NEW CATEGORIES OF VEHICLES

Since one of the primary goals of roadworthiness tests is to ensure road safety, it is not logical that certain categories of vehicles are inspected periodically, while others are excluded from this obligation. As CITA has already concluded in its 2019 study,[2] mandatory inspections of two-, three-wheelers, and light trailers would have a positive cost-benefit impact. Considering that the European motorcycle fleet consists of 24.7 million motorcycles, many lives could be saved by inspecting additional categories of vehicles.

Therefore, CITA proposes a complete inspection, regardless of the engine and power limitations, for the following categories of vehicles and at least in the proposed intervals:

Inspection of two- and three-wheelers:

- Micro Mobility vehicles (e. g. E-Scooters, self balancing vehicles): 1st inspection after 1 year, subsequent inspections every year.
- Mopeds: 1st inspection after 3 years, subsequent inspections every 2 years.
- Motorcycles: 1st inspection after 4 years, subsequent inspections every 2 years.

Inspection of light trailers:

- 1st inspection after 4 years, subsequent inspections every 2 years.

2.5. INCREASING THE FREQUENCY OF TESTING FOR VEHICLES USED IN SHARED MOBILITY, PUBLIC TRANSPORT, AND OLD VEHICLES

Directive 2014/45 already provides for more frequent inspections of taxis or ambulances. With the growth of shared mobility and the use of individual vehicles for public transport purposes, the frequency of inspections on these vehicles should likewise increase, since those vehicles are mostly used more in the same time and with less care than private vehicles. Therefore, CITA proposes to subject these M1 and N1 vehicles to a roadworthiness test one year after the initial registration date of the vehicle and then annually thereafter. The same frequency of testing could

[2] Study on the inclusion of light trailers and two- or three-wheel vehicles in the scope of the periodic roadworthiness testing, February 2019

also be extended to L-category vehicles used in the context of shared mobility or public transport.

As the average age of the vehicle fleet in Europe is continuously increasing (almost 12 years currently), the percentage of old vehicles is growing. As vehicles age, major defects become more frequent. Therefore, CITA proposes an annual inspection for all vehicles older than 12 years.

2.6. EMISSIONS OF VEHICLES

Modern vehicle engines and exhaust gas treatment systems have other critical emissions than known from older systems. The currently prescribed test methods and tools do not provide sufficient functionality to measure Particle Number (PN) and nitrogen oxides (NOx).

The development of the Roadworthiness Package is an excellent opportunity to include the last development on PN counting in periodical and roadside inspection. This method is already developed and soon to be used in some Member States and other regions of the world.

Furthermore, it is necessary to develop the appropriate methods to incorporate NOx testing in the scope of the inspection, along with an improved approach to detect tampering in teamwork with vehicle approval.

Last but not least, it is instrumental in taking full advantage of the collaboration with vehicle approval to facilitate that vehicles are kept clean during their whole life. Particularly, it is essential to ensure coordination with the development of the Euro 7/VII standards.

2.7. ELECTRIC AND HYBRID VEHICLES

High-voltage batteries in vehicles and specific components need to be inspected in more detail. On one side, because of electrical safety, on the other, to ensure that performances are kept sufficiently. For example batteries State of Health – SoH is essential to ensure range and charging efficiency.

2.8. MANDATORY INSPECTION OF FUNCTIONALITY AND EFFECTIVENESS OF ADVANCED DRIVING ASSISTANCE SYSTEMS (ADAS)

Under the new General Safety Regulation (EU) 2019/2144, all motor vehicles (M, N) will have to be equipped with safety features, such as intelligent speed assistance, driver drowsiness and attention warning systems, and many others.

Since those systems often are related with a high and expensive effort for repair and maintenance as well as mostly expensive sensor-modules, the potential for not appropriate servicing, especially of older vehicles or after an accident is high. Additionally to cost saving, some vehicle owners might feel over restricted by the systems warnings and limitations and therefore the potential for tampering the systems will rise (e. g. permanent deactivation of speed warning or lane departure

warning). To ensure road safety for the whole vehicle life cycle, during the periodic technical inspection, it must be possible to detect any critical damage or manipulation of these mandatory safety-relevant systems. Not only to be assured that the systems are still working, but also to ensure that a faulty or tampered system does not lead to further safety risks. Especially slightly damaged systems for example due to a crash at very slow speeds can lead to dangerous situations, since most misalignments of sensors stay undetected by the owner or the vehicles self-diagnosys but change the behavior of the vehicle. Hence, after the repair of a heavily damaged or damages near the vehicles ADAS sensors, an appropriate technical inspection should be mandatory to guarantee full functionality and safety of ADAS and to identify any potential changes made to the safety relevant components.

As explained above, it is no longer sufficient to simply verify the system installation and analyse tell-tales or electronic status bits. Rather, test procedures must allow to evaluate the correct functionality independently and additionally to vehicles self-diagnosys. Also the software itself and other vehicle data is crutial for the proper functioning of those embedded systems. Therefore the test procedure relevant data together with software versions and a software integrity verification must be available for the test procedures (see also 2.11).

The focus of periodical technical inspection should be the in-vehicle technologies/systems regarding conformity, effectiveness and damages using the benefits of system self-diagnostics and additionally even more important the relevant external test procedures. As an example CITA proposes to include eCall in the scope of periodic technical inspection and test it via the electronic vehicle interface[3].

To ensure the benefit of those external test procedures it will be necessary to have those methodes preconceived in the development and therefore the type approval process. Additionally, a requirement should be defined to enable the testability of installed systems e.g. via standardised interfaces (e.g. ePTI) and vehicle test modes (e.g. test HMI or sensors whiles vehicle is standing). Manufacturers and importers of vehicles, systems or components should be required to provide the authorities with sufficient specifications relevant for periodic inspections. These contain information on the installation of the components and systems and on the corresponding inspection procedures. Components of such specifications can be, for example, inspection requirements, identification features, fault codes, algorithms, tamper-proof displays and physical quantities.

In order to simplify the process for both the responsible authorities respectively the officially appointed inspection organisations and the vehicle manufacturers, it would make sense to have a central body in each member state to issue and process the specifications. This concept has proven to be practicable in Germany, for example.

[3] See more details in the EU-Commission study on the inclusion of eCall in the periodic roadworthiness testing of motor vehicles: https://op.europa.eu/en/publication-detail/-/publication/c6524bd7-2b54-11e9-8d04-01aa75ed71a1

2.9. CONNECTED AND AUTOMATED VEHICLES UNDER TECHNICAL INSPECTION

A comprehensive roadworthiness framework must ensure that also automated vehicles of SAE Level 3 and higher are regularly tested to evaluate safety performance. While some stakeholders claim that a system self-diagnosis is the only essential method to increase the functional safety of the vehicle, self-diagnostics cannot replace an impartial PTI and a physical inspection. Conversely, testing the self-diagnosis itself should be part of a PTI to ensure that the vehicle is still able to recognise its operational driving domain (ODD) boundaries.

Evidentially, the whole electronic and IT architecture of the vehicle including the software, object and environment detecting sensors are increasingly becoming the key components of vehicles. This applies not only for automated driving functionalities but also as well for safety and environmental protection relevant systems. Hence, CITA is committed to ensuring that future verification of software integrity during periodic technical inspections is implemented during the development and revision of international and European vehicle type approval regulations.

Vehicle software must already be clearly identified during the type approval by a standardised and harmonised procedure so that changes to the vehicle software through legal updates or illegal manipulations in the vehicle life cycle can be clearly identified during the PTI.

2.10. FIGHT AGAINST MANIPULATION AND CYBERATTACKS

As explained above, new technologies in road transport are increasingly based on IT and communications, which raises potential issues related to the consistency of vehicle IT systems. These include the modification of software for tampering purposes or the theft of cars or personal data through interference with communications. Whilst tampering might not seem to be a huge issue overall, when there is a potential for simply making money with it, then solutions for tampering will emerge (e. g. odometer fraud, deactivating instead of repairing systems like Airbags or ADAS).

Moreover, new vehicles generate a large amount of data, many of which are personal, the use of which must be well-defined and protected.

To add on, current technologies allow vehicle software to be modified over the air, thus constantly changing the performance of the cars. These variations may be very positive when under control, but if the software is mismanaged, it can create serious challenges for road safety, transport security, environmental protection and security of personal data.

To ensure cybersecurity, the regulatory framework must allow appropriate stakeholders to verify that vehicles are using approved software with the right version including software integrity charachteristics. The EU type-approval legislation already foresees the adoption of an implementing act prescribing

technical specifications for vehicle cybersecurity and software updates. This must, consequently, be reflected in the roadworthiness tests.

2.11. ACCESS TO DATA AND SOFTWARE UPDATES TO APPROVAL RELEVANT COMPONENTS OF THE VEHICLE

In order to further develop inspection and assessment procedures for modern vehicles throughout their entire life cycle, technical inspection, as a sovereign activity, needs non-discriminatory, free and independent access to the original/ native data of the individual vehicle (VIN related) including updated software and software identification of vehicles. Both at the testing station and by means of digital remote access via wireless interfaces.

Since 2007, access to vehicle data for example for emission relevant purposes has been regulated in the special EU vehicle type-approval Regulation EC/715/2007. It remains crucial that the provisions of this Regulation are unrestricted and applied in the national legal systems, also for safety relevant systems. In order to take into account the increasing use of connectivity (3G-4G etc.) in vehicles, this legislation now needs to be urgently adapted to the state of the art. Indeed, access to vehicle data for diagnosis, testing and inspection of engine management and exhaust gas purification systems and road safety-relevant systems via wireless interfaces has so far not been covered by the roadworthiness Regulation[4].

2.12. INDEPENDENT INSPECTION OF ROAD/TRAFFIC INFRASTRUCTURE FOR CCAM – COOPERATIVE, CONNECTED AUTOMATED MOBILITY

Automated and connected driving will mean that periodic vehicle inspections will have to extend not only to the vehicle but also to the connected traffic infrastructure.

Although out of scope of directive 2014/45/EU, data security and data protection of vehicles, as well as the safety-relevant functionalities related to communication with the traffic infrastructure, must be tested by an independent third-party inspection.

2.13. CARGO SECURING

Many accidents of heavy vehicles are related or due to bad cargo securing. Annex V to Directive 2014/47/EU includes requirements for testing the cargo securing within roadside inspections. Neither in the initial approval of vehicles or within periodical inspections any cargo securing requirements for the vehicle itself are set. At least within periodical inspections the proper condition of cargo securing elements of all cargo vehicles (N, O) should be tested (e. g. latches, anchor points,

[4] See more detail in the EC's communication on a European strategy for data: https://ec.europa.eu/info/sites/info/files/communication-european-strategy-data-19feb2020_en.pdf

stanchions, sidewalls etc.) to allow the driver to secure cargo with the elements implemented by the manufacturer.

Unfortunately there are no requirements set for cargo vehicles to provide proper basics for securing the cargo. Although it is not directly related to roadworthiness testing, it should be mandatory for all cargo vehicles (N, O) to fulfil the vehicle related state of the art cargo securing requirements and to test them within the vehicles type approval (e. g. number and stability of lashing and anchoring points). Examples of requirements could be found in the german national VDI standards 2700.

3. REGISTRATION DOCUMENTS 2014/46

3.1. RECOMMENDATION: DATA EXCHANGE TO MAKE APPROVAL OF RELEVANT SOFTWARE UPDATES POSSIBLE

In order to be able to apply an approval granted for a software update to vehicles already in use, various conditions must be created in the vehicle registration documentation. CITA proposes the following requirements as mandatory:

- Standardized data exchange between approval authorities and licensing authorities
- Elimination of the obligation to carry the registration certificate with the driver, if the data is already recorded electronically, or more convinient to eliminate the physical registration certificate completely.
- Possibility of data access by authorities and bodies entrusted with official tasks even if the vehicle is registered in another Member State (for defined purposes, e.g. technical services, traffic monitoring/ roadside inspection, registration, technical inspection according to Directive 2014/45/EU, etc.).

4. ADDITIONAL SUBJECTS

The following concepts need also be considered as added-value activities related to roadworthiness:

- To include recall campaigns within the frame of the roadworthiness package: in periodical and roadside inspection, and related to the vehicle registration data.
- To consider the modification of vehicles from an EU perspective to advance in harmonisation, in particular for socially sensitive aspects like the adaptation of vehicles to be driven or used by handicapped people.
- To consider some steps forward in the harmonisation within the Union, like the tolerance with expired inspections.
- To develop the appropriate requirements regarding the mandatory equipment in case of alternative methods.
- To consider the potential for authorities of the use of PTI data: market surveillance, etc.
- To ensure that discussions related to the content of the inspection and the necessary data are undertaken simultaneously.

- To develop a new approach to access vehicle data, reducing the impact in OEMs and facilitating their use.
- To ensure the right coordination between type-approval and the roadworthiness package to ensure access when necessary.