



Informal document **GRPE-70-14**
(70th GRPE, 12 - 16 January 2015
agenda item 3a)

**Background
of the**

**Proposals for amending R83
(Series 06 and 07)**

GRPE/2015/4 (OICA) Reg. 83-06
GRPE/2015/5 (OICA) Reg. 83-07



Background

GRPE/2015/4: To update the on-board diagnostics (OBD) requirements to the state of the art. Re-work of GRPE/2014/14 Part A presented at Jan and June 2014.

GRPE/2015/5: To update the on-board diagnostics (OBD) requirements to the state of the art. Re-work of GRPE/2014/14 Part B presented at Jan and June 2014.

Main purpose of the proposed amendments

- Clarification of requirements which led to different interpretations
- Update requirements to current technologies



OBD Working Group meetings in 2014

OBD Working Group by EU Commission

Meetings on

- 13.02.2014
- 30.04.2014
- 25.07.2014
- 17.09.2014

in Brussels to discuss the proposed amendments to UN Regulation 83 (series 06 and series 07).



Changes

Modifications to reflect **hybrid vehicles** and **vehicles employing engine shut - off strategies**.

- New definition of driving cycle
- Changes in erasure of fault codes

Requirements were linked to engine start, which is not necessarily present in a hybrid vehicle.

Requirements for vehicles using engine shut-off was not defined at all.

Equivalent behaviour of all types of vehicles targeted.



Changes

Monitoring against an emission threshold is not appropriate for an electrical failure. A type 1 test is therefore not necessary.

The requirements of the OBD system test (demonstration) are modified accordingly.

- Electrical failures are approved, even if emissions are above the OBD threshold.
- For electrical failures a type 1 test is not necessary



Changes

IUPR requirements

Clarification for IUPR track and report requirements for monitors that are monitoring continuously for short circuit or open circuit failures.

These monitors are exempted from reporting of IUPR values.

A definition of „continuous“ therefore was necessary



OBD Standards

Standards referenced in Regulation 83 (series 07 only)

- to avoid inconsistencies, all standards are moved into one paragraph, which is referenced from within Regulation 83
- all OBD related standards are updated accordingly
- Two new standards
 - ISO 14229 (UDS)
 - ISO 27145 (WWH OBD), which is already used for heavy duty vehicles)

are introduced starting 2019.



Details



Updated OBD related standards

Standards used for the transmission of OBD relevant information:

- (a) ISO 15031-5 "Road vehicles - communication between vehicles and external test equipment for emissions-related diagnostics – Part 5: Emissions-related diagnostic services", dated 1 April 2011 or SAE J1979 dated 23 February 2012;
- (b) ISO 15031-4 "Road vehicles – Communication between vehicle and external test equipment for emissions related diagnostics – Part 4: External test equipment", dated 1 June 2005 or SAE J1978 dated 30 April 2002;
- (c) ISO 15031-3 "Road vehicles – Communication between vehicle and external test equipment for emissions related diagnostics Part 3: Diagnostic connector and related electrical circuits: specification and use", dated 1 July 2004 or SAE J 1962 dated 26 July 2012;
- (d) ISO 15031-6 "Road vehicles – Communication between vehicle and external test equipment for emissions related diagnostics – Part 6: Diagnostic trouble code definitions", dated 13 August 2010 or SAE J2012 dated 07 March 2013;
- (e) ISO 27145 "Road vehicles -Implementation of World-Wide Harmonized On-Board Diagnostics (WWH-OBD)" dated 2012-08-15 with the restriction, that only 6.5.3.1 (a) may be used as a data link;
- (f) ISO 14229:2013 "Road vehicles — Unified diagnostic services (UDS) with the restriction, that only 6.5.3.1 (a) may be used as a data link".

The standards (e) and (f) may be used as an option instead of (a) not earlier than 01.01.2019.



Updated OBD related standards

Update of communication standards

The communication standards referenced throughout the regulation are outdated. With the standards currently referenced it would be impossible to fulfil other requirements in Regulation No. 83, i.e. reporting of IUPR information.

Furthermore some standards are referenced several times throughout the document, which may result in future inconsistencies. Therefore all references to communication standard are moved into a separate paragraph.

Two new standards for communication to external test equipment are introduced into the regulation. ISO 27145 (WWH OBD), which is already used in Heavy Duty vehicles and ISO 14229, which forms the basis for WWH OBD.



Modifications to reflect changes in vehicle technology

Driving Cycle

2.10. A "driving cycle" consists of engine ~~start-up~~ **key-on**, a driving mode where a malfunction would be detected if present, and engine ~~shut-off~~ **key-off**.

Erasure of fault codes

3.8.1. The OBD system may erase a fault code and the distance travelled and freeze-frame information if the same fault is not re-registered in at least 40 engine warm-up cycles **or 40 driving cycles with vehicle operation in which the criteria specified in sections 7.5.1 (a) – (c) of Annex 11, Appendix 1 are met.**

Update of the definition of "driving cycle" to reflect changes in vehicle technology (e.g. hybrid electric vehicles), that do not need a start of the internal combustion engine for operation or warm up much slower than a conventional vehicle



Electrical failures

[...] When measured over the Type I Test cycle, such defective components or devices shall not cause the vehicle emissions to exceed the limits of paragraph 3.3.2 by more than 20 per cent. **For electrical failures (short/open circuit), the emissions may exceed the limits of paragraph 3.3.2. by more than 20 per cent.**

6.1.1. The Type I Test need not be performed for the demonstration of electrical failures (short/open circuit). The manufacturer may demonstrate these failure modes using driving conditions in which the component is used and the monitoring conditions are encountered. These conditions shall be documented in the type approval documentation.

Electrical failures (disconnection, short to battery and short to ground) have only one of two states, present or not present. There is no such thing as a partial failure therefore the concept of threshold monitoring is inappropriate.

Demonstrating these types failures in a type 1 test is often inappropriate or wasteful. The demonstration of the monitor working properly should therefore be possible in a driving cycle defined by the manufacturer, in which the component (sensor/actuator) is used. This is true also for the electronic evaporative control device.

The proposed changes do not alter the requirements of monitoring the electrical failures, but intend to clarify the situation during the OBD system test.



IUPR

7.6.2.1. Numerators and denominators for specific monitors of components or systems, that are monitoring continuously for short circuit or open circuit failures are exempted from reporting.

“Continuously,” if used in this context means monitoring is always enabled and sampling of the signal used for monitoring occurs at a rate no less than two samples per second and the presence or the absence of the failure relevant to that monitor has to be concluded within 15 seconds.

If for control purposes, a computer input component is sampled less frequently, the signal of the component may instead be evaluated each time sampling occurs.

It is not required to activate an output component/system for the sole purpose of monitoring that output component/system.

The intention of the text of paragraph 7.6.2. in Appendix 1 to Annex 11 saying "... except those monitoring for short circuit or open circuit failures ..." was to exempt the ratios of monitors for electrical failures from being reported. This wording could however give the impression that electrical failures are exempted from being reported only for systems with multiple monitors but are requested for systems consisting of only one electrical monitor.

Ratios for continuously monitored components or systems need not be reported, because their ratio is per definition above the minimum required ratio for any system or component.

A definition of “continuously”, aligned with the provisions of the heavy duty OBD requirements is added.