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ANNEXES 13 to 22

ANNEXES

to the

Commission Implementing Regulation

laying down rules, procedures and testing methodologies for the application of Regulation (EU) 2024/1257 as regards exhaust and evaporative emission type-approval of vehicles of categories M1 and N1

ANNEX XIII

EMISSION TYPE-APPROVAL OF REPLACEMENT POLLUTION CONTROL DEVICES AS SEPARATE TECHNICAL UNIT

1. INTRODUCTION

1.1. This Annex contains additional requirement for the type-approval as separate technical units of pollution control devices.

2. GENERAL REQUIREMENTS

2.1. Marking

Original replacement pollution control devices shall bear at least the following identifications:

(a) the vehicle manufacturer's name or trade mark;

(b) the make and identifying part number of the original replacement pollution control device as recorded in the information mentioned in point 2.3.

2.2. Documentation

Original replacement pollution control devices shall be accompanied by the following information:

(a) the vehicle manufacturer's name or trade mark;

(b) the make and identifying part number of the original replacement pollution control device as recorded in the information mentioned in point 2.3;

(c) the vehicles for which the original replacement pollution control device is of a type covered by point 2.3 of the Addendum to Appendix 4 to Annex I, including, where applicable, a marking to identify if the original replacement pollution control device is suitable for fitting to a vehicle that is equipped with an on-board diagnostic (OBD) system;

(d) installation instructions, where necessary.

This information shall be available in the product catalogue distributed to points of sale by the vehicle manufacturer.

2.3. The vehicle manufacturer shall provide to the technical service and/or approval authority the necessary information in electronic format which makes the link between the relevant part numbers and the type-approval documentation.

This information shall contain the following:

(a) make(s) and type(s) of vehicle,

(b) make(s) and type(s) of original replacement pollution control device,

(c) part number(s) of original replacement pollution control device,

(d) type-approval number of the relevant vehicle type(s) with regard to emissions.

3. EU SEPARATE TECHNICAL UNIT TYPE-APPROVAL MARK

3.1. Every replacement pollution control device conforming to the type approved under this Regulation as a separate technical unit shall bear an EU type-approval

mark.

3.2. This mark shall consist of a rectangle surrounding the lower-case letter ‘e’ followed by the distinguishing number of the Member State which has granted the EU type-approval in accordance with the numbering system set out in Regulation (EU) 2020/683 ([1]).

The EU type-approval mark shall also include in the vicinity of the rectangle the ‘base approval number’ contained in section 4 of the type-approval number referred to in Annex IV to Regulation (EU) 2020/683, preceded by the two figures indicating the sequence number assigned to the latest major technical amendment to this Regulation on the date EU type-approval for a separate technical unit was granted. For this Regulation, the sequence number is 00.

3.3. The EU type-approval mark shall be affixed to the replacement pollution control device in such a way as to be clearly legible and indelible. It shall, wherever possible, be visible when the replacement pollution control device is installed on the vehicle.

3.4. Appendix 3 to this Annex gives an example of the EU type-approval mark.

4. TECHNICAL REQUIREMENTS

4.1. The requirements for the type-approval of replacement pollution control devices shall be those of Section 5 of UN Regulation No 103 ([2]) with the exceptions set out in sections 4.1.1 to 4.1.4.

4.1.1. Reference to the ‘test cycle’ in Section 5 of UN Regulation No 103 shall be understood as being the same Type 1 test and Type 1 test cycle as used for the original type-approval of the vehicle.

4.1.2. The terms ‘catalytic converter’ and ‘converter’ used in section 5 of UN Regulation No 103 shall be understood to mean ‘pollution control device’

4.1.3. The regulated pollutants referred to throughout section 5.2.3 of UN Regulation No 103 shall be replaced by all the pollutants specified in Annex 1, Table 1 of Regulation (EU) 2024/1257 for replacement pollution control devices intended to be fitted to vehicles type approved to Regulation (EU) 2024/1257.

4.1.4. For replacement pollution control devices intended to be fitted to vehicles type approved to Regulation (EU) 2024/1257, the durability requirements and associated deterioration factors specified in section 5 of UN Regulation No 103, shall refer to those specified in Annex VII to this Regulation.

4.2. For vehicles with positive-ignition engines, if the NMHC emissions measured during the demonstration test of a new original equipment catalytic converter, under paragraph 5.2.1. of UN Regulation No 103, are higher than the values measured during the type-approval of the vehicle, the difference shall be added to

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[1] Commission Implementing Regulation (EU) 2020/683 of 15 April 2020 implementing Regulation (EU) 2018/858 of the European Parliament and of the Council with regards to the administrative requirements for the approval and market surveillance of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles (OJ L 163, 26.5.2020, p. 1, ELI: http://data.europa.eu/eli/reg_impl/2020/683/oj).

[2] Regulation No 103 of the Economic Commission for Europe of the United Nations (UNECE) — Uniform provisions concerning the approval of replacement pollution control devices for power-driven vehicles [2017/1446] (OJ L 207, 10.8.2017, p. 30, ELI: http://data.europa.eu/eli/reg/2017/1446/oj).

the OBD thresholds. The OBD thresholds are specified in Table 4A of paragraph 6.8.2. of UN Regulation No 154.

4.3. The revised OBD thresholds will apply during the tests of OBD compatibility set out in paragraphs 5.5 to 5.5.5 of UN/ECE Regulation No 103. In particular, when the exceedance allowed in paragraph 1 of Appendix 1 to Annex C5 to UN Regulation No 154 is applied.

4.4. Requirements for replacement periodically regenerating systems

4.4.1. Requirements regarding emissions

4.4.1.1. The vehicle(s) indicated in Articles 13(3), (4) and (5), equipped with a replacement periodically regenerating system of the type for which approval is requested, shall be subject to the tests described in Appendix 1 to Annex B6 to UN Regulation No 154, in order to compare its performance with the same vehicle equipped with the original periodically regenerating system.

4.4.1.2. Reference to the 'Type 1 test' and 'Type 1 test cycle' in Appendix 1 to Annex B6 to UN Regulation No 154 and the 'test cycle' in Section 5 of UN Regulation No 103 shall be understood as being the same Type 1 test and Type 1 test cycle as used for the original type-approval of the vehicle.

4.4.2. Determination of the basis for comparison

4.4.2.1. The vehicle shall be fitted with a new original periodically regenerating system. The emissions performance of this system shall be determined following the test procedure set out in Appendix 1 to Annex B6 to UN Regulation No 154.

4.4.2.1.1. Reference to the 'Type 1 test' and 'Type 1 test cycle' in Appendix 1 to Annex B6 to UN Regulation No 154 and the 'test cycle' in Section 5 of UN Regulation No 103 shall be understood as being the same Type 1 test and Type 1 test cycle as used for the original type-approval of the vehicle.

4.4.2.2. Upon request of the applicant for the approval of the replacement component, the approval authority shall make available on a non- discriminatory basis, the information referred to in point 3.2.12.2.10.2. of the information document contained in Annex A1 of UN Regulation No 154 for each vehicle tested.

4.4.3. Exhaust gas test with a replacement periodically regeneration system

4.4.3.1. The original equipment periodically regenerating system of the test vehicle(s) shall be replaced by the replacement periodically regenerating system. The emissions performance of this system shall be determined following the test procedure set out in Appendix 1 to Annex B6 to UN Regulation No 154.

4.4.3.1.1. Reference to the 'Type 1 test' and 'Type 1 test cycle' in Appendix 1 to Annex B6 to UN Regulation No 154 and the 'test cycle' in Section 5 of UN Regulation No 103 shall be understood as being the same Type 1 test and Type 1 test cycle as used for the original type-approval of the vehicle.

4.4.3.2. To determine the D-factor of the replacement periodically regenerating system, any of the engine test bench methods referred to in Appendix 1 to Annex B6 to UN Regulation No 154 may be used.

4.4.4. Other requirements

The requirements provided in paragraphs 5.2.3, 5.3, 5.4 and 5.5 of UN Regulation No 103 shall apply to replacement periodically regenerating systems. In these paragraphs the words 'catalytic converter' shall be understood to mean

‘periodically regenerating system’. The exceptions provided in the paragraphs in section 4.1 of this Annex shall also apply to periodically regenerating systems.

5. DOCUMENTATION

5.1. Each replacement pollution control device shall be clearly and indelibly marked with the manufacturer’s name or trade mark and accompanied by the following information:

(a) the vehicles (including year of manufacture) for which the re- placement pollution control device is approved, including, where applicable, a marking to identify if the replacement pollution control device is suitable for fitting to a vehicle that is equipped with an on-board diagnostic (OBD) system;

(b) installation instructions, where necessary.

The information shall be available in the product catalogue distributed to points of sale by the manufacturer of replacement pollution control devices.

6. CONFORMITY OF PRODUCTION

6.1. Measures to ensure the conformity of production shall be taken in accordance with the provisions laid down in Article 31 of Regulation (EU) 2018/858.

6.2. Special provisions

6.2.1. The checks referred to in point 3 of Annex IV to Regulation (EU) 2018/858 shall include compliance with the characteristics as defined under Article 3(5) of this Regulation.

6.2.2. For the application of Article 31(3) of Regulation (EU) 2018/858, the tests described in section 4.4.1 of this Annex and section 5.2 of UN/ECE Regulation No 103 (requirements regarding emissions) may be carried out. In this case, the holder of the approval may request, as an alter- native, to use as a basis for comparison not the original equipment pollution control device, but the replacement pollution control device which was used during the type-approval tests (or another sample that has been proven to conform to the approved type). Emissions values measured with the sample under verification shall then on average not exceed by more than 15 % the mean values measured with the sample used for reference.

Appendix 1

MODEL

Information document No …

relating to the EU type-approval of replacement pollution control devices

The following information, if applicable, shall be supplied in triplicate and include a list of contents. Any drawings shall be supplied in appropriate scale and sufficient detail on size A4 or on a folder of A4 format. Photographs, if any, shall show sufficient detail.

If the systems, components or separate technical units have electronic controls, information concerning their performance shall be supplied.

0. GENERAL

0.1. Make (trade name of manufacturer): …

0.2. Type: …

0.2.1. Commercial name(s), if available: …

0.5. Name and address of manufacturer: …

Name and address of authorised representative, if any: …

0.7. In the case of components and separate technical units, location and method of affixing of the EU approval mark: …

0.8. Address(es) of assembly plant(s): …

1. DESCRIPTION OF THE DEVICE

1.1. Make and type of the replacement pollution control device: …

1.2. Drawings of the replacement pollution control device, identifying in particular all the characteristics referred to under Article 3(5) of this Regulation:

1.3. Description of the vehicle type or types with regard to emissions for which the replacement pollution control device is intended: …

1.3.1. Number(s) and/or symbol(s) characterising the engine and vehicle type(s) with regard to emissions: …

1.3.2. Is the replacement pollution control device intended to be compatible with OBD requirements (Yes/No)[3]

1.4. Description and drawings showing the position of the replacement pollution control device relative to the engine exhaust manifold(s): …

[3] Delete where not applicable

Appendix 2

MODEL EU TYPE-APPROVAL CERTIFICATE

(Maximum format: A4 (210 mm × 297 mm))

EU TYPE-APPROVAL CERTIFICATE

Stamp of administration

Communication concerning the:

– EU type-approval[4], …,

– extension of EU type-approval[5], …,

– refusal of EU type-approval[6], …,

– withdrawal of EU type-approval[7], …,

of a type of component/separate technical unit[8]

with regard to Regulation (EU) 2024/1257, as implemented by Regulation (EU) No 2025/xxx.

Regulation (EU) 2024/1257 or Regulation (EU) No 2025/xxx as last amended by …

EU type-approval number: …

Reason for extension: …

SECTION I

0.1. Make (trade name of manufacturer): …

0.2. Type: …

0.3. Means of identification of type if marked on the component/separate technical unit[9]: …

0.3.1. Location of that marking: …

0.5. Name and address of manufacturer: …

0.7. In the case of components and separate technical units, location and method of affixing of the EU approval mark: …

0.8. Name and address(es) of assembly plant(s): …

0.9. Name and address of manufacturer's representative (if any): …

SECTION II

1. Additional information

1.1. Make and type of the replacement pollution control device: …

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4 Delete where not applicable

5 Delete where not applicable

6 Delete where not applicable

7 Delete where not applicable

8 Delete where not applicable

9 If the means of identification of type contains characters not relevant to describe the vehicle, component or separate technical unit types covered by this type-approval certificate such characters shall be represented in the document by the symbol:'?' (e.g. ABC??123??).

1.2. Vehicle type(s) with regard to emissions for which the pollution control device type qualifies as replacement part: …

1.3. Type(s) of vehicles) on which the replacement pollution control device has been tested: …

1.3.1. Has the replacement pollution control device demonstrated compatibility with OBD requirements (yes/no)[10]: …

2. Technical service responsible for carrying out the tests: …

3. Date of test report: …

4. Number of test report: …

5. Remarks: …

6. Place: …

7. Date: …

8. Signature: …

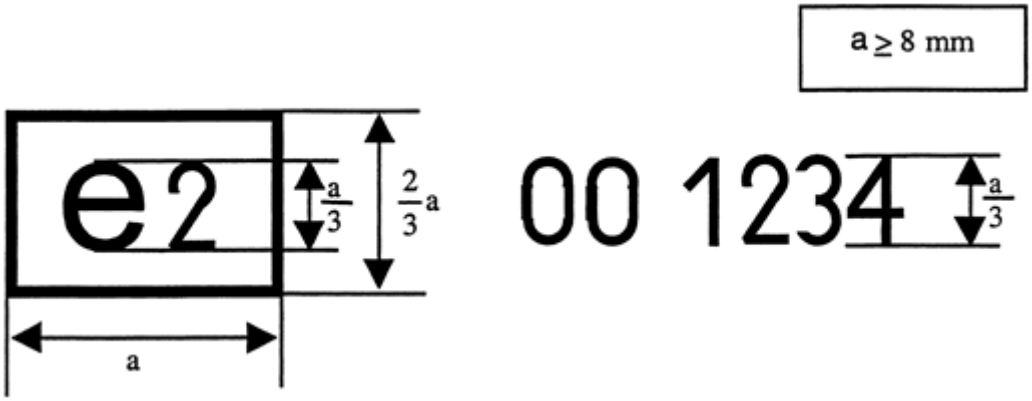
Attachments:	Information package.

[10] Delete where not applicable

Appendix 3

Model of emission type-approval marks

(see point 3.2 of this Annex)



The above approval mark affixed to a component of a replacement pollution control device shows that the type concerned has been approved in France (e 2), pursuant to this Regulation. The first two digits of the approval number (00) indicate that this part was approved according to this Regulation. The following four digits (1234) are those allocated by the approval authority to the replacement pollution control device as the base approval number.

ANNEX XIV

ANTI-TAMPERING, SECURITY AND CYBERSECURITY

1. INTRODUCTION

This Annex lays down measures regarding the type-approval of anti-tampering, security and cybersecurity systems.

2. DEFINITIONS

For the purposes of this Annex, the definitions in UN Regulation No 155[1] shall apply.

'Attacks' shall be understood as comprising tampering attempts, attempts to circumvent security and cyber-attacks.

3. REQUIREMENTS FOR TYPE-APPROVAL

3.1. Responsibilities of manufacturers

It is the responsibility of the manufacturer that the vehicle type (with regard to emissions) is equipped with sufficient anti-tampering, security and cybersecurity measures to make it resistant against tampering, cybersecurity and security threats arising in all phases of its life-cycle.

To fulfil this responsibility, the vulnerabilities that may lead to tampering shall be minimised to the fullest extent possible, based on the best available knowledge at the time of type-approval, for all systems listed in Article 4(7) of Regulation (EU) 2024/1257.

This shall be deemed to be complied with when:

a) the vehicle type with regard to emissions satisfies the requirements of UN Regulation No 155[2]

and

b) the manufacturer's vulnerability/threat analysis and risk assessment consider, where applicable, the aims of Regulation (EU) 2024/1257 and in particular:

i) for fuel and reagent injection system, engine and engine control units and pollution control systems, the manufacturer's vulnerability/threat analysis and risk assessment

[1] UN Regulation No 155 – Uniform provisions concerning the approval of vehicles with regards to cyber security and cyber security management system (OJ L, 2025/5, 10.1.2025, ELI: http://data.europa.eu/eli/reg/2025/5/oj).

[2] Unless not required in accordance with the Small Series Scheme I under Annex II, Part I, Appendix 1 to Regulation (EU) 2018/858.

considers at least the high-level vulnerabilities/threats, examples of vulnerabilities or attack methods, and examples of mitigations of Table 4.1 of Appendix I to this Annex.

ii) for the OBM system, OBD system and OBFCM device the manufacturer's vulnerability/threat analysis and risk assessment considers at least the high-level vulnerabilities/threats, examples of vulnerability or attack method, and examples of mitigations of

Table 4.2 of Appendix I to this Annex.

iii) for the odometer, the total distance indicated and total distance values are protected according to UN Regulation No 39[3].

iv) for traction batteries and related management systems, electric motor and related control units and environmental vehicle passport, the manufacturer's vulnerability/threat analysis and risk assessment considers at least the high-level vulnerabilities/threats, examples of vulnerabilities or attack methods, and examples of mitigations of Table 4.3 of Appendix 1 to this Annex.

Without prejudice to requirements of paragraph 7.2.2.2(g) of UN Regulation No 155, the manufacturer shall monitor for, detect, respond to and inform the approval authority on evidences of successful attacks on any of the systems listed in Article 4(7) of Regulation (EU) 2024/1257.

3.2. Responsibilities of approval authorities

Without prejudice to the requirements of paragraph 5.1.1. of UN Regulation No 155, type-approval authorities shall verify whether the vulnerability/threat analysis and risk assessment conducted by the manufacturer is appropriate and sufficient. This verification shall ensure that the vulnerabilities and threats of the tables in Appendix 1 have been appropriately managed by the manufacturer. The examples in these tables shall be used as reference.

The type-approval authority may require additional documentation to verify that the proposed mitigation actions are correctly implemented.

Type-approval authorities are encouraged to exchange best practices and experiences within the framework of the Forum for Exchange of Information on Enforcement as established in Regulation (EU) 2018/858.

[3] Regulation No 39 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of vehicles with regard to the speedometer and odometer equipment including its installation [2018/1857] (OJ L 302, 28.11.2018, p. 106, ELI: http://data.europa.eu/eli/reg/2018/1857/oj).

3.3. Responsibilities of market surveillance authorities

Following the requirements in Article 8 to Regulation (EU) 2018/858[4], the market surveillance authorities shall carry out regular tests to verify whether anti-tampering, security and cybersecurity measures are sufficient. Market surveillance authorities shall be responsible for vehicle selection, application of testing methods, follow-up activities, reporting and corrective or restrictive measures.

3.3.1. Vehicle selection for market surveillance

When carrying out market surveillance tests, the market surveillance authorities shall select the vehicle types with regards to emissions to be tested based on a risk assessment. Vehicle types (with regards to emissions) deemed to pose a greater risk according to the risk assessment shall be prioritised for testing according to paragraph 3.3.2.

The risk assessment shall consider the following aspects:

(a) Evidence that effective tampering products are widely available on the market for use on certain vehicle types with regard to emissions;

(b) Evidence of known vulnerabilities affecting certain vehicle types with regard to emissions;

(c) Evidence about the prevalence of tampering for certain vehicle types with regard to emissions (including, among others, OBM data submitted by vehicle manufacturers);

(d) The number of vehicles in circulation belonging to certain vehicle types with regards to emissions;

(e) Other relevant information, including test results of recognised third parties and information exchanged in the Forum for Exchange of Information on Enforcement, as established in Regulation (EU) 2018/858.

3.3.2. Testing methods

Market surveillance authorities may employ any test method to establish whether vehicles belonging to a certain vehicle type with regard to emissions are sufficiently protected against attacks which could affect the proper operation of systems listed in Article 4(7) of Regulation (EU) 2024/1257. Market surveillance authorities are encouraged to exchange best practices and experiences within the framework of the Forum for Exchange of Information on Enforcement as established in Regulation (EU) 2018/858.

[4] Regulation (EU) 2018/858 of the European Parliament and of the Council of 30 May 2018 on the approval and market surveillance of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles (OJ L 151, 14.6.2018, p. 1, ELI: http://data.europa.eu/eli/reg/2018/858/oj).

The good state of each test vehicle shall be verified before conducting the tests, ensuring in particular the proper operation of systems listed in Article 4(7) of Regulation (EU) 2024/1257 and that they have not been subject to attacks in the scope of the tests. The verification shall ensure that no relevant fault code is stored nor any relevant warning light is on, that none of the pollutant monitoring statuses is in 'Error' and that the tampering detection level [Reference to Second Implementing Act, Annex I] reported by the OBM is 'Normal'.

This verification shall also include, where appropriate, the performance of an ex-ante Type 1 [Reference to MIA or UNR 154] or RDE test [Reference to MIA or UNR 168]. The attack test shall not proceed unless the emission results of the ex-ante test fulfil the applicable emission limits.

The tests conducted by market surveillance authorities shall aim to reproduce the attacks likely to be experienced by certain vehicle types with regard to emissions in the field due to a high benefit-cost ratio. These may include attempts to tamper with vehicles by exploiting existing tampering, security and cybersecurity vulnerabilities, or by installing tampering products that are available on the market. The selection of attacks shall be based on the risk assessment described in paragraph 3.3.1.

3.3.3. Test evaluation

The market surveillance authority shall determine the outcome of the test by evaluating the effects of the attack on exhaust emissions or on the integrity of the data used by the systems listed in Article 4(7) of Regulation (EU) 2024/1257, taking account of the response of the vehicle to the attacks. The authority shall come to a 'pass', 'follow-up' or 'fail' decision on one or both aspects, as appropriate according to the nature of the attack.

A 'pass' outcome requires no further action.

A 'follow-up' outcome shall be followed by the activities described in paragraph 3.3.4.

A 'fail' outcome shall be followed by the activities described in paragraph 3.3.5.

Following the attack, the market surveillance authority may condition the vehicle by driving it over a certain distance, over multiple trips, or in other conditions that are deemed appropriate for the attack to be detected.

3.3.3.1. Evaluation of effects on exhaust emissions (pollutants monitored by OBM)

After the attack and optional conditioning, an ex-post Type 1 or RDE test shall be performed. The ex-ante and ex-post tests shall be of the same type. If two RDE tests are driven, the tests shall be performed over the same route, with similar driving behaviour, and under comparable environmental and traffic conditions.

Following the ex-post emissions test, the test outcome shall be determined for each pollutant monitored by the OBM system. The test outcome shall be considered a 'pass' if one of the following is observed:

(a) Exhaust emissions do not increase substantially from those of the ex-ante emissions test. A substantial increase shall be understood as an exhaust emissions increase by more than [100%] of the applicable emission limit and where emissions of the ex-post test are above the applicable OBD threshold.

(b) Exhaust emissions are substantially increased to a level of up to 2,5 times the applicable emission limit, while the tampering detection level is set to 'Level 1' or higher.

(c) Exhaust emissions are substantially increased to a level equal or higher than 2,5 times the applicable emission limit, while the tampering detection level is set to 'Level 2' and the corresponding OBM status has transitioned to 'Error'.

If the test outcome is not a direct 'pass', the vehicle may be conditioned further to allow more evaluation time for the OBM system to transition the pollutant monitoring statuses and tampering detection level.

When, after further conditioning, the monitoring statuses or tampering detection level do not transition in such a way that they lead to a 'pass' outcome, the test outcome shall be considered a 'follow-up' if one of the following outcomes is observed:

(a) Exhaust emissions are substantially increased to a level of up to 2,5 times the applicable emission limit, while the tampering detection level is set to 'Level 0'.

(b) Exhaust emissions are substantially increased to a level equal or higher than 2,5 times the applicable emission limit, while the corresponding OBM status has transitioned to 'Error' and the tampering detection level is set to 'Level 1' or lower.

If the outcome is neither a 'pass' nor a 'follow-up', it shall be considered as a 'fail'.

Vehicles not equipped with an OBM system shall be excluded from the evaluation of the effects on exhaust emissions according to this paragraph.

3.3.3.2. Evaluation of effects on exhaust emissions (pollutants not monitored by OBM)

After the attack and optional conditioning, an ex-post Type 1 or RDE test shall be performed. The ex-ante and ex-post tests shall be of the same type. If two RDE tests are driven, the tests shall be performed over the same route, with similar driving behaviour, and under comparable environmental and traffic conditions.

Following the ex-post emissions test, for all pollutants not monitored by the OBM system, the test outcome shall be considered a 'follow-up' when the pollutants are substantially increased to a level above the applicable OBD threshold values as specified in paragraph 6.8.2 of UN Regulation No 154 while the malfunction indicator (MI) is not activated. In any other case, it shall be considered a 'pass'.

If the test outcome is not a direct ‘pass’, the vehicle may be conditioned further to allow more evaluation time for the OBD system to activate the malfunction indicator.

3.3.3.3. Evaluation of effects on the integrity of data

Following the attack and optional conditioning, the outcome shall be considered a ‘pass’ when the attack is unsuccessful in modifying data of the systems listed in Article 4(7) of Regulation (EU) 2024/1257.

If the attack is successful in modifying data of the systems listed in Article 4(7) of Regulation (EU) 2024/1257, the outcome shall be evaluated by the market surveillance authority on the following two criteria:

(a) Impact: what the relevance of data modification is in terms of impact on the environment or on the aims of Regulation (EU) 2024/1257;

(b) Response: whether the vehicle responded by adequately conveying information about the invalidity of the modified data.

When the impact is regarded as insignificant, the outcome shall be considered a ‘pass’.

When the impact is regarded as significant, and the response is deemed adequate by the authority, the outcome shall be considered a ‘pass’.

When the impact is regarded as significant and the response is deemed inadequate, the outcome shall be considered a ‘follow-up’. In such cases, the market surveilance authority shall contact the manufacturer to inform them of the outcome of the test, the characteristics of the vehicle and the nature of the tests performed.

The manufacturer may propose further conditioning to allow additional time for the vehicle to respond to the attack, or repeated tests on similar vehicles. Following the further conditioning or repeated tests, the response of the vehicle shall be evaluated. If the vehicle response is still deemed inadequate by the market surveillance authority, the outcome shall be confirmed as a ‘follow-up’. If the response of the vehicle is deemed adequate, the outcome shall be considered a ‘pass’.

3.3.4. Follow-up activities (Alt: Reporting, corrective and restrictive measures)

In the case of an attack with an outcome considered as ‘follow-up’, the manufacturer shall, within a period agreed with the market surveillance authority, propose a technical solution to the market surveillance authority to increase the resistance of the vehicle against attacks, either by effectively mitigating the exploitation of the vulnerability or by implementing methods to detect the attack and initiate an appropriate response, along with a plan to implement this technical solution. The market surveillance authority shall evaluate the technical solution and accompanying implementation plan and request modifications where appropriate.

When the technical solution and implementation plan are accepted by the market surveillance authority, the manufacturer shall proceed with the implementation of the technical solution as agreed with the market surveillance authority.

When the technical solution and implementation plan fail to satisfy the market surveillance authority, the outcome shall be considered a 'fail'.

3.3.5. Reporting, corrective and administrative measures following a 'fail' outcome

A 'fail' outcome upon an attack shall be investigated in detail, where necessary in cooperation with the manufacturer and the granting type-approval authority, to establish:

(a) which vulnerabilities were exploited and whether these were identified at the time of type-approval;

(b) in case that vulnerabilities were identified at the time of type-approval, whether the mitigation measures have been properly applied;

(c) whether the vulnerabilities apply to other vehicle types with regard to emissions.

Without prejudice to requirements of Article 52 of Regulation (EU) 2018/858, the details of tests with a 'fail' outcome shall be reported to the manufacturer, and the market surveillance authorities shall require the manufacturer to take all appropriate corrective measures without delay to ensure that the exploited vulnerability is effectively mitigated, preferably by an over-the-air software update of the relevant vehicle systems according to UN Regulation No 156[5].

In determining the appropriateness of corrective measures, authorities shall consider the state of technology of the vehicle type with regard to emissions, the technical feasibility of possible mitigations and the likelihood of exploitation of the vulnerability (approximated by the benefit-cost ratio of the attack). The manufacturer may, with appropriate supporting evidence, demonstrate that a vulnerability cannot be effectively mitigated or that an appropriate response from the tampering detection cannot be realised, due to technical limitations of the vehicle's architecture.

The results of the investigation of attacks with a 'fail' outcome shall be brought to the attention of to the Forum for Exchange of Information on Enforcement as established in Regulation (EU) 2018/858. In case of vulnerabilities that cannot be effectively mitigated due to technical limitations are identified, the Forum for Exchange of Information on Enforcement shall consider requesting corresponding additional mitigations in future type approvals.

[5] UN Regulation No 156 – Uniform provisions concerning the approval of vehicles with regards to software update and software updates management system [2021/388] (OJ L 82, 9.3.2021, p. 60, ELI: http://data.europa.eu/eli/reg/2021/388/oj).

3.4. Roles and responsibilities for the Commission and recognised third parties

The Commission and recognised third parties may verify whether vehicles belonging to a certain vehicle type with regard to emissions are sufficiently protected against tampering attempts, security and cybersecurity attacks affecting the systems listed in Article 4(7) of Regulation (EU) 2024/1257 according to the methods described in paragraph 3.3.2.

4. ADMINISTRATIVE PROVISIONS

4.1. Administrative provisions for anti-tampering, security and cybersecurity

Documentation to demonstrate compliance with paragraph 3.1 shall be made available by the manufacturer in two parts: (a) The formal documentation package for the approval, which shall be supplied to the type-approval authority at the time of submission of the type approval application. This documentation package shall be used by the type-approval authority as the basic reference for the approval process. The type-approval authority shall ensure that this documentation package remains available for at least 10 years counted from the time when production of the vehicle type (with regard to emissions) is definitively discontinued. (b) Additional material relevant to the requirements of this regulation may be retained by the manufacturer, but made open for inspection at the time of type-approval. The manufacturer shall ensure that any material made open for inspection at the time of type approval remains available for at least a period of 10 years counted from the time when production of the vehicle type (with regardto emissions) is definitively discontinued.

In cases where information is shown to be covered by intellectual property rights or to constitute specific know-how of the manufacturer or of their suppliers, the manufacturer or their suppliers shall make available sufficient information to enable the checks referred to in this Regulation to be made properly. Such information shall be treated on a confidential basis.

The manufacturer shall provide a manufacturer’s declaration of compliance with the anti-tampering, security and cybersecurity requirements of this Regulation for the purposes of type-approval. This declaration shall use the format provided in Appendix 2 to this Annex.

Appendix 1

HIGH-LEVEL VULNERABILITIES/THREATS, EXAMPLES OF VULNERABILITIES OR ATTACK METHODS, AND EXAMPLES OF MITIGATIONS

The manufacturers, while analysing the vulnerabilities/threats and assessing the risks for the systems listed in Article 4(7) of Regulation (EU) 2024/1257, shall consider all relevant vulnerabilities or attack methods associated with each high-level vulnerability/threat, and implement proportionate mitigations to protect the vehicle type with regard to emissions as appropriate. Examples of vulnerabilities or attack methods to be considered and examples of mitigations to be implemented are included in Table 4.1,

Table 4.2 and Table 4.3 for each high-level vulnerability/threat of each system. The examples referring to Annex 5, Part A and Part B of UN Regulation No 155 shall be considered in the context of the specific system to which they apply.

Table 4.1: High-level vulnerabilities/threats, examples of vulnerabilities or attack methods and example of mitigations

System	High-level vulnerability/threat	Examples of vulnerabilities or attack methods	Examples of mitigations
Pollution control systems	Unauthorised modification of engine/sensor control unit (ECU/SCU) data or software code	Vulnerabilities or attack methods in Annex 5, Part A of UN Regulation No 155: 9.1, 12.1, 17.1, 18.3	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Unauthorised software injection via ECU flashing tools to disable or alter emission control components, suppress OBD/OBM inducement, or prevent DTCs	Access control techniques/designs and secure software update procedures e.g., update authentication, integrity check, secure boot process
	Unauthorised access and modification to ECU/SCU hardware	Vulnerabilities or attack methods in Annex 5, Part A of UN Regulation No 155: 28.2, 32.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Unauthorised access to and modification of internal circuit of control units of emission-related components	Access prevention or detection measures e.g., with tamper-resistant or tamper-evident hardware
	Manipulation of communication messages inside the vehicle through data modifications	Vulnerabilities or attack methods in Annex 5, Part A of UN Regulation No 155: 11.3, 20.3, 23.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Injection, interception or alteration of vehicle communication messages (e.g., CAN), for example by emulators	Measures to detect malicious internal messages or activity e.g., plausibility checks, timing analysis or certificate-based authentication to maintain emission data integrity
	Manipulation of signals inside the vehicle through hardware modifications	Vulnerabilities or attack methods in Annex 5, Part A of UN Regulation No 155: 4.1, 25.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Unauthorised alteration or manipulation of emission-related signals (e.g., ambient or exhaust temperature) by physical modifications, for example by modifiers	Diagnostic functions, plausibility checks or anomaly detection systems
Fuel and reagent system	Unauthorised modification of ECU/SCU data or software code	Vulnerabilities or attack methods in Annex 5, Part A of UN Regulation No 155: 9.1, 20.4, 23.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Unauthorised modification of engine control software to modify fuel or reagent injection e.g., altering injected quantity	Access control techniques/designs and secure software update procedures e.g., update authentication, integrity check, secure boot process
	Unauthorised access and modification to ECU/SCU hardware	Vulnerabilities or attack methods in Annex 5, Part A of UN Regulation No 155: 25.1, 27.1, 32.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Unauthorised access to and modification of internal circuit of control units of fuel or reagent-related components	Access prevention or detection measures e.g., with tamper-resistant or tamper-evident hardware
Engine and engine control units	Unauthorised modification of ECU data or software code	Vulnerabilities or attack methods in Annex 5, Part A of UN Regulation No 155: 9.1, 20.4 , 23.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Installing unauthorised firmware to modify engine functional parameters	Access control techniques/designs and secure software update procedures e.g., update authentication, integrity check, secure boot process

	Unauthorised access and modification to ECU hardware	Vulnerabilities or attack methods in Annex 5, Part A of UN Regulation No 155: 4.1, 11.3, 18.3, 32.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Unauthorised access to and modification of internal circuit of engine control units	Access prevention or detection measures e.g., with tamper resistant or tamper evident hardware

Table 4.2: High-level vulnerabilities/threats, examples of vulnerabilities or attack methods and example of mitigations

System	**High-level vulnerability/threat**	**Examples of vulnerabilities or attack methods**	**Examples of mitigations**
OBM system	Unauthorised modification of ECU/SCU data or software code	Vulnerabilities in Annex 5, Part A of UN Regulation No 155: 9.1, 20.4, 23.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Modifying or disabling vehicle data reported by the OBM system	Access control techniques/designs and secure software update procedures e.g., update authentication, integrity check, secure boot process
	Unauthorised access and modification to ECU/SCU hardware	Vulnerabilities in Annex 5, Part A of UN Regulation No 155: 25.1, 32.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Unauthorised access to and modification of internal circuit of control units of OBM-related components	Access prevention or detection measures e.g., with tamper-resistant or tamper-evident hardware
OBD system	Unauthorised modification of ECU/SCU data or software code	Vulnerabilities in Annex 5, Part A of UN Regulation No 155: 19.1, 18.3, 20.4, 20.5, 23.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Installing unauthorised firmware to modify diagnostic behaviour	Access control techniques/designs and secure software update procedures e.g., update authentication, integrity check, secure boot process
	Unauthorised access and modification to ECU/SCU hardware	Vulnerabilities in Annex 5, Part A of UN Regulation No 155: 25.1, 32.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Unauthorised access to and modification of internal circuit of control units of OBD-related components	Access prevention or detection measures e.g., with tamper-resistant or tamper-evident hardware
OBFCM device	Unauthorised modification of ECU/SCU data or software code	Vulnerabilities in Annex 5, Part A of UN Regulation No 155: 9.1, 20.4, 23.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Modifying fuel consumption data reported by the device	Access control techniques/designs and secure software update procedures e.g., update authentication, integrity check, secure boot process
	Unauthorised access and modification to ECU/SCU hardware	Vulnerabilities in Annex 5, Part A of UN Regulation No 155: 25.1, 32.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Unauthorised access to and modification of internal circuit of control units of OBFCM-related components	Access prevention or detection measures e.g., with tamper-resistant or tamper-evident hardware

Table 4.3: High-level vulnerabilities/threats, examples of vulnerabilities or attack methods and example of mitigations

System	High-level vulnerability/threat	Examples of vulnerabilities or attack methods	Examples of mitigations
Traction batteries and related management systems	Unauthorised modification of ECU/SCU data or software code	Vulnerabilities in Annex 5, Part A of UN Regulation No 155: 12.2, 20.3, 23.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Altering software to modify charging/discharging rates and battery durability data	Access control techniques/designs and secure software update procedures e.g., update authentication, integrity check, secure boot process
	Unauthorised access and modification to ECU/SCU hardware	Vulnerabilities in Annex 5, Part A of UN Regulation No 155: 27.1, 32.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Unauthorised access to and modification of internal circuit of control units of battery-related components	Access prevention or detection measures e.g., with tamper-resistant or tamper-evident hardware
Electric Motor and Related Control Units	Unauthorised modification of ECU/SCU data or software code	Vulnerabilities in Annex 5, Part A of UN Regulation No 155: 5.1, 9.1, 20.4, 23.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Installing unauthorised firmware to modify inverter or motor controllers	Access control techniques/designs and secure software update procedures e.g., update authentication, integrity check, secure boot process
	Unauthorised access and modification to ECU/SCU hardware	Vulnerabilities in Annex 5, Part A of UN Regulation No 155: 25.1, 32.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Unauthorised access to and modification of internal circuit of control units of electric motor-related components	Access prevention or detection measures e.g., with tamper-resistant or tamper-evident hardware
EVP	Unauthorised modification of ECU/SCU data or software code	Vulnerabilities in Annex 5, Part A of UN Regulation No 155: 9.1, 20.4, 23.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Modifying environmental data related to the EVP	Access control techniques/designs and secure software update procedures e.g., update authentication, integrity check, secure boot process
	Unauthorised access and modification to ECU/SCU hardware	Vulnerabilities in Annex 5, Part A of UN Regulation No 155: 25.1, 32.1	Corresponding mitigations in Annex 5, Part B of UN Regulation No 155
		Unauthorised access to and modification of internal circuit of control units to modify environmental data related to the EVP	Access prevention or detection measures e.g., with tamper-resistant or tamper-evident hardware

Appendix 2

MANUFACTURER'S DECLARATION OF COMPLIANCE WITH THE ANTI-TAMPERING, SECURITY AND CYBERSECURITY REQUIREMENTS FOR THE PURPOSES OF TYPE-APPROVAL

(Manufacturer): …..

(Address of the manufacturer): …..

Declares that:

(2) For the Vehicle Type(s), Family(ies) or other vehicle descriptor(s) with regard to emissions ([16]) listed in Annex I to this declaration are in compliance with the provisions of Regulation (EU) 2024/1257 and its implementing legislation relating to the anti-tampering, security and cybersecurity;

(3) The anti-tampering, security and cybersecurity information documentation in Annex II to this declaration describing the detailed technical criteria attached to this declaration is correct and complete for all vehicles to which this declaration applies;

(4) Annex III to this declaration lists any exemptions and/or deficiencies applicable to these vehicles related to the anti-tampering, security and cybersecurity provisions laid down in this Regulation.

Done at [….. Place ([17])]

On [….. Date]

[*Name and signature of Manufacturer's Representative ([18])*]

Attachments

Annex I: List of Vehicle Type(s), Family(ies) or other vehicle descriptor(s) with regard to emissions to which this declaration applies

Annex II: Anti-tampering, security and cybersecurity Documentation package

Annex III: list of any exemptions and/or deficiencies applicable to these vehicles related to the OBD provisions laid down in this Regulation

16 Delete what is not applicable.

17 Established in the Union.

18 'Manufacturer's representative' means any natural or legal person established in the Union who is duly appointed by the manufacturer to represent the manufacturer before the approval authority or the market surveillance authority and to act on the manufacturer's behalf in matters covered by the Regulation, as defined in article 3(41) of Regulation (EU) 2018/858.

ANNEX XV

(reserved)

ANNEX XVI

REQUIREMENTS FOR VEHICLES THAT USE A REAGENT FOR THE EXHAUST AFTER-TREATMENT SYSTEM

1. INTRODUCTION

1.1. This Annex sets out the requirements for vehicles that rely on the use of a reagent for the after-treatment system in order to reduce emissions.

2. GENERAL REQUIREMENTS

2.1. The general requirements for vehicles that use a reagent for the exhaust after-treatment system shall be those set out in paragraph 6.9. of UN Regulation No 154[19].

2.2. A template for the manufacturer's declaration of compliance with the reagent requirements is laid down in Appendix 1 of this Annex.

3. TECHNICAL REQUIREMENTS

3.1. The technical requirements for vehicles that use a reagent for the exhaust after-treatment system shall be those set out in Appendix 6 to UN Regulation No 154.

3.2. The reference to Annex A1 in paragraph 4.1. of Appendix 6 to UN Regulation No 154 shall be understood as reference to Appendix 3 of Annex I to this Regulation.

[19] UN Regulation No 154 - Uniform provisions concerning the approval of light duty passenger and commercial vehicles with regards to criteria emissions, emissions of carbon dioxide and fuel consumption and/or the measurement of electric energy consumption and electric range (WLTP), 02 series of amendments (OJ L, 2022/2124, 10.11.2022, ELI: http://data.europa.eu/eli/reg/2022/2124/oj).

Appendix 1

MANUFACTURER'S DECLARATION OF COMPLIANCE WITH THE REAGENT REQUIREMENTS

(Manufacturer): …..

(Address of the manufacturer): …..

Declares that:

For this interpolation family/ies listed in Annex I of this declaration, the requirements regarding the correct operation of systems using a consumable reagent in accordance with Annex XVI of this Regulation are complied with.

Done at [….. Place ([20])]

On [….. Date]

[Name and signature of Manufacturer's Representative ([21])]

Attachment(s)

Annex I: List of interpolation families to which this declaration applies

[20] Established in the Union.

[21] 'Manufacturer's representative' means any natural or legal person established in the Union who is duly appointed by the manufacturer to represent the manufacturer before the approval authority or the market surveillance authority and to act on the manufacturer's behalf in matters covered by the Regulation, as defined in article 3(41) of Regulation (EU) 2018/858.

ANNEX XVII

(reserved)

ANNEX XVIII

AMENDMENTS TO IMPLEMENTING REGULATION (EU) 2020/683

The explanatory notes in Annex I toRegulation (EU) 2020/683are amended as follows:

(1) the explanatory note (116) is replaced by the following:

‘(116) Add the number of the Euro level and, if appropriate, add:

- where Regulation (EC) No 715/2007 applies (‘Euro 6’), the character corresponding to the provisions used for type-approval, as set out Table 1 of Annex I, Appendix 6 of Implementing Regulation (EU) 2017/1151;

- where Regulation (EU) 2024/1257 applies (‘Euro 7’), the relevant character provided for in Table 1 of Annex I, Appendix 6 of Implementing Regulation (EU) 2025/XX.’

(2) the explanatory notes (190) and (191) are added:

‘(190) Commission Implementing Regulation (EU) <*publication office to insert reference number to this regulation*> laying down rules for the application of Regulation (EU) 2024/1257 of the European Parliament and of the Council on type-approval of motor vehicles and engines and of systems, components and separate technical units intended for such vehicles, with respect to their emissions and battery durability (‘Euro 7’)

(191) where Regulation (EC) No 715/2007 applies (‘Euro 6’): number of the base regulatory act and latest amending regulatory act applicable: ...

where Regulation (EU) 2024/1257 applies (‘Euro 7’): the approval certificate numbers of all relevant Implementing Acts, in accordance with example (e) of point 3.1 of Annex IV. List all relevant Implementing Acts approval certificate numbers line by line.’

Annex IV is amended as follows:

(1) In point 2.2 (section 2), the following point (d) is added:

‘(d) the number of the Implementing Regulation adopted pursuant to Regulation (EU) 2024/1257 and laying down the applicable requirements.’

(2) In point 2.3 (section 3), the following point (e) is added:

‘(e) where there is an emission type-approval in accordance with the relevant Implementing Act that applies under Regulation (EU) 2024/1257, the number of the last amending implementing act shall be directly followed by one of the two-letter characters from its corresponding implementing act table, i.e. without an asterisk being placed between this number and the relevant two-letter character.’

(3) In point 3.1, the following point (e) is added:

‘(e) in accordance with Implementing Regulation (EU) <*publication office to insert reference number to this regulation*>:

e4*2025/XX*2025/XXMA*00003*00[(190)]’

The Appendix to Annex VIII is amended as follows:

(1) Point 48 under Model B-Part 2 (vehicle categories M_1 and N_1) is replaced by the following:

‘48. Exhaust emissions (162) (163) (164):

The relevant approval certificate number(s) [(191)]: ...'

ANNEX XIX

(reserved)

ANNEX XX

MEASUREMENTS OF NET POWER AND THE MAXIMUM 30 MINUTES POWER OF ELECTRIC DRIVE TRAINS

1. INTRODUCTION

1.1. This Annex sets out requirements for measuring net engine power, net power and the maximum 30 minutes power of electric drive trains.

1.2. The latter in case of electric drive trains composed of controllers and motors, which are used as the sole mode of propulsion, at least for part of the time.

2. GENERAL SPECIFICATIONS

2.1. The general specifications for conducting the tests and interpreting the results are those set out in paragraph 5 of UN Regulation No 85 ([22]), with the exceptions specified in this Annex.

2.2. Test fuel

2.2.1. Paragraphs 5.2.3.1., 5.2.3.2.1., 5.2.3.3.1., and 5.2.3.4. of UN Regulation No 85 shall be understood as follows:

2.2.2. The fuel used shall be the one available on the market. In any case of dispute, the fuel shall be the appropriate reference fuel specified in Annex IX to this Regulation.

2.3. Power correction factors

2.3.1. By way of derogation from paragraph 5.1 of Annex 5 to UN Regulation No 85, when a turbo-charged engine is fitted with a system which allows compensating the ambient conditions temperature and altitude, at the request of the manufacturer, the correction factors αa or αd shall be set to the value of 1.

[22] Regulation No 85 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of internal combustion engines or electric drive trains intended for the propulsion of motor vehicles of categories M and N with regard to the measurement of net power and the maximum 30 minutes power of electric drive trains (OJ L 323, 7.11.2014, p. 52, ELI: http://data.europa.eu/eli/reg/2014/85/oj).

ANNEX XXI

WORLD HARMONIZED LIGHT VEHICLE TEST PROCEDURE (WLTP) – (TYPE 1 TEST)

1. INTRODUCTION

This Annex describes the procedure for determining the levels of emissions of gaseous compounds, particulate matter, particle number, CO_2 emissions, fuel consumption, electric energy consumption and electric range from light- duty vehicles.

2. GENERAL REQUIREMENTS

2.1. The general requirements for conducting the type 1 test shall be those set out in UN Regulation No 154[23], in relation to level 1A.

2.2. The limit values referred to in Table 1A of paragraph 6.3.10. of UN Regulation No 154 shall be replaced by the limit values set out in Table 1 of Annex I to Regulation (EU) 2024/1257.

2.3. In relation to the ambient temperature correction test (ATCT), unless the approval authority requires a test to be performed, the template for a manufacturer's declaration as laid down in Appendix 1 of this Annex shall be used.

2.4. A template for the manufacturer's declaration for the regeneration requirements is laid down in Appendix 2 of this Annex.

3. TECHNICAL REQUIREMENTS

The technical requirements for conducting the type 1 test shall be those set out in paragraph 6.3. and Annexes Part B of UN Regulation No 154, with the exceptions described in the points below.

3.1. Table A4/2 in paragraph 4.2.2.1. of Annex B4 to UN Regulation No 154 shall read as follows:

Energy efficiency class	Range of RRC for C1 tyres	Range of RRC for C2 tyres	Range of RRC for C3 tyres
A	RRC ≤ 6,5	RRC ≤ 5,5	RRC ≤ 4,0
B	6,6 ≤ RRC ≤ 7,7	5,6 ≤ RRC ≤ 6,7	4,1 ≤ RRC ≤ 5,0
C	7,8 ≤ RRC ≤ 9,0	6,8 ≤ RRC ≤ 8,0	5,1 ≤ RRC ≤ 6,0
D	9,1 ≤ RRC ≤ 10,5	8,1 ≤ RRC ≤ 9,0	6,1 ≤ RRC ≤ 7,0
E	RRC ≥10,6	RRC ≥ 9,1	RRC ≥ 7,1
Energy efficiency class	Value of RRC to be used for interpolation for C1 tyres	Value of RRC to be used for interpolation for C2 tyres	Value of RRC to be used for interpolation for C3 tyres
A	RRC = 5,9 (*)	RRC = 4,9 (*)	RRC = 3,5 (*)
B	RRC = 7,1	RRC = 6,1	RRC = 4,5

[23] UN Regulation No 154 - Uniform provisions concerning the approval of light duty passenger and commercial vehicles with regards to criteria emissions, emissions of carbon dioxide and fuel consumption and/or the measurement of electric energy consumption and electric range (WLTP), 02 series of amendments (OJ L, 2022/2124, 10.11.2022, ELI: http://data.europa.eu/eli/reg/2022/2124/oj).

C	RRC = 8,4	RRC = 7,4	RRC = 5,5
D	RRC = 9,8	RRC = 8,6	RRC = 6,5
E	RRC = 11,3	RRC = 9,9	RRC = 7,5

(*) 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.

3.2 Paragraph 4.3.1.2.1.3. of Annex B5 to UN Regulation No 154 shall read as follows:

4.3.1.2.1.3. Any other sampling configuration for the PTS for which equivalent solid particle penetration at 15 nm can be demonstrated shall be considered acceptable.

3.3 Paragraph 4.3.1.2.1.5. of Annex B5 to UN Regulation No 154 shall read as follows:

4.3.1.2.1.5. Any other sampling configuration for the OT for which equivalent solid particle penetration at 15 nm can be demonstrated shall be considered acceptable.

3.4 Paragraph 4.3.1.3.3.(g) of Annex B5 to UN Regulation No 154 shall read as follows:

(g) Achieve a particle concentration reduction factor fr(di) for particles of 15 nm, 30 nm and 50 nm electrical mobility diameters that is no more than 100 per cent, 30 per cent and 20 per cent respectively higher, and no more than 5 per cent lower than that for particles of 100 nm electrical mobility diameter for the VPR as a whole;

3.5 Paragraph 4.3.1.3.3.(i) of Annex B5 to UN Regulation No 154 shall read as follows:

(i) Achieve more than 99.9 per cent vaporization of tetracontane ($CH_3(CH_2)_{38}CH_3$) particles with count median diameter > 50 nm and mass > 1 mg/m^3, by means of heating and reduction of partial pressures of the tetracontane.

3.6 Table A5/2 in paragraph 4.3.1.3.4. of Annex B5 to UN Regulation No 154 shall read as follows:

Table A5/2

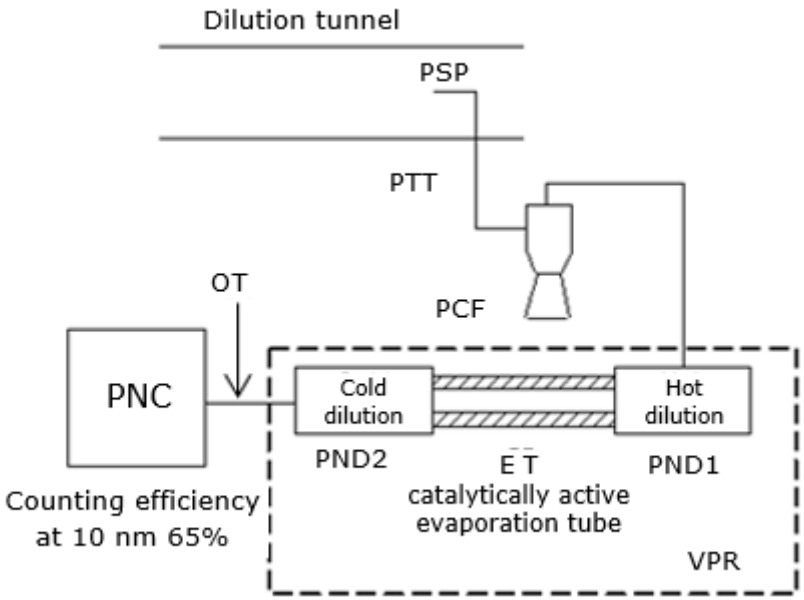
PNC counting efficiency

Nominal particle electrical mobility diameter (nm)	PNC counting efficiency (per cent)
10	65 ± 15
15	> 90

3.7 Figure A5/14 in paragraph 4.3.1.4. of Annex B5 to UN Regulation No 154 shall read as follows:

Figure A5/14

A recommended particle sampling system



3.8 The final sentence in paragraph 4.3.1.4. of Annex B5 to UN Regulation No 154 shall read as follows:

The evaporation tube, ET, shall be catalytically active with a wall temperature of 350 °C (±10 °C).

3.9 Paragraph 5.7. of Annex B5 to UN Regulation No 154 is not applicable.

3.10 Paragraph 5.7.1.3.(b) of Annex B5 to UN Regulation No 154 shall read as follows:

(b) A second full flow PNC with counting efficiency above 90 per cent for 10 nm equivalent electrical mobility diameter particles that has been calibrated by the method described above. The second PNC counting efficiency shall be taken into account in the calibration.

3.11 Paragraph 5.7.1.4. of Annex B5 to UN Regulation No 154 shall read as follows:
5.7.1.4. Calibration shall also include a check, according to the requirements of paragraph 4.3.1.3.4.(h) of this annex, on the PNC's counting efficiency with particles of 10 nm electrical mobility diameter. A check of the counting efficiency with 15 nm particles is not required during periodical calibration.

3.12 The last section of paragraph 5.7.2.1. of Annex B5 to UN Regulation No 154 shall read as follows:
The VPR shall be characterised for particle concentration reduction factor with solid particles of 15, 30, 50 and 100 nm electrical mobility diameter. Particle concentration reduction factors fr(d) for particles of 15 nm, 30 nm and 50 nm electrical mobility diameters shall be no more than 100 per cent, 30 per cent and 20 per cent higher respectively, and no more than 5 per cent lower than that for particles of 100 nm electrical mobility diameter. For the purposes of validation, the arithmetic average of the particle concentration reduction factor calculated for particles of 30 nm, 50 nm and 100 nm electrical mobility diameters shall be within ±10 per cent of the arithmetic average particle concentration reduction factor fr determined during the latest complete calibration of the VPR.

3.13 The first section of paragraph 5.7.2.2. of Annex B5 to UN Regulation No 154 shall read as follows:

The test aerosol for these measurements shall be solid particles of 15, 30, 50 and 100 nm electrical mobility diameter and a minimum concentration of 5,000 particles per cm^3 and a minimum concentration of 3,000 particles per cm^3 of 15 nm electrical mobility diameter at the VPR inlet. The test aerosol shall be thermally stable at the VPR operating temperatures. Particle number concentrations shall be measured upstream and downstream of the components.

3.14 The text after the second equation in paragraph 5.7.2.2. of Annex B5 to UN Regulation No 154 shall be deleted.

3.15 Paragraph 5.7.2.3. of Annex B5 to UN Regulation No 154 shall read as follows:
5.7.2.3. The VPR shall demonstrate greater than 99.9 per cent removal efficiency of tetracontane ($CH_3(CH_2)_{38}CH_3$) particles with count median diameter > 50 nm and mass > 1 mg/m^3.

Appendix 1

MANUFACTURER'S DECLARATION FOR THE AMBIENT TEMPERATURE CORRECTION TEST (ATCT)

(Manufacturer): …..

(Address of the manufacturer): …..

Declares that:

For the vehicles covered by this type-approval, the following family correction factors (FCFs)

Vehicle descriptor (OEM to be defined)	FCF
X	
Y	
Z	

shall be considered for postprocessing of the relevant WLTP type 1 tests at 23 °C. This declaration is based on the testing conditions and settings as defined in UN Regulation No. 154 ([24]), Annexes B6a and B6 (Level 1A) as applicable.

Done at [….. Place ([25])]

On [….. Date]

[Name and Signature of Manufacturer's Representative ([26])]

[24] UN Regulation No 154 - Uniform provisions concerning the approval of light duty passenger and commercial vehicles with regards to criteria emissions, emissions of carbon dioxide and fuel consumption and/or the measurement of electric energy consumption and electric range (WLTP), 02 series of amendments (OJ L, 2022/2124, 10.11.2022, ELI: http://data.europa.eu/eli/reg/2022/2124/oj).

[25] Established in the Union.

[26] 'Manufacturer's representative' means any natural or legal person established in the Union who is duly appointed by the manufacturer to represent the manufacturer before the approval authority or the market surveillance authority and to act on the manufacturer's behalf in matters covered by the Regulation, as defined in article 3(41) of Regulation (EU) 2018/858.

Appendix 2

MANUFACTURER'S DECLARATION FOR THE REGENERATION REQUIREMENTS

(Manufacturer): …..

(Address of the manufacturer): …..

Declares[27]:

For the Vehicle Type(s), Family(ies) or other vehicle descriptor(s)[28] with regards to emissions listed in Annex I of this declaration, the following Ki factors in accordance with UN Regulation No. 154 ([29]), Annex B6, Appendix 1:

Diesel engine

	NO_X	CO	THC+ NO_X	PM	CO_2
Multiplicative					
Additive					

Petrol engine

	NO_X	CO	THC	NMHC	PM	CO_2
Multiplicative						
Additive						

Alternatively (if applicable):

[ ] Ki factors with a value of 1.0 as the periodic regeneration occurs at least once per Type 1 test and has already occurred at least once during vehicle preparation.

[ ] Ki factors with a value of 1.0 as the distance between two successive periodic regenerations is more than 4,000 km of driving repeated Type 1 tests.

[ ] CO_2 Ki factors with a value of 1.05 as emission limits are fulfilled during regenerations.

In addition, for the purpose of WLTP Type 1 Charge Sustaining Tests conducted for the purpose of type-approval, conformity of production, in-service conformity and market surveillance, these Ki factors shall be applied for the Vehicle Type(s), Family(ies) or other vehicle descriptor(s) with regard to emissions listed in Annex I of this declaration.

Done at [….. Place ([30])]

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27 Manufacturers shall declare the deterioration factors – either multiplicative or additive – rounded off to two decimals.

28 Delete what is not applicable.

29 UN Regulation No 154 - Uniform provisions concerning the approval of light duty passenger and commercial vehicles with regards to criteria emissions, emissions of carbon dioxide and fuel consumption and/or the measurement of electric energy consumption and electric range (WLTP), 02 series of amendments (OJ L, 2022/2124, 10.11.2022, ELI: http://data.europa.eu/eli/reg/2022/2124/oj).

30 Established in the Union.

On [….. Date]

[*Name and Signature of Manufacturer's Representative (*[31]*)*]

Attachment(s)

Annex I: List of Vehicle Type(s), Family(ies) or other vehicle descriptor(s) with regard to emissions to which this declaration applies

[31] 'Manufacturer's representative' means any natural or legal person established in the Union who is duly appointed by the manufacturer to represent the manufacturer before the approval authority or the market surveillance authority and to act on the manufacturer's behalf in matters covered by the Regulation, as defined in article 3(41) of Regulation (EU) 2018/858.

ANNEX XXII

DEVICES FOR MONITORING ON BOARD THE VEHICLE, THE CONSUMPTION OF FUEL AND ELECTRIC ENERGY

1. INTRODUCTION

This Annex sets out the definitions and requirements applicable to the devices for monitoring on board the vehicle the consumption of fuel and/or electric energy.

2. GENERAL REQUIREMENTS

The general requirements for OBFCM devices shall be those set out in paragraph 6.3.9. of UN Regulation No 154 ([32]).

3. TECHNICAL REQUIREMENTS

The technical requirements for the OBFCM device shall be those set out in Appendix 5 to UN Regulation No 154.

[32] UN Regulation No 154 - Uniform provisions concerning the approval of light duty passenger and commercial vehicles with regards to criteria emissions, emissions of carbon dioxide and fuel consumption and/or the measurement of electric energy consumption and electric range (WLTP), 02 series of amendments (OJ L, 2022/2124, 10.11.2022, ELI: http://data.europa.eu/eli/reg/2022/2124/oj).