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Light vehicles:
UN Regulations Nos. 68 (Measurement of the maximum speed, including electric vehicles), 83 (Emissions of M1 and N1 vehicles), 101 (CO2 emissions/fuel consumption), 103 (Replacement pollution control devices) and 154 (Worldwide harmonized Light vehicles Test Procedures (WLTP)) and [180] (OBM and EVP)

Proposal for a new Supplement to the 04 series of amendments to UN Regulation No. 154 (Worldwide harmonized Light vehicles Test Procedures (WLTP))

Submitted by the experts of Japan, The United Kingdom of Great Britain and Northern Ireland, the European Commission and the International Organization of Motor Vehicle Manufacturers*

The text reproduced below was prepared by the representatives of the European Commission, Japan, The United Kingdom of Great Britain and the experts from the International Organization of Motor Vehicle Manufacturers (OICA). This document aims to propose a new Supplement to the 04 series of amendments to UN Regulation No. 154 in order to introduce provisions relating to Manipulation Devices and Strategies which were previously in the 09 series of amendments to UN Regulation No. 154. The document also proposes other updates, including: to clarify the levels to which certain provisions apply; clarifications and corrections to the requirements for the laboratory test for pure electric range ratio at low temperature for Pure Electric Vehicles; an update to allow the use in Levels 1A and 2 of actual tyre rolling resistance values to calculate the final road load coefficient for the individual vehicles; align the Regulation with the current regional status and the current state-of-the-art.

The modifications to the current text of the Regulation are marked in bold for new or strikethrough for deleted characters, except for complete new annexes (Annex C2) in normal text.

* In accordance with the programme of work of the Inland Transport Committee for 2026 as outlined in proposed programme budget for 2026 (A/80/6 (Sect. 20), table 20.7), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

I. Proposal

Table of Contents, amend to read:

"…

…"

Introduction, amend to read:

"**Introduction**

…

In addition, this Regulation includes an update to the Type 5 test for verifying the durability of pollution control devices and updated On-Board Diagnostic (OBD) requirements. These updates are in order to reflect the changes from the previous NEDC based Type 1 test to the new WLTP Type 1 test. The 04 series introduces new annexes with requirements relating to in-vehicle battery durability**, manipulation devices and manipulation strategies** and a new test for range of Pure Electric Vehicles at low temperatures.

..."

Paragraph 1.1., amend to read:

"1.1. …

In addition, this Regulation lays down rules for verifying the durability of pollution control devices' On-Board Diagnostic (OBD) systems, On-Board Fuel Consumption Monitoring (OBFCM) devices, battery durability**,** ~~and~~ electric range at low ambient temperatures **and manipulation devices and manipulation strategies**.

..."

Paragraph 1.3., amend to read:

"1.3. ...

In addition, this Regulation lays down rules for verifying the durability of pollution control devices, On-Board Diagnostic (OBD) systems, On-Board Fuel Consumption Monitoring (OBFCM) devices, battery durability**,** ~~and~~ electric range at low ambient temperatures **and manipulation devices and manipulation strategies**."

Paragraph 3.5.2., amend to read:

"3.5.2. ~~(Reserved)~~ **"Manipulation device" means any element of design that results in a vehicle not complying with the requirements of this Regulation when driven but not under a regulatory test, despite it resulting in the vehicle appearing to be compliant when tested, or that manipulates data related to sensors, fuel or electric energy consumption, electric range or battery durability;**"

Paragraph 3.5.3., amend to read:

"3.5.3. ~~(Reserved)~~ **"Manipulation strategy" means a strategy that results in a vehicle not complying with the requirements of this Regulation when driven but not under regulatory test, despite it resulting in the vehicle appearing to be compliant when tested, or that manipulates data related**

to sensors, fuel or electric energy consumption, electric range or battery durability;"

Paragraph 3.5.4., amend to read:

"3.5.4. ~~(Reserved)~~ **"Third party" means a party with legitimate interest and access to adequate testing facilities for the purpose of compliance checks and tests, with these facilities accredited in accordance with EN ISO/IEC 17020 and EN ISO/IEC 17025.** "

Paragraph 3., add a new paragraph 3.5.13. to read:

"**3.5.13. "Base Emission Strategy (BES)" means an emission strategy that is active throughout the speed and load operating range of the vehicle unless an Auxiliary Emission Strategy is activated.** "

Paragraph 3., add a new paragraph 3.5.14. to read:

"**3.5.14. "Auxiliary Emission Strategy (AES)" means an emission strategy that becomes active and replaces or modifies a BES for a specific purpose and in response to a specific set of ambient or operating conditions and only remains operational as long as those conditions exist.**"

Paragraph 4.1.2., add a new point (f) to read:

"**(f) All relevant documentation to technically justify the absence of manipulation devices and manipulation strategies.**"

Paragraph 4.3., add a new sub-paragraph 4.3.6. to read:

"**4.3.6. For the purpose of paragraph 4.1.2.(f)., the manufacturer shall comply with Annex C2 to this Regulation on tests, methods and procedures to establish the absence of manipulation devices and manipulation strategies**

4.3.6.1. These tests, methods and procedures include the roles and responsibilities assigned to vehicle manufacturers, type-approval authorities, and other actors that shall ensure the absence of manipulation devices and manipulation strategies and are specified in Annex C2."

Paragraph 6.1.1., add a new sub-paragraph at the end to read:

"6.1.1. …

Manufacturers shall ensure that type approval procedures for verifying the requirements for manipulation devices and manipulation strategies are met."

Paragraph 11.1.4., amend to read:

"11.1.4. Until 31 December 2029 Contracting Parties shall not refuse to grant approvals to new types of vehicles which comply with the 04 series of amendments to this Regulation ~~and do not comply with~~ **excluding** the following requirements:

For Level 1A and Level 2 only:

~~a. The lifetime value retention status requirements defined in paragraphs 3.1., 3.2., 3.3., 3.4., 3.5. and 3.6. of Appendix 5 to this Regulation.~~

~~b~~**a**. For PEVs, the requirements for OBFCM devices regarding the determination, storage and making available of lifetime values for the parameters defined in paragraphs 3.3 (j) and (k) of Appendix 5 to this Regulation.

~~c~~**b**. For OVC-HEVs the requirements for OBFCM devices regarding the determination, storage and making available of lifetime values for the parameters defined in paragraphs 3.2 (p) and (q) of Appendix 5 to this Regulation.

~~d~~**c**. The accuracy requirements regarding the vehicle energy charged for OVC-HEVs and PEVs according to paragraph 4 of Appendix 5 and according to paragraph 3.4 of Appendix 2, and Type 1 test requirements according to paragraph 3.4.4.4 of Annex B8.

For Level 1A only:

d. The lifetime value retention status requirements defined in paragraphs 3.1., 3.2., 3.3., 3.4., 3.5. and 3.6. and paragraph 5. of Appendix 5 to this Regulation.

e. For PEVs, the requirements for OBFCM devices defined in point (c) of paragraph 5.11.1."

Appendix 2

Paragraph 3.4., point (1), amend to read:

"(1) Applicable vehicles

Vehicles referred in paragraph 5.11.1. to this Regulation	Level 1A	Level 1B	Level 2
(a)	yes	yes	yes
(b)	yes	~~NA~~**yes**	yes
(c)	yes	NA	yes
(d)	NA	LPG only	LPG only

"

Annex A1

Appendix1

Part III, paragraph 2.3., amend to read:

"**2.3. Conclusion**

~~Low temperature family correction factor~~ ***Pure Electric Range ratio(s) at low temperature (-7 °C)***	*Result*
Calculated $K_{PER,WLTC,LT}$	
Declared $K_{PER,WLTC,LT,dec}$	
Pass/Fail?	
$K_{PER,WLTC,LT,dec}$ confirmed?	

"

Annex A2

Appendix 6, first usage of the instruction "*Use the following paragraph …*", amend to read:

"~~Use the following paragraph in case the minimum performance requirements are applied and skip it in case the declared performance requirements are applied~~ **The following**

paragraph shall apply in the case that the minimum performance requirements are applied. It is not applicable in the case that the declared performance requirements are applied:"

Appendix 6, second usage of the instruction "Use the following paragraph ...", amend to read:

"~~Use the following paragraph in case the declared performance requirements are applied and skip it in case the minimum performance requirements are applied~~ **The following paragraph shall apply in the case that the declared performance requirements are applied. It is not applicable in the case that the minimum performance requirements are applied**:"

Appendix 6, third usage of the instruction "Use the following paragraph ...", amend to read:

"~~Use the following paragraph in all cases~~ **The following paragraph shall apply in the case that either the declared performance requirements or the minimum performance requirements are applied**:"

Annex B3

Paragraph 3.6., Table A3/6b, add a new row to the table caption to read:

"Table A3/6b
This table is applicable to Level 1A and Level 2 only;
Gasoline/petrol (E10H)"

Paragraph 5.4., Table A3/18 Diesel (B5H), add a new paragraph number 5.5. and amend to read:

"**5.5. Diesel (nominal 52 Cetane, B5H)**

~~Table A3/18~~ **Table A3/17a**

This table is applicable to Level 2 only

Diesel (B5H)"

Annex B4

Paragraph 4.2.2.1., Table A4/2, amend the note below the table to read:

"* ~~Only for 4 phase WLTP calculation~~ **Calculation** of individual vehicles **for Level 1A and 4-phase WLTP in Level 2 only**: In case the actual RRC value is lower than this value, the actual rolling resistance value of the tyre or any higher value up to the RRC value indicated here shall be used for interpolation."

Paragraph 4.2.2.1., add a new sub-paragraph below Table A4/2 to read:

"If the interpolation method is applied to rolling resistance, the actual rolling resistance values for the tyres fitted to the test vehicles L and H shall be used as input for the interpolation method. For an individual vehicle within an interpolation family, the RRC value for the energy efficiency class of the tyres fitted shall be used.

In the case where individual vehicles can be supplied with a complete set of standard wheels and tyres and in addition a complete set of snow tyres (marked with 3 Peaked Mountain and Snowflake – 3PMS) with or without wheels, the additional wheels/tyres shall not be considered as optional equipment.

For Level 1A and 4-phase WLTP in Level 2 only:

At the vehicle manufacturer's request, all individual vehicles within an interpolation family shall have their road loads calculated using the actual tyre rolling resistance value of their tyres."

Annex B7

Table A7/1, Step 9, amend the first (left-hand) column to read:

"

9
~~For Level 1A and results after 4 phases in Level 2~~
Final criteria emission result

"

Paragraph 3.2.3.2.2.2.2., add a new sub-paragraph at the end to read:

"3.2.3.2.2.2.2. …

For Level 1A and 4-phase WLTP in Level 2 only:

At the vehicle manufacturer's request, all individual vehicles within an interpolation family shall have their road loads calculated using the actual tyre rolling resistance value of their tyres."

Paragraph 3.2.4.1.1.2.2., add a new sub-paragraph at the end to read:

"3.2.4.1.1.2.2. ...

For Level 1A and 4-phase WLTP in Level 2 only:

At the vehicle manufacturer's request, all individual vehicles within an interpolation family shall have their road loads calculated using the actual tyre rolling resistance value of their tyres."

Annex B8

Paragraph 4.6.3., amend to read:

"4.6.3. ~~This paragraph is applicable for Level 1A only~~

Stepwise procedure for calculating the final test results of OVC-FCHVs

This paragraph describes the stepwise calculation of the final charge-depleting as well as the final charge-sustaining and charge-depleting weighted test results.

…"

Annex B10

Paragraph 5.5., amend to read:

"5.5. Dynamometer and vehicle operation

The requirements of paragraphs 2.4.2.1.1. to 2.4.4. of Annex B6 shall apply to the low temperature test, with the exception of paragraph**s 2.4.2.1.2. and** 2.4.3.

Paragraph 2.4.5. of Annex B6 shall be replaced with the requirements of paragraph 4.1.3.1. of this annex."

Paragraph 6.1.3., amend to read:

"6.1.3. Low temperature pure electric range ratio calculation

$K_{PER,WLTC,LT,} = PER_{WLTC,LT,ave} / PER_{WLTC,Type1,ave}$

where:

$PER_{WLTC,Type1,ave}$ is the average pure electric range ($PER_{WLTC,ave}$) of the parent vehicle determined according to the output of ~~step 10~~ **step 7** of Table A8/10 to Annex B8 in case of the consecutive cycle Type 1 test procedure or determined according to the output of step 6 of Table A8/11 to Annex B8 in case of the shortened Type 1 test procedure , km

$PER_{WLTC,LT,ave}$ …"

Table A10/1, Step no. 1, Input column, amend to add "Δ", to read:

"…

Step no.	*Source*	*Input*	*Process*	*Output*
1	Low temperature test results	$\Delta E_{REESS,LT,j}$	Calculate values of the low temperature test according to paragraph 6.1.1. of this Annex. Output available for each low temperature test.	UBE_{LT} $K_{WLTC,LT,j}$ $EC_{DC,WLTC,LT}$ $PER_{WLTC,LT}$
…				

…"

Annex C1

Appendix 1, add footnote to read:

"[(1)] **Default values [of 0xFF] may be supplied, if the manufacturer does not apply a virtual distance calculation**"

Annex C2, amend to read:

"Annex C2 ~~(Reserved)~~

Manipulation devices and manipulation strategies

This annex is applicable to Level 1A and Level 2 only

1. Introduction

1.1. This annex sets out the tests, methods and procedures for establishing the absence of manipulation devices and manipulation strategies as specified in paragraph 3. of this annex.

1.2. This annex also specifies the documentation that ensures the proper monitoring and enforcement of rules related to manipulation devices and manipulation strategies. It aims to strengthen emissions control mechanisms, enhance transparency, and ensure that vehicles comply with regulatory requirements for the lifetime of the vehicles, particularly the exhaust emission and evaporative emission limits set out in this Regulation and UN Regulation No. 168 and the test conditions therein, as well as the prohibition of manipulation devices and manipulation strategies.

1.3. Specifications for methodologies, tests and procedures that relate to data integrity, such as manipulation of data related to sensors, fuel or electric energy consumption, electric range or battery durability, are provided for in UN Regulation No. [XXX] on On-Board Monitoring (OBM).

1.4. This annex also sets out roles and responsibilities for the actors involved to ensure compliance with the above-mentioned regulatory requirements and prohibition of manipulation devices and manipulation strategies.

1.5. For the purposes of this annex, manipulation devices and manipulation strategies should be construed as set out in paragraphs 3.5.2. and 3.5.3. of this Regulation. The notion of manipulation strategy shall be distinguished from respectively the notions of 'Base Emission Strategies (BES)' and 'Auxiliary Emission Strategies (AES)' which are defined in respectively paragraphs 3.5.13. and 3.5.14. of this Regulation, and which relate to documentation requirements under this annex.

2. General requirements – tests and methodologies

2.1. Referring to the provisions of paragraphs 3.5.2. and 3.5.3. of this Regulation, (i) manipulation devices and manipulation strategies related to emissions (exhaust, evaporative or other) and (ii) manipulation devices and manipulation strategies related to data integrity should be distinguished.

2.2. When assessing situations that could involve the use of manipulation devices or manipulation strategies for exhaust and evaporative emissions, a broad assessment and interpretation of those situations should be made. Any devices or strategies that reduce the effectiveness of exhaust and non-exhaust emission limits and testing condition requirements under this Regulation, that cause a non-compliant vehicle to appear compliant or that falsify test results, should be considered when determining whether manipulation devices or manipulation strategies exist. Contracting Party authorities should apply dedicated screening tests and enforcement measures to prevent the circumvention of the emissions' requirements..

2.3. The assessment of such situations as part of type-approval should distinguish and identify specific situations where the reduction of effectiveness of exhaust and evaporative emission control is justified by technical reasons and is not due to manipulation. This is particularly relevant in driving conditions that are adjacent to one or more boundary conditions of a regulated emissions test. For such situations, manufacturers shall comply with criteria for the declaration of technically justified emission control strategies that are only active for a specific set of ambient or operating conditions, thereby documenting and explaining the reduction of the effectiveness of emission control that may be observed (for instance, the dosing of reagent may stop at very low temperatures due to physical limitations of hardware). These technically justified emission strategies shall satisfy strict criteria to demonstrate that they are acceptable and that therefore they do not constitute a manipulation device or manipulation strategy. The methodology for the assessment and approval of AES is specified in Appendix 1 to this annex.

2.4. Manufacturers shall ensure that no vehicle is equipped with manipulation devices or strategies related to data integrity.

2.5. Manufacturers shall not introduce software or calibration updates that manipulate data related to sensors, fuel or electric energy consumption, electric range or battery durability, either before or after the placing in the market.

2.6. Manufacturers shall disclose any software and calibration updates affecting the integrity of data related to sensors, fuel or electric energy consumption, electric range or battery durability to the granting type-approval authority.

3. Technical requirements - documentation

3.1. Manufacturers shall document Auxiliary Emission Strategies (AES) at type-approval. For the type-approval authorities to be able to assess the proper use of AES, considering the prohibition of manipulation devices and manipulation strategies, the manufacturer shall provide an extended documentation package, as described in Appendix 1 to this annex.

3.2. The extended documentation shall remain strictly confidential. It may be kept by the approval authority, or, at the discretion of the approval authority, may be retained by the manufacturer. In the case the manufacturer retains the documentation package, that package shall be identified and dated by the approval authority once reviewed and approved. It shall be made available for inspection by the approval authority at the time of approval or at any time during the validity of the approval.

3.3. Manufacturers shall also provide to the approval authorities a formal documentation package, as described in Appendix 2 to this annex, containing information on AES/BES that would allow an independent tester to identify if the emissions measured can be attributed to an AES or BES strategy or are potentially due to a manipulation device or manipulation strategy.

3.4. Manufacturers shall make the formal documentation package available to all type-approval authorities, technical services, market surveillance authorities, recognised third parties and regional authorities.

3.5. Manufacturers shall introduce an indicator (AES flag or timer) to indicate when a vehicle runs in a mode where an AES that has been documented in the extended documentation package is active instead of BES mode. The indicator shall be available via the serial port of the standard diagnostic connector upon request of a generic scan-tool. The AES that is running shall be identifiable via the formal documentation package.

4. Roles and responsibilities

4.1. This paragraph sets out roles and responsibilities for the actors involved to ensure compliance with regulatory requirements:

- For vehicle manufacturers: it introduces criteria for the declaration of justified auxiliary emission control strategies that are active for a specific purpose and in response to a specific set of ambient or operating conditions. These emission control strategies shall satisfy strict technical criteria to demonstrate that they do not constitute a manipulation device or manipulation strategy.

- For type-approval authorities: it introduces criteria for the approval of technically justified emission control strategies. The approval of such emission control strategies relies on the concept of ‘Auxiliary Emission Strategies’ (AES), which is adapted from the Euro 6 legal framework. This annex supports the documentation of AES and clarifies their role in aiding emissions measurement and monitoring through on-board monitoring systems (OBM).

- For Contracting Party authorities: it sets a framework for the detection of manipulation devices and manipulation strategies using dedicated screening tests and enforcement measures.

- For recognised third parties and regional authorities: it sets out roles in the performance of screening tests.

4.2. Roles and responsibilities of vehicle manufacturers

4.2.1. Manufacturers shall ensure the absence of manipulation devices and manipulation strategies related to emissions under the scope of this Regulation: manufacturers shall ensure that no vehicle is equipped with manipulation devices or strategies.

4.2.2. Manufacturers shall document software updates to vehicles in service that reduce the effectiveness of emissions control strategies after type-approval.

4.2.3. Manufacturers shall disclose any software updates or calibrations affecting exhaust emissions control systems to the granting type-approval authority.

4.2.4. Manufacturers shall document Auxiliary Emission Strategies (AES) as part of type-approval as specified in paragraph 3 ‘Technical requirements – documentation’.

4.2.5. The manufacturer shall cooperate with the type-approval authority to allow them to select up to a maximum of 5 AES that will be monitored by OBM according to Annex 4 of UN Regulation No. [XXX] on On-Board Monitoring (OBM).

4.3. Roles and responsibilities of type-approval authorities

4.3.1. At the request of the manufacturer, the approval authority shall conduct a preliminary assessment of the AES for new vehicle types with regard to emissions, together with the selection of AES according to paragraph 4.2.5. In that case, the relevant documentation shall be provided to the type-approval authority between 2 and 12 months before the start of the type-approval process.

4.3.2. The type-approval authority shall make a preliminary assessment based on the extended documentation package, as described in point (b) of Appendix 2 to this annex, provided by the manufacturer. The approval authority shall make the assessment in accordance with the methodology described in Appendix 1 to this annex. The type-approval authority may deviate from that methodology in exceptional and duly justified cases.

4.3.3. The preliminary assessment of the AES for new vehicle types with regard to emissions shall remain valid for the purposes of type-approval for a period of 18 months. That period may be extended by the type-approval authority by a further 12 months at the request of the manufacturer.

4.3.4. In cooperation with the manufacturer, the type-approval authority shall select up to a maximum of 5 AES that will be monitored by OBM according to Annex 4 of UN Regulation No. [XXX] on On-Board Monitoring (OBM). The selection of AES shall prioritise those AES with the greatest expected impact by combination of their effect upon emissions when they are active and their expected rate of activation while the vehicles are in use.

4.3.5. The extended documentation package shall be identified and dated by the type-approval authority. If the extended documentation package is kept by the type-approval authority, it shall be retained for at least 10 years after the approval is granted.

4.3.6. The type-approval authority shall evaluate the documentation of software updates that reduce the effectiveness of emissions control strategies after type-approval and extend the approval as appropriate as long as the requirements continue to be met.

4.3.7. The type-approval authority may test the functionality of the AES flag or timer to indicate when a vehicle runs in AES mode instead of BES mode.

4.3.8. Type-approval authorities shall ensure a harmonised assessment of Auxiliary Emission Strategies (AES). A list of AES which were deemed non-acceptable by type-approval authorities shall be compiled yearly by the EU Forum for Exchange of Information on Enforcement or similar entity in a Contracting Party and made available to the public by Contracting Parties at the latest by end of March of the following year, in case there were AES which were deemed non-acceptable by the Forum or similar entity.

4.4. Roles and responsibilities of Contracting Party authorities

4.4.1. Contracting Party authorities may conduct screening tests to detect manipulation devices and manipulation strategies related to emissions.

4.4.2. Contracting Party authorities should decide case-by-case which methods are best suited, based on an appropriate risk assessment which considers possible non-compliance, the likelihood of its occurrence, and other possible indicators, like the severity of the occurrence.

4.4.2. The search for manipulation devices or strategies could include two distinct cases:

Case A) ‘Boundary detection”: manipulation devices or strategies that use the regulated test boundaries or surrogates thereof as triggers (such as ambient temperature, altitude, trip duration, fuel consumed and driving dynamics ranges), or;

Case B) ‘Test detection’: manipulation devices or strategies triggered by the presence of test equipment (e.g., backpressure increase at the tailpipe, signals on rear ultrasonic sensors, connection of a data recorder on the OBD port) or the vehicle localization (i.e., anything informing the vehicle that it is being tested on road for tailpipe emissions). These ‘Test detection’ manipulation devices or manipulation strategies apply primarily to on-road tests with PEMS, since vehicles tested in the laboratory usually need to use a special ‘chassis dynamometer mode’ to allow emissions testing without triggering safety devices, etc.

4.4.3. For all screening test campaigns, it shall be necessary, as a minimum, to include testing the vehicle with the regulatory methodologies. This is an important step to make sure that the vehicle is free of malfunctioning, poor maintenance or other similar issues, which would unduly increase the level of emissions.

4.4.4. To detect the presence of manipulation devices or strategies according to Case A, it is necessary that the vehicles are tested under variations of the regulated testing conditions referred to as ‘modalities’. The set of modalities is not fixed but instead kept open due to the need to detect specific technology behaviours in response to a complex set of parameters and the need to keep an unpredictable character.

4.4.6. Contracting Party authorities shall enforce the prohibition of manipulation devices and manipulation strategies related to emissions. If a manipulation device or strategy related to emissions is identified, market surveillance authorities shall proceed in accordance with Chapter XI on Safeguard Clauses of Regulation (EU) 2018/858 or equivalent provisions in other Contracting Parties.

4.4.7. [Contracting Party authorities shall ensure a uniform application of criteria for the assessment of screening tests, by taking into consideration guidance published by regional authorities and the information available within the EU Forum for Exchange of Information on Enforcement or similar entity in another Contracting Party.]

4.5. Roles and responsibilities of Contracting Parties and recognised third parties

4.5.1. Contracting Parties and recognised third parties may conduct screening tests to detect manipulation devices and manipulation strategies related to emissions according to paragraph 4.4.1.

Annex C2 - Appendix 1

Methodology for the assessment and approval of AES and BES

This appendix provides a structured approach for assessing and approving Auxiliary Emission Strategies (AES) and Base Emission Strategies (BES).

1. Documentation of AES and BES

1.1. Manufacturers shall include a technical description of their BES in the extended documentation package according to Appendix 2.

1.2. Manufacturers shall document all AES, with the possible omission of certain AES according to paragraph 1.5. Manufacturers shall justify the use of an AES that is documented based on one or more of the following criteria:

a. The AES is necessary for the safe operation of the vehicle.

b. The AES is necessary to avoid sudden and irreparable damage to a powertrain[1] component.

c. The AES is only active during engine start.

d. The AES is necessary due to physical limitations of the emission control system.

1.3. For each AES that is documented, manufacturers shall submit:

- A description of the technical motivation for the AES. This will be substantiated by supporting evidence, such as durability tests or risk analyses, demonstrating why the AES is technically necessary;
- A description of the precise conditions that lead to the activation and de-activation of the AES. This shall include, as appropriate, engine parameters, ambient parameters and any other relevant condition;
- An estimation of the emissions and CO_2 impact of the AES when it is active;
- An estimation of the expected rate of activation of the AES while the vehicles are in use.

1.4. The information referred to in paragraph 1.3. shall be included in the extended documentation package according to Appendix 2.

1.5. Manufacturers may omit any AES from the extended documentation package provided they meet one or more of the following conditions:

- The AES does not lead to the exceedance of limit values defined in this Regulation while it is active;
- The AES does not reduce the effectiveness of the emission control systems while it is active;
- The conditions that lead to the activation of the AES are substantially included in the test procedures.

[1] As defined in Mutual Resolution No. 2 (M.R.2) of the 1958 and 1998 Agreements of UNECE

2. Assessment of AES and BES

2.1. Authorities shall approve a BES that satisfies the documentation requirements of paragraph 1.1.

2.2. Authorities shall approve an AES that is documented if it is technically justified by one or more criteria under paragraph 1.2., provided that the following criteria are also met:

- The technical motivation for the AES is satisfactory and supported by appropriate evidence;
- The conditions that lead to the activation and de-activation of the AES are set according to technical characteristics of the emission control systems concerned and not to the boundary conditions or other conditions covered by a regulatory test.

3. Approval of AES and BES

The type-approval authority shall approve the AES and BES submitted by the manufacturer based on the contents of the extended documentation package.

The extended documentation package shall be limited to 100 pages.

The extended documentation package may be complemented with annexes and other attached documents, containing additional and complementary elements, if necessary. The manufacturer shall send a new consolidated version of the extended documentation package (with tracked changes) to the type-approval authority every time changes are introduced to the AES. The new version of the AES shall be evaluated and approved by the type-approval authority.

The extended documentation package shall include a declaration of the software versions and calibrations used to control these AES/BES, including the appropriate checksums or reference values of these software versions and calibrations, as well as instructions to the authority on how to read the checksums or reference values; the declaration shall be updated and sent to the type-approval authority that holds this extended documentation package each time there is a new software version or calibration that has an impact on the AES/BES. Manufacturers may request to use an alternative to a checksum if it provides an equivalent level of traceability for software version and calibration management.

The extended documentation package shall also include a declaration of the manufacturer on the absence of manipulation devices or manipulation strategies. The approval of the extended documentation package shall not constitute proof of the absence of manipulation devices or manipulation strategies.

Annex C2 - Appendix 2

Documentation packages

Formal Documentation Package

The manufacturer may use one formal documentation package for multiple emission type-approvals. The formal documentation package shall include the following information:

Point	Explanation
1. Emission Type-approval Number(s)	List of emission type-approval number(s) covered by this BES-AES declaration: including type-approval reference, software reference, calibration number or checksums of each version and of each relevant Control Unit such as engine and aftertreatment ones
Method of reading of software and calibration version	E.g. scan-tool explanation
2. Base Emission Strategies	
BES x	Description of strategy x
BES y	Description of strategy y
3. Auxiliary Emission Strategies	
Presentation of the AESs	Hierarchical relations among AES: which AES takes precedence if more than one is present
AES x	— AES description and justification — Measured and/or modelled parameters for AES activation — Other parameters used to activate the AES — Increase of pollutant and CO_2 emissions during the use of AES compared to BES — Estimation of the expected rate of activation of the AES while the vehicles are in use
AES y	As above

Extended Documentation Package

The extended documentation package shall be structured as follows:

Extended Documentation Package for AES Application No YYY/OEM

Parts	Paragraph	Point	Explanation
Introduction documents		Introduction letter to TAA	Reference of the document with the version, the date of issuing the document, signature by the relevant person in the manufacturer organisation
		Versioning table	Content of each version modifications: and which part is modified
		Description of the (emission) types concerned	
		Attached documents table	List of all attached documents
		Cross references	(Indicate where to find each requirement of the regulation)
		Declaration on absence of manipulation devices and manipulation strategies	+ signature
Core document	0	Acronyms/abbreviations	
	1	GENERAL DESCRIPTION	
	1.1	Engine general presentation	Description of main characteristics: displacement, aftertreatment, …
	1.2	General system architecture	System bloc diagram: list of sensors and actuators, explanation of engine general functions
	1.3	Reading of software and calibration version	E.g. scan-tool explanation
	2	Base Emission Strategies	
	2.x	BES x	Description of strategy x
	2.y	BES y	Description of strategy y
	3	Auxiliary Emission Strategies	

	3.0	Presentation of the AESs	Hierarchical relations among AES: description and justification (e.g. safety, reliability, etc.)
	3.x	AES x	3.x.1 AES justification 3.x.2 Measured and/or modelled parameters for AES characterisation 3.x.3 Action mode of AES - Parameters used 3.x.4 Effect of AES on pollutants and CO_2 3.x.5 Estimation of the expected rate of activation of the AES while the vehicles are in use
	3.y	AES y	3.y.1 3.y.2 etc.
	100-page limit ends here		
	Annex		List of types covered by this BES-AES: including type-approval reference, software reference, calibration number, checksums of each version and of each control unit (engine and/or after-treatment if any)
Attached documents		Technical note for AES justification nº xxx	Risk assessment or justification by testing or example of sudden damage, if any
		Technical note for AES justification nº yyy	
		Test report for specific AES impact quantification	Test report of all specific tests done for AES justification, test conditions details, description of the vehicle, date of the tests, emission and/or CO_2 impact with or without AES activation

"

Annex C4

Paragraph 1.5., amend to read:

"1.5. **(Reserved)**~~This paragraph is applicable to Level 1A only~~

~~At the request of the manufacturer, the Technical Service may carry out the Type 1 test before the whole vehicle or bench ageing durability test has been completed using the assigned deterioration factors in Table 3A in paragraph 6.7.2. of this Regulation. On completion of the whole vehicle or bench ageing durability test, the Technical Service may then amend the type approval results recorded in Annex A2 to this Regulation by replacing the assigned deterioration factors in the above table with those measured in the whole vehicle or bench ageing durability test.~~"

Annex C5

Paragraph 4.2.2., amend to read:

"4.2.2. For Level 1A and Level 2

The Type Approval Authority ~~will~~ **shall** not accept any deficiency request that does not respect the OBD thresholds set out in paragraph 6.8.2. of this Regulation.

For Level 1B

The responsible authority shall reject any deficiency request that does not respect the OBD thresholds set out in regional legislation multiplied by a factor required by regional legislation up to a maximum factor of two."

Appendix 1

Paragraph 6.2.1., amend to read:

"6.2.1. Preconditioning for adaption

Preconditioning for adaption consists of two parts

(a) Preconditioning for adaption without fault

(b) Preconditioning for adaption with fault

upon the choice of the manufacturer.

Level 1A ~~and Level 2~~

The preconditioning for adaption consists of one or more consecutive WLTC 4-phase tests. At the request of the manufacturer and with the approval of the Type Approval Authority, an alternative method for adaption may be used instead of 4-phase tests.

If the fault code is stored after preconditioning for adaption, the manufacturer shall delete the fault code.

Level 1B **and Level 2**

The preconditioning for adaption consists of one or more consecutive WLTC 3-phase tests. At the request of the manufacturer and with the approval of the Type Approval Authority, an alternative method for adaption may be used instead of 3-phase tests.

If the fault code is stored after preconditioning for adaption, manufacturer shall delete the fault code."

Paragraph 6.2.2.1., amend to read:

"6.2.2.1. Level 1A ~~and Level 2~~

According to the engine type and after introduction of one of the failure modes given in paragraph 6.3. of this appendix, the vehicle shall be preconditioned by driving at least two consecutive 4-phase WLTC tests.

Level 1B **and Level 2**

According to the engine type and after introduction of one of the failure modes given in paragraph 6.3. of this appendix, the vehicle shall be preconditioned by driving at least two consecutive 3-phase WLTC tests."

II. Justification

1. The requirements for manipulation devices and manipulation strategies are now proposed for inclusion in Level 1A and Level 2 of UN Regulation No. 154. This requires a series of changes throughout the Regulation, including new definitions, new approval requirements and a new Annex C2. The requirements were previously included in UN

Regulation No. 83 and a Supplement to that Regulation has therefore been prepared to remove them from there.

2. Some corrections and clarifications to the levels to which certain requirements apply have been made throughout the document.

3. Some corrections and clarifications to the requirements for the laboratory test for pure electric range ratio at low temperature for Pure Electric Vehicles have been made in Annexes Part A and Annex B10.

4. Additions have been made for Level 1a and Level 2 to allow the use of actual tyre rolling resistance values to calculate the final road load coefficient for the individual vehicles to improve the accuracy of the declared CO_2, fuel and electric consumption and range values. Depending on the manufacturer's capability (BOM complexity, factory equipment, …), this possibility has to be optional to the manufacturer.

5. Other amendments align the Regulation with the current regional status and the current state-of-the-art.