

Commission Regulation (EU) No 582/2011 of 25 May 2011 implementing and amending Regulation (EC) No 595/2009 of the European Parliament and of the Council with respect to emissions from heavy duty vehicles (Euro VI) and amending Annexes I and III to Directive 2007/46/EC of the European Parliament and of the Council (Text with EEA relevance)

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Article 18	Amendments to Regulation (EC) No 595/2009
Article 19	Amendments to Directive 2007/46/EC
Article 20	Entry into force
	Signature

## ANNEX I

### ADMINISTRATIVE PROVISIONS FOR EC TYPE-APPROVAL

1. REQUIREMENTS ON FUEL RANGE
  - 1.1. Requirements on universal fuel range type-approval
    - 1.1.1. The parent engine shall meet the requirements of this Regulation...
    - 1.1.2. If the manufacturer permits the engine family to run on...
    - 1.1.3. In the case of natural gas/biomethane fuelled engines, including dual-fuel...
      - 1.1.3.1. At the manufacturer's request the engine may be tested on...
    - 1.1.4. In the case of an engine fuelled with CNG which...
      - 1.1.4.1. At the manufacturer's request the engine may be tested on...
    - 1.1.5. In the case of natural gas/biomethane engines, the ratio of...
    - 1.1.6. In the case of LPG the manufacturer shall demonstrate the...
      - 1.1.6.1. The ratio of emission results 'r' shall be determined for...
  - 1.2. Requirements on restricted fuel range type-approval in case of engines...
    - 1.2.1. Exhaust emissions type-approval of an engine running on CNG and...
      - 1.2.1.1. At the manufacturer's request the engine may be tested on...
      - 1.2.1.2. The ratio of emission results 'r' shall be determined for...
      - 1.2.1.3. On delivery to the customer the engine shall bear a...
    - 1.2.2. Exhaust emissions type-approval of an engine running on natural gas/biomethane...
      - 1.2.2.1. In the case of CNG, at the manufacturer's request the...
      - 1.2.2.2. On delivery to the customer the engine shall bear a...
  - 1.3. Requirements on fuel-specific type-approval
    - 1.3.1. A fuel specific type-approval may be granted for LNG fuelled...
    - 1.3.2. The manufacturer can only apply for a fuel specific type-approval...
    - 1.3.3. In the case of a dual-fuel engine family where the...
2. EXHAUST EMISSIONS TYPE-APPROVAL OF A MEMBER OF A FAMILY
  - 2.1. With the exception of the case mentioned in point 2.2,...
  - 2.2. If the technical service determines that, with regard to the...
3. ENGINE MARKINGS
  - 3.1. In the case of an engine type-approved as a separate...
  - 3.2. Every engine type approved under this Regulation as a separate...
  - 3.3. Labels for natural gas/biomethane and LPG fuelled engines
    - 3.3.1. The following information shall be given on the label:
    - 3.3.2. Properties
    - 3.3.3. Placing
  - 3.4. In case of an application for EC type-approval of a...
4. INSTALLATION ON THE VEHICLE
  - 4.1. The engine installation on the vehicle shall be performed in...

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- 4.2. Installation of a type-approved engine on a vehicle
- 4.3. Inlet to fuel tanks in the case of a petrol...
  - 4.3.1. The inlet orifice of the petrol or E85 tank shall...
  - 4.3.2. Point 4.3.1 shall not apply to a vehicle for which...
  - 4.3.3. Provision shall be made to prevent excess evaporative emissions and...
- 5. REQUIREMENTS AND TESTS FOR IN-SERVICE TESTING
  - 5.1. Introduction
  - 5.2. General Requirements
    - 5.2.1. For the purpose of in-service testing, the calculated load (engine...
    - 5.2.2. The output torque may be estimated by the ECU using...
    - 5.2.3. The engine torque in Nm resulting from the above data...
    - 5.2.4. Access to the information required in point 5.2.1 shall be...
    - 5.2.5. The average load at each operating condition in Nm calculated...
    - 5.2.6. External access to the information required in point 5.2.1 shall...
  - 5.3. Verification of the availability and conformity of the ECU information...
    - 5.3.1. The availability of the data stream information required in point...
    - 5.3.2. In the case where this information cannot be retrieved in...
    - 5.3.3. The conformity of the ECU torque signal to the requirements...
    - 5.3.3.1. The conformity of the ECU torque signal to the requirements...
    - 5.3.4. In the case where the engine under test does not...
    - 5.3.5. The conformity of the ECU torque signal is considered to...
- 6. ENGINE FAMILY
  - 6.1. Parameters defining the engine family
  - 6.2. Choice of the parent engine
  - 6.3. Parameters for defining an OBD engine family
  - 6.4. Extension to include a new engine system into an engine-family...
    - 6.4.1. At the request of the manufacturer and upon approval of...
    - 6.4.2. Where the elements of design of the parent engine system...
    - 6.4.3. Where the elements of design of the new engine system...
- 7. CONFORMITY OF PRODUCTION
  - 7.1. General requirements
  - 7.2. Emissions of pollutants
    - 7.2.1. If emissions of pollutants are to be measured and an...
    - 7.2.2. Conformity of the engine subjected to a pollutant test:
      - 7.2.2.1. Three engines shall be taken from the series production of...
      - 7.2.2.2. Where the approval authority is satisfied with the production standard...
      - 7.2.2.3. On the basis of tests of the engine by sampling...
    - 7.2.3. The tests shall be carried out on newly manufactured engines....
      - 7.2.3.1. At the request of the manufacturer, the tests may be...
      - 7.2.3.2. When the manufacturer requests to conduct a running-in procedure in...
      - 7.2.3.3. For diesel, ethanol (ED95), petrol, E85, LNG 20 , LNG...
      - 7.2.3.4. For CNG engines, including dual-fuel engines, all those tests may...
      - 7.2.3.5. Non-compliance of gas and dual-fuel engines
      - 7.2.3.6. Tests for conformity of production of a gas fuelled engine...
  - 7.3. On-board diagnostics (OBD)
    - 7.3.1. When the approval authority determines that the quality of production...
    - 7.3.2. The production is deemed to be in conformity if this...
    - 7.3.3. If the engine taken from the series production does not...

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- 7.3.4. The production is deemed to conform if at least three...
- 7.4. ECU information required for in-service testing
  - 7.4.1. The availability of the data stream information requested in point...
  - 7.4.2. In the case where this information cannot be retrieved in...
  - 7.4.3. The conformity of the ECU torque signal with the requirements...
  - 7.4.4. In the case where the test equipment does not comply...
  - 7.4.5. The conformity of the ECU torque signal shall be considered...
  - 7.4.6. The availability and conformity checks of the ECU information required...
  - 7.4.7. The results of the manufacturer's survey shall be made available...
  - 7.4.8. At the request of the approval authority, the manufacturer shall...
- 8. DOCUMENTATION
  - 8.1. The documentation package required by Articles 5, 7 and 9...
  - 8.2. The formal documentation package may be brief, provided that it...
  - 8.3. The extended documentation package shall include the following information:
    - 8.3.1. The extended documentation package shall remain strictly confidential. It may...

#### Appendix 1

Procedure for production conformity testing when standard deviation is satisfactory...

1. This Appendix describes the procedure to be used to verify...

#### Appendix 2

Procedure for production conformity testing when standard deviation is unsatisfactory...

1. This Appendix describes the procedure to be used to verify...

#### Appendix 3

Procedure for production conformity testing at manufacturer's request

1. This Appendix describes the procedure to be used to verify,...

#### Appendix 4

Models of information document

Explanatory notes (regarding filling in the table):

#### Appendix

to information document

Information on test conditions

1. Spark plugs
  - 1.1. Make:

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- 1.2. Type:
- 1.3. Spark-gap setting:
2. Ignition coil
  - 2.1. Make:
  - 2.2. Type:
3. Lubricant used
  - 3.1. Make:
  - 3.2. Type: (state percentage of oil in mixture if lubricant and...
4. Engine-driven equipment
  - 4.1. The power absorbed by the auxiliaries/equipment needs only be determined,...
  - 4.2. Enumeration and identifying details:
  - 4.3. Power absorbed at engine speeds specific for emissions test
5. Engine performance (declared by manufacturer) (8)
  - 5.1. Engine test speeds for emissions test in accordance with Annex...
  - 5.2. Declared values for power test in accordance with Annex XIV...
6. Dynamometer load setting information (if applicable)
  - 6.3. Fixed load curve dynamometer setting information (if used)
  - 6.4. Adjustable load curve dynamometer setting information (if used)
7. Test conditions for OBD testing
  - 7.1. Test cycle used for the verification of the OBD system:...
  - 7.2. Number of preconditioning cycles used before OBD verification tests:

## Appendix 5

Model of EC type-approval certificate of an engine type/component as...  
EC TYPE-APPROVAL CERTIFICATE

### SECTION I

0.1. Make (trade name of manufacturer):

- 0.1. Make (trade name of manufacturer):
- 0.2. Type:
- 0.3. Means of identification of type, if marked on the component/separate...
- 0.4. Name and address of manufacturer:
- 0.5. In the case of components and separate technical units, location...
- 0.6. Name(s) and address(es) of assembly plant(s):
- 0.7. Name and address of the manufacturer's representative (if any)

### SECTION II

1. Additional information (where applicable): see Addendum

1. Additional information (where applicable): see Addendum
2. Technical service responsible for carrying out the tests:
3. Date of test report:
4. Number of test report:
5. Remarks (if any): see Addendum
6. Place:
7. Date:

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8. Signature:

### Addendum

to EC type-approval certificate No ...

#### 1. ADDITIONAL INFORMATION

- 1.1. Particulars to be completed in relation to the type-approval of...
- 1.2. If the engine referred to in 1.1 has been type...
- 1.3. Particulars to be completed in relation to the type-approval of...
- 1.4. Emission levels of the engine/parent engine ( 1 )
  - 1.4.1. WHSC test
  - 1.4.2. WHTC test
  - 1.4.3. Idle test
  - 1.4.4. PEMS demonstration test
- 1.5. Power measurement
  - 1.5.1. Engine power measured on test bench
  - 1.5.2. Additional data

### Appendix 6

Model of ECT type-approval certificate of a type of vehicle...  
EC TYPE-APPROVAL CERTIFICATE

#### SECTION I

0.1. Make (trade name of manufacturer):

- 0.1. Make (trade name of manufacturer):
- 0.2. Type:
- 0.3. Means of identification of type, if marked on the component/separate...
  - 0.3.1. Location of that marking:
- 0.4. Name and address of manufacturer:
- 0.5. In the case of components and separate technical units, location...
- 0.6. Name(s) and address(es) of assembly plant(s):
- 0.7. Name and address of the manufacturer's representative (if any)

#### SECTION II

1. Additional information (where applicable): see Addendum

1. Additional information (where applicable): see Addendum
2. Technical service responsible for carrying out the tests:
3. Date of test report:
4. Number of test report:
5. Remarks (if any): see Addendum
6. Place:
7. Date:
8. Signature:

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## Appendix 7

### Model of EC type-approval certificate of a type of vehicle... EC TYPE-APPROVAL CERTIFICATE

#### SECTION I

##### 0.1. Make (trade name of manufacturer):

- 0.1. Make (trade name of manufacturer):
- 0.2. Type:
  - 0.2.1. Commercial name(s) (if available):
- 0.3. Means of identification of type, if marked on the vehicle (1) (a):...
  - 0.3.1. Location of that marking:
- 0.4. Category of vehicle (b):
- 0.5. Name and address of manufacturer:
- 0.6. Name(s) and address(es) of assembly plant(s):
- 0.7. Name and address of the manufacturer's representative (if any):

#### SECTION II

##### 1. Additional information (where applicable): see Addendum

1. Additional information (where applicable): see Addendum
2. Technical service responsible for carrying out the tests:
3. Date of test report:
4. Number of test report:
5. Remarks (if any): see Addendum
6. Place:
7. Date:
8. Signature:

#### Addendum

to EC type-approval certificate No ...

1. ADDITIONAL INFORMATION
  - 1.1. Particulars to be completed in relation to the type-approval of...
  - 1.2. If the engine referred to in 1.1 has been type-approved...
  - 1.3. Particulars to be completed in relation to the type-approval of...
  - 1.4. Emission levels of the engine/parent engine( 1 )
    - 1.4.1. WHSC test
    - 1.4.2. WHTC test
    - 1.4.3. Idle test
    - 1.4.4. PEMS demonstration test
  - 1.5. Power measurement
    - 1.5.1. Engine power measured on test bench
    - 1.5.2. Additional data

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## Appendix 8

Example of EC type-approval mark

## Appendix 9

EC Type-Approval Certification Numbering System

## Appendix 10

Explanatory notes

- (1) Delete where not applicable (there are cases where nothing needs...
- (2) Specify the tolerance.
- (3) Please fill in here the upper and lower values for...
- (4) To be documented in case of a single OBD engine...
- (5) Value for the combined WHTC including cold and hot part...
- (6) To be documented if not documented in the documentation referred...
- (7) Delete as appropriate.
- (8) Information concerning engine performance shall only be given for the...
- (9) Specify the tolerance; to be within  $\pm 3$  % of the...
- (10) In the case of engines included in points 1.1.3. and...
  - (a) If the means of identification of type contains characters not...
  - (b) Classified according to definitions listed in Section A of Annex...
  - (d) Dual-fuel engines.
    - (d1) In case of a dual-fuel engine or vehicle.
    - (d2) In the case of dual-fuel engines of Type 1B, Type...
    - (d3) Except for dual-fuel engines or vehicles.
    - (d4) In the cases laid down in Table 1 of Annex...
    - (d5) In the case of dual-fuel engines of Type 1B, Type...
  - (l) This figure shall be rounded off to the nearest tenth...
  - (m) This value shall be calculated and rounded off to the...
  - (n) Determined in accordance with the requirements of Annex XIV.

## ANNEX II

### CONFORMITY OF IN-SERVICE ENGINES OR VEHICLES

1. INTRODUCTION
  - 1.1. This Annex sets out requirements for checking and demonstrating the...
2. PROCEDURE FOR IN-SERVICE CONFORMITY
  - 2.1. The conformity of in-service vehicles or engines of an engine...
  - 2.2. If the normal in-service conditions of a particular vehicle are...
  - 2.3. The manufacturer shall demonstrate to the approval authority that the...
  - 2.4. The manufacturer shall report the schedule and the sampling plan...
  - 2.5. Vehicles without a communication interface which permits the collection of...
  - 2.6. Vehicles where the collection of ECU data influences the vehicle...
  - 2.7. Dual-fuel engines or vehicles



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- 2.7.1. Dual-fuel engines and vehicles shall comply with the following additional...
3. ENGINE OR VEHICLE SELECTION
  - 3.1. After the granting of type-approval for an engine family the...
    - 3.1.1. With a minimum sample size of three engines the sampling...
    - 3.1.2. The test statistic quantifying the cumulative number of non-conforming tests...
    - 3.1.3. The pass or fail decision of the lot shall be...
  - 3.2. The engines and vehicles selected shall be used and registered...
  - 3.3. Each vehicle tested shall have a maintenance record to show...
  - 3.4. The OBD system shall be checked for proper functioning of...
  - 3.5. The engine or vehicle shall exhibit no indications of abuse...
  - 3.6. All emission control system components on the vehicle shall be...
  - 3.7. In agreement with the approval authority, the manufacturer may run...
4. TEST CONDITIONS
  - 4.1. Vehicle payload
  - 4.2. Ambient conditions
  - 4.3. Engine coolant temperature
  - 4.4. The lubricating oil, fuel and reagent shall be within the...
    - 4.4.1. Lubricating oil
    - 4.4.2. Fuel
      - 4.4.2.1. If the manufacturer in accordance with Section 1 of Annex...
    - 4.4.3. Reagent
  - 4.5. Trip requirements
    - 4.5.1. For M1 and N1 vehicles the trip shall consist of...
    - 4.5.2. For M2 and M3 vehicles the trip shall consist of...
    - 4.5.3. For N2 vehicles the trip shall consist of approximately 45 %...
    - 4.5.4. For N3 vehicles the trip shall consist of approximately 20 %...
    - 4.5.5. The following distribution of the characteristic trip values from the...
  - 4.6. Operational requirements
    - 4.6.1. The trip shall be selected in such a way that...
    - 4.6.2. Emissions and other data sampling shall start prior to starting...
    - 4.6.3. It shall not be permitted to combine data of different...
    - 4.6.4. If the engine stalls, it may be restarted, but the...
    - 4.6.5. The minimum test duration shall be long enough to complete...
    - 4.6.6. The electrical power to the PEMS system shall be supplied...
      - 4.6.6.1. As an alternative to point 4.6.6, the electrical power to...
      - 4.6.6.2. In case of a dispute the results of measurements performed...
    - 4.6.7. The installation of the PEMS equipment shall not influence the...
    - 4.6.8. It is recommended to operate the vehicles under normal daytime...
    - 4.6.9. If the approval authority is not satisfied with the data...
    - 4.6.10. The same route shall be used for the tests of...
5. ECU DATA STREAM
  - 5.1. Verification of the availability and conformity of the ECU data...
    - 5.1.1. The availability of the data stream information according to the...
      - 5.1.1.1. If that information cannot be retrieved by the PEMS system...
        - 5.1.1.1.1. In the case where this information can be retrieved by...
        - 5.1.1.1.2. In the case where that information cannot be retrieved in...

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- 5.1.2. Torque signal
  - 5.1.2.1. The conformity of the torque signal calculated by the PEMS...
    - 5.1.2.1.1. The method used to check this conformity is described in...
    - 5.1.2.2. The conformity of the ECU torque signal is considered to...
    - 5.1.2.3. If the calculated torque does not remain within the full...
    - 5.1.2.4. Dual-fuel engines and vehicles shall, in addition, comply with the...
- 6. EMISSIONS EVALUATION
  - 6.1. The test shall be conducted and the test results shall...
  - 6.2. The conformity factors shall be calculated and presented for both...
  - 6.3. The 90 % cumulative percentile of the exhaust emission conformity factors...
    - 6.3.1. In the case of a type 2A and type 2B...
    - 6.3.2. As an alternative point 6.3.1., in absence of a robust...
- 7. EVALUATION OF IN-SERVICE CONFORMITY RESULTS
  - 7.1. On the basis of the in-service conformity report referred to...
- 8. CONFIRMATORY VEHICLE TESTING
  - 8.1. Confirmatory testing is done for the purpose of confirmation of...
  - 8.2. Approval authorities may conduct confirmatory testing.
  - 8.3. The confirmatory test shall be performed as vehicle testing as...
  - 8.4. A test result may be regarded as non-satisfactory when, from...
- 9. PLAN OF REMEDIAL MEASURES
  - 9.1. The manufacturer shall submit a report to the approval authority...
  - 9.2. The manufacturer shall provide a copy of all communications related...
  - 9.3. The manufacturer shall assign a unique identifying name or number...
  - 9.4. The manufacturer shall present a plan of remedial measures which...
    - 9.4.1. A description of each engine system type included in the...
    - 9.4.2. A description of the specific modifications, alterations, repairs, corrections, adjustments,...
    - 9.4.3. A description of the method by which the manufacturer informs...
    - 9.4.4. A description of the proper maintenance or use, if any,...
    - 9.4.5. A description of the procedure to be followed by engine...
    - 9.4.6. A copy of the information transmitted to the engine or...
    - 9.4.7. A brief description of the system which the manufacturer uses...
    - 9.4.8. A copy of all instructions to be sent to those...
    - 9.4.9. A description of the impact of the proposed remedial measures...
    - 9.4.10. Any other information, reports or data the approval authority may...
    - 9.4.11. Where the plan of remedial measures includes a recall, a...
  - 9.5. The manufacturer may be required to conduct reasonably designed and...
- 10. REPORTING PROCEDURES
  - 10.1. A technical report shall be submitted to the approval authority...
    - 10.1.1. General
      - 10.1.1.1 Name and address of the manufacturer.
      - 10.1.1.2 Address(es) of assembly plant(s).
      - 10.1.1.3 The name, address, telephone and fax numbers and e-mail address...
      - 10.1.1.4 Type and commercial description (mention any variants).
      - 10.1.1.5 Engine family.

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- 10.1.1.6 Parent engine.
- 10.1.1.7 Engine family members.
- 10.1.1.8 The vehicle identification number (VIN) codes applicable to the vehicles...
- 10.1.1.9 Means and location of identification of type, if marked on...
- 10.1.1.10 Category of vehicle.
- 10.1.1.11 Type of engine: petrol, ethanol (E85), diesel/NG /LPG/ethanol (ED95) (Delete...
- 10.1.1.12 The numbers of the type-approvals applicable to the engine types...
- 10.1.1.13 Details of extensions, field fixes/recalls to those type-approvals for the...
- 10.1.1.14 The engine build period covered within the manufacturer's information (e.g....
- 10.1.2. Engine/vehicle selection
  - 10.1.2.1 Vehicle or engine location method.
  - 10.1.2.2 Selection criteria for vehicles, engines, in-service families.
  - 10.1.2.3 Geographical areas within which the manufacturer has collected vehicles.
- 10.1.3. Equipment
  - 10.1.3.1 PEMS Equipment, brand and type.
  - 10.1.3.2 PEMS calibration.
  - 10.1.3.3 PEMS power supply.
  - 10.1.3.4 Calculation software and version used (e.g. EMROAD 4.0).
- 10.1.4. Test data
  - 10.1.4.1 Date and time of test.
  - 10.1.4.2 Location of test including details information about the test route....
  - 10.1.4.3 Weather/ambient conditions (e.g. temperature, humidity, altitude).
  - 10.1.4.4 Distances covered per vehicle on the test route.
  - 10.1.4.5 Test fuel specifications characteristics.
  - 10.1.4.6 Reagent specification (if applicable).
  - 10.1.4.7 Lubrication oil specification.
  - 10.1.4.8 Emission test results according to Appendix 1 to this Annex....
- 10.1.5. Engine information
  - 10.1.5.1 Engine fuel type (e.g. diesel, ethanol ED95, NG, LPG, petrol,...
  - 10.1.5.2 Engine combustion system (e.g. compressed ignition or positive ignition).
  - 10.1.5.3 Type-approval number.
  - 10.1.5.4 Engine rebuilt.
  - 10.1.5.5 Engine manufacturer.
  - 10.1.5.6 Engine model.
  - 10.1.5.7 Engine production year and month.
  - 10.1.5.8 Engine identification number.
  - 10.1.5.9 Engine displacement [litres].
  - 10.1.5.10 Number of cylinders.
  - 10.1.5.11 Engine rated power [kW @ rpm].
  - 10.1.5.12 Engine peak torque [Nm @ rpm].
  - 10.1.5.13 Idle speed [rpm].
  - 10.1.5.14 Manufacturer supplied full-load torque curve available (yes/no).

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- 10.1.5.1 ~~Manufacturer~~ supplied full-load torque curve reference number.
- 10.1.5.1 ~~De~~NOx system (e.g. EGR, SCR).
- 10.1.5.1 ~~Type~~ of catalytic converter.
- 10.1.5.1 ~~Type~~ of Particulate trap.
- 10.1.5.1 ~~After~~-treatment modified with respect to type-approval? (yes/no)
- 10.1.5.2 ~~Engine~~ ECU information (Software calibration number).
- 10.1.6. Vehicle information
  - 10.1.6.1 ~~Vehicle~~ owner.
  - 10.1.6.2 ~~Vehicle~~ type (e.g. M3, N3) and application (e.g. rigid or...)
  - 10.1.6.3 ~~Vehicle~~ manufacturer.
  - 10.1.6.4 ~~Vehicle~~ Identification Number.
  - 10.1.6.5 ~~Vehicle~~ registration number and country of registration.
  - 10.1.6.6 ~~Vehicle~~ model.
  - 10.1.6.7 ~~Vehicle~~ production year and month.
  - 10.1.6.8 ~~Transmission~~ type (e.g. manual, automatic or other).
  - 10.1.6.9 ~~Number~~ of forward gears.
  - 10.1.6.10 ~~O~~dometer reading at test start [km].
  - 10.1.6.11 ~~G~~ross vehicle combination weight rating (GVW) [kg].
  - 10.1.6.12 ~~T~~ire size [Not mandatory].
  - 10.1.6.13 ~~T~~ail pipe diameter [mm] [Not mandatory].
  - 10.1.6.14 ~~N~~umber of axles.
  - 10.1.6.15 ~~F~~uel tank(s) capacity [litres] [Not mandatory].
  - 10.1.6.16 ~~N~~umber of fuel tanks [Not mandatory].
  - 10.1.6.17 ~~R~~eagent tank(s) capacity [litres] [Not mandatory].
  - 10.1.6.18 ~~N~~umber of reagent tanks [Not mandatory].
- 10.1.7. Test route characteristics
  - 10.1.7.1 ~~O~~dometer reading at test start [km]
  - 10.1.7.2 ~~D~~uration [s]
  - 10.1.7.3 ~~Average~~ ambient conditions (as calculated from the instantaneous measured data)...
  - 10.1.7.4 ~~Ambient~~ conditions sensor information (type and location of sensors)
  - 10.1.7.5 ~~Vehicle~~ speed information (for example cumulative speed distribution)
  - 10.1.7.6 ~~Shares~~ of the time of the trip characterised by urban,...
  - 10.1.7.7 ~~Shares~~ of the time of the trip characterised by accelerating,...
- 10.1.8. Instantaneous measured data
  - 10.1.8.1 ~~T~~HC concentration [ppm].
  - 10.1.8.2 ~~C~~O concentration [ppm].
  - 10.1.8.3 ~~N~~Ox concentration [ppm].
  - 10.1.8.4 ~~C~~O<sub>2</sub> concentration [ppm].
  - 10.1.8.5 ~~C~~H<sub>4</sub> concentration [ppm] for P.I. engines only.
  - 10.1.8.6 ~~Exhaust~~ gas flow [kg/h].
  - 10.1.8.7 ~~Exhaust~~ temperature [°C].
  - 10.1.8.8 ~~Ambient~~ air temperature [°C].
  - 10.1.8.9 ~~Ambient~~ pressure [kPa].
  - 10.1.8.10 ~~Ambient~~ humidity [g/kg] [Not mandatory].
  - 10.1.8.11 ~~E~~ngine torque [Nm].
  - 10.1.8.12 ~~E~~ngine speed [rpm].
  - 10.1.8.13 ~~E~~ngine fuel flow [g/s].
  - 10.1.8.14 ~~E~~ngine coolant temperature [°C].

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- 10.1.8.1 Vehicle ground speed [km/h] from ECU and GPS.
- 10.1.8.1 Vehicle latitude [degree] (Accuracy needs to be sufficient to enable...)
- 10.1.8.1 Vehicle longitude [degree].
- 10.1.9. Instantaneous calculated data
  - 10.1.9.1 THC mass [g/s].
  - 10.1.9.2 CO mass [g/s].
  - 10.1.9.3 NOx mass [g/s].
  - 10.1.9.4 CO<sub>2</sub> mass [g/s].
  - 10.1.9.5 CH<sub>4</sub> mass [g/s] for P.I. engines only.
  - 10.1.9.6 THC cumulated mass [g].
  - 10.1.9.7 CO cumulated mass [g].
  - 10.1.9.8 NOx cumulated mass [g].
  - 10.1.9.9 CO<sub>2</sub> cumulated mass [g].
  - 10.1.9.10 CH<sub>4</sub> cumulated mass [g] for P.I. engines only.
  - 10.1.9.11 Calculated fuel rate [g/s].
  - 10.1.9.12 Engine power [kW].
  - 10.1.9.13 Engine work [kWh].
  - 10.1.9.14 Work window duration [s].
  - 10.1.9.15 Work window average engine power [%].
  - 10.1.9.16 Work window THC conformity factor [-].
  - 10.1.9.17 Work window CO conformity factor [-].
  - 10.1.9.18 Work window NOx conformity factor [-].
  - 10.1.9.19 Work window CH<sub>4</sub> conformity factor [-] for P.I. engines only....
  - 10.1.9.20 CO<sub>2</sub> mass window duration [s].
  - 10.1.9.21 CO<sub>2</sub> mass window THC conformity factor [-].
  - 10.1.9.22 CO<sub>2</sub> mass window CO conformity factor [-].
  - 10.1.9.23 CO<sub>2</sub> mass window NOx conformity factor [-].
  - 10.1.9.24 CO<sub>2</sub> mass window CH<sub>4</sub> conformity factor [-] for P.I. engines...
- 10.1.10. Averaged and integrated data
  - 10.1.10.1 Average THC concentration [ppm] [Not mandatory].
  - 10.1.10.2 Average CO concentration [ppm] [Not mandatory].
  - 10.1.10.3 Average NOx concentration [ppm] [Not mandatory].
  - 10.1.10.4 Average CO<sub>2</sub> concentration [ppm] [Not mandatory].
  - 10.1.10.5 Average CH<sub>4</sub> concentration [ppm] for gas engines only [Not mandatory]....
  - 10.1.10.6 Average Exhaust gas flow [kg/h] [Not mandatory].
  - 10.1.10.7 Average Exhaust temperature [°C] [Not mandatory].
  - 10.1.10.8 THC emissions [g].
  - 10.1.10.9 CO emissions [g].
  - 10.1.10.10 NOx emissions [g].
  - 10.1.10.11 CO<sub>2</sub> emissions [g].
  - 10.1.10.12 CH<sub>4</sub> emissions [g] for gas engines only.
- 10.1.11. Pass-fail results
  - 10.1.11.1 Minimum, maximum, and 90 % cumulative percentile for:
    - 10.1.11.2 Work window THC conformity factor [-].
    - 10.1.11.3 Work window CO conformity factor [-].
    - 10.1.11.4 Work window NOx conformity factor [-].
    - 10.1.11.5 Work window CH<sub>4</sub> conformity factor [-] for P.I. engines only....
    - 10.1.11.6 CO<sub>2</sub> mass window THC conformity factor [-].
    - 10.1.11.7 CO<sub>2</sub> mass window CO conformity factor [-].

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- 10.1.11. ~~CO~~2 mass window NOx conformity factor [-].
- 10.1.11. ~~CO~~2 mass window CH4 conformity factor [-] for P.I. engines...
- 10.1.11. ~~Work~~ window: Minimum and maximum average window power [%].
- 10.1.11. ~~CO~~2 mass window: Minimum and maximum window duration [s].
- 10.1.11. ~~Work~~ window: Percentage of valid windows.
- 10.1.11. ~~CO~~2 mass window: Percentage of valid windows.
- 10.1.12. Test verifications
  - 10.1.12. ~~THC~~ analyser zero, span and audit results, pre and post...
  - 10.1.12. ~~CO~~ analyser zero, span and audit results, pre and post...
  - 10.1.12. ~~NOx~~ analyser zero, span and audit results, pre and post...
  - 10.1.12. ~~CO~~2 analyser zero, span and audit results, pre and post...
  - 10.1.12. ~~Data~~ consistency check results, according to Section 3.2 of Appendix...
  - 10.1.12. ~~Results~~ of the linear regression described in point 3.2.1 of...
  - 10.1.12. ~~Result~~ of the consistency check of the ECU data in...
  - 10.1.12. ~~Result~~ of the consistency check of the Brake-specific fuel consumption...
  - 10.1.12. ~~Result~~ of the consistency check of the Odometer in accordance...
  - 10.1.12. ~~Result~~ of the consistency check of the ambient pressure in...
- 10.1.13. List of further attachments where these exist.

## Appendix 1

Test procedure for vehicle emissions testing with portable emissions measurement...

1. INTRODUCTION
2. TEST PROCEDURE
  - 2.1. General requirements
  - 2.2. Test parameters
    - 2.2.1. Data reporting format
  - 2.3. Preparation of the vehicle
  - 2.4. Installation of the measuring equipment
    - 2.4.1. Main Unit
    - 2.4.2. Exhaust flow meter
    - 2.4.3. Global Positioning System
    - 2.4.4. Connection with the vehicle ECU
    - 2.4.5. Sampling of gaseous emissions
  - 2.5. Pre-test procedures
    - 2.5.1. Starting and stabilising the PEMS instruments
    - 2.5.2. Cleaning the sampling system
    - 2.5.3. Checking and calibrating the analysers
    - 2.5.4. Cleaning the EFM
  - 2.6. Emissions test run
    - 2.6.1. Test start
    - 2.6.2. Test run
    - 2.6.3. End of test sequence
  - 2.7. Verification of the measurements
    - 2.7.1. Checking of the analysers
    - 2.7.2. Zero drift

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- 2.7.3. Span drift
- 2.7.4. Drift verification
- 2.7.5. Drift correction
- 3. CALCULATION OF THE EMISSIONS
  - 3.1. Time alignment of data
    - 3.1.1. Gas analysers data
    - 3.1.2. Gas analysers and EFM data
    - 3.1.3. PEMS and engine data
    - 3.1.4. Procedure for improved time-alignment of the PEMS data
  - 3.2. Data consistency checks
    - 3.2.1. Analysers and EFM data
    - 3.2.2. ECU torque data
    - 3.2.3. Brake-Specific Fuel Consumption
    - 3.2.4. Odometer
    - 3.2.5. Ambient pressure
  - 3.3. Dry-Wet correction
  - 3.4. NOx correction for humidity and temperature
  - 3.5. Calculation of the instantaneous gaseous emissions
- 4. DETERMINATION OF EMISSIONS AND CONFORMITY FACTORS
  - 4.1. Averaging window principle
  - 4.2. Work based method
    - 4.2.1. Calculation of the specific emissions
    - 4.2.2. Selection of valid windows
      - 4.2.2.1. If the percentage of valid windows is less than 50 %,...
      - 4.2.2.2. In any case, the lower threshold shall not be lower...
      - 4.2.2.3. The test shall be void if the percentage of valid...
    - 4.2.3. Calculation of the conformity factors
  - 4.3. CO2 mass based method
    - 4.3.1. Selection of valid windows
      - 4.3.1.1. If the percentage of valid windows is less than 50 %,...
      - 4.3.1.2. In any case, the lowered value in above formula shall...
      - 4.3.1.3. The test shall be void if the percentage of valid...
    - 4.3.2. Calculation of the conformity factors

## Appendix 2

### Portable measurement equipment

- 1. GENERAL
- 2. MEASURING EQUIPMENT
  - 2.1. Gas analysers general specifications
  - 2.2. Gas analysers technology
  - 2.3. Sampling of gaseous emissions
  - 2.4. Other instruments
- 3. AUXILIARY EQUIPMENT
  - 3.1. Exhaust Gas Flow Meter (EFM) tailpipe connection
  - 3.2. PEMS location and mounting hardware
  - 3.3. Electrical power

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### Appendix 3

#### Calibration of portable measurement equipment

1. EQUIPMENT CALIBRATION AND VERIFICATION
  - 1.1. Calibration gases
  - 1.2. Leakage test
  - 1.3. Response time check of the analytical system

### Appendix 4

#### Method to check the conformity of the ECU torque signal...

1. INTRODUCTION
2. THE 'MAXIMUM TORQUE' METHOD
  - 2.1. The 'maximum torque' method consists of demonstrating that a point...
  - 2.2. If a point on the reference maximum torque curve as...

### ANNEX III

#### VERIFYING EXHAUST EMISSIONS

1. INTRODUCTION
  - 1.1. This Annex sets out the test procedure for verifying exhaust...
2. GENERAL REQUIREMENTS
  - 2.1. The requirements for conducting the tests and interpreting the results...
  - 2.2. In the case of dual-fuel engines and vehicles, the additional...
  - 2.3. For testing positive ignition engines by using an exhaust dilution...

### ANNEX IV

#### EMISSIONS DATA REQUIRED AT TYPE-APPROVAL FOR ROADWORTHINESS PURPOSES

1. INTRODUCTION
  - 1.1. This Annex sets out the procedure for measuring carbon monoxide...
  - 1.2. This Annex does not apply to dual-fuel engines and vehicles....
2. GENERAL REQUIREMENTS
  - 2.1. The general requirements shall be those set out in Sections...
  - 2.2. The atomic ratios set out in Section 5.3.7.3 shall be...
  - 2.3. The table in point 1.4.3 of Appendix 5 to Annex...
  - 2.4. The manufacturer shall confirm the accuracy of the Lambda value...
3. TECHNICAL REQUIREMENTS
  - 3.1. The technical requirements shall be those set out in Annex...
  - 3.2. The reference fuels specified in Section 2.1 of Annex 5...



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## ANNEX V

### VERIFYING EMISSIONS OF CRANKCASE GASES

1. INTRODUCTION
  - 1.1. This Annex sets out the provisions and test procedures for...
2. GENERAL REQUIREMENTS
  - 2.1. No crankcase emissions shall be discharged directly into the ambient...
3. SPECIFIC REQUIREMENTS
  - 3.1. Point 3.1.1. and 3.1.2. shall apply to compression-ignition engines, dual-fuel...
    - 3.1.1. Engines equipped with turbochargers, pumps, blowers, or superchargers for air...
    - 3.1.2. Crankcase emissions that are routed into the exhaust upstream of...
  - 3.2. Points 3.2.1 and 3.2.2 shall apply to positive-ignition engines fuelled...
    - 3.2.1. The pressure in the crankcase shall be measured over the...
      - 3.2.1.1. The pressure in the intake manifold shall be measured to...
      - 3.2.1.2. The pressure measured in the crankcase shall be measured to...
    - 3.2.2. Compliance with point 2.1 shall be deemed satisfactory if, in...

## ANNEX VI

### REQUIREMENTS TO LIMIT OFF-CYCLE EMISSIONS (OCE) AND IN-USE EMISSIONS

1. INTRODUCTION
  - 1.1. This Annex sets out the performance requirements and prohibition of...
2. DEFINITIONS
3. GENERAL REQUIREMENTS
  - 3.1. The general requirements shall be those set out in paragraph...
  - 3.2. In the case of dual-fuel engines, adaptive strategies are allowed...
4. PERFORMANCE REQUIREMENTS
  - 4.1. The performance requirements shall be those set out in paragraph...
    - 4.1.1. Point (a) of paragraph 5.1.2 of Annex 10 to UNECE...
    - 4.1.2. Section 5.2.1. of Annex 10 to UN/ECE Regulation No 49...
    - 4.1.3. The applicable emission limits shall be the following:
    - 4.1.4. ....
5. AMBIENT AND OPERATING CONDITIONS
  - 5.1. The ambient and operating conditions for the purpose of this...
6. OFF-CYCLE LABORATORY TESTING AND IN-USE VEHICLE TESTING AT TYPE-APPROVAL
  - 6.1. The off-cycle test procedure during type-approval shall follow the off-cycle...
    - 6.1.1. The first subparagraph of paragraph 7.3 of Annex 10 to...
    - 6.1.2. Section 7.2.1 of Annex 10 to UN/ECE Regulation No 49...
    - 6.1.3. Section 7.3 of Annex 10 to UN/ECE Regulation No 49...
      - 6.1.3.1. ....
      - 6.1.3.2. ....

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- 6.1.4. Section 7.5.4 of Annex 10 to UN/ECE Regulation No 49...
- 6.1.5. Section 7.5.5 of Annex 10 to UN/ECE Regulation No 49...
- 6.1.6. Section 7.5.6 of Annex 10 to UN/ECE Regulation No 49...
- 6.2. Dual-fuel engines and vehicles
  - 6.2.1. In the case of Type 1B, Type 2B and Type...
- 6.3. Additional requirements with respect to in-use vehicle testing will be...
- 7. STATEMENT OF OFF-CYCLE EMISSION COMPLIANCE
  - 7.1. The statement of off-cycle emission compliance shall be drawn up...
    - 7.1.1. The first subparagraph of paragraph 10 of Annex 10 to...
- 8. DOCUMENTATION
- 9. STATEMENT OF OFF-CYCLE EMISSION COMPLIANCE
  - 9.1. ....
- 10. DOCUMENTATION

## Appendix 1

### PEMS demonstration test at type-approval

- 1. INTRODUCTION
- 2. TEST VEHICLE
  - 2.1. The vehicle used for demonstrating the PEMS demonstration test shall...
  - 2.2. The availability and conformity of the ECU data-stream information shall...
  - 2.3. Manufacturers shall ensure that vehicles can be tested with PEMS...
- 3. TEST CONDITIONS
  - 3.1. Vehicle payload
  - 3.2. Ambient conditions
  - 3.3. The engine coolant temperature shall be in accordance with point...
  - 3.4. Fuel, lubricants and reagent
  - 3.5. Trip and operational requirements
- 4. EMISSIONS EVALUATION
  - 4.1. The test shall be conducted and the test results calculated...
- 5. REPORT
  - 5.1. A technical report describing the PEMS demonstration test shall show...

## ANNEX VII

### VERIFYING THE DURABILITY OF ENGINE SYSTEMS

- 1. INTRODUCTION
  - 1.1. This Annex sets out the procedures for selecting engines to...
  - 1.2. This Annex also sets out the emission and non-emission-related maintenance...
  - 1.3. In the case of dual-fuel engines, paragraph 6.5 of Annex...
- 2. SELECTION OF ENGINES FOR ESTABLISHING USEFUL LIFE DETERIORATION FACTORS

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- 2.1. The selection of the engines shall be carried out in...
- 2.2. ....
- 2.3. ....
  - 2.3.1. ....
- 3. ESTABLISHING USEFUL LIFE DETERIORATION FACTORS
  - 3.1. The requirements for the establishment of useful life deterioration factors...
    - 3.1.1. Paragraph 3.2.1.3 of Annex 7 to UNECE Regulation No 49 shall...
    - 3.1.2. Paragraph 3.2.1.9 of Annex 7 to UNECE Regulation No 49 shall...
    - 3.1.3. Paragraph 3.5.1 of Annex 7 to UNECE Regulation No 49 shall...
    - 3.1.4. Paragraph 3.7.1 of Annex 7 to UN/ECE Regulation No 49 shall...
    - 3.1.5. Paragraph 3.8.1 of Annex 7 to UNECE Regulation No 49 shall...
    - 3.1.6. Paragraph 3.8.3 of Annex 7 to UNECE Regulation No 49 shall...
  - 3.2. The use of market fuels is allowed for conducting the...
    - 3.2.1. In-service and dynamometer service accumulation
      - 3.2.1.1. ....
      - 3.2.1.2. ....
      - 3.2.1.3. ....
      - 3.2.1.4. ....
      - 3.2.1.5. ....
      - 3.2.1.6. ....
      - 3.2.1.7. ....
      - 3.2.1.8. Minimum service accumulation period
      - 3.2.1.9. ....
      - 3.2.1.10. ....
    - 3.2.2. ....
  - 3.3. Engine testing
    - 3.3.1. Engine system stabilisation
      - 3.3.1.1. ....
      - 3.3.1.2. ....
    - 3.3.2. Service accumulation testing
      - 3.3.2.1. ....
      - 3.3.2.2. ....
      - 3.3.2.3. ....
  - 3.4. Reporting
    - 3.4.1. ....
    - 3.4.2. ....
  - 3.5. Determination of deterioration factors
    - 3.5.1. ....
    - 3.5.2. ....
    - 3.5.3. ....
  - 3.6. Assigned deterioration factors
    - 3.6.1. ....
  - 3.7. Application of deterioration factors
    - 3.7.1. ....
    - 3.7.2. ....
    - 3.7.3. ....
  - 3.8. Checking of conformity of production
    - 3.8.1. ....
    - 3.8.2. ....
    - 3.8.3. ....
- 4. MAINTENANCE

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- 4.1. Emission-related scheduled maintenance
  - 4.1.1. ....
  - 4.1.2. ....
  - 4.1.3. ....
- 4.2. Changes to scheduled maintenance
  - 4.2.1. ....
- 4.3. Non-emission-related scheduled maintenance
  - 4.3.1. ....
- 4.4. Repair
  - 4.4.1. ....
  - 4.4.2. ....

## ANNEX VIII

### CO<sub>2</sub> EMISSIONS AND FUEL CONSUMPTION

- 1. INTRODUCTION
  - 1.1. This Annex sets out the provisions and test procedures for...
- 2. GENERAL REQUIREMENTS
  - 2.1. The general requirements shall be those set out in paragraph...
  - 2.2. ....
- 3. DETERMINATION OF CO<sub>2</sub> EMISSIONS
  - 3.1. The requirements for the determination of CO<sub>2</sub> emissions shall...
    - 3.1.1. Paragraph 3.1 and Appendix 1 of Annex 12 to UNECE...
    - 3.1.2. Data evaluation
    - 3.1.3. Calculation of cycle averaged emission
  - 3.2. Dilute measurement
    - 3.2.1. Measurement
    - 3.2.2. Data evaluation
    - 3.2.3. Calculation of cycle averaged emission
  - 3.3. Calculation of brake specific emissions
    - 3.3.1. WHTC
    - 3.3.2. WHSC
- 4. DETERMINATION OF FUEL CONSUMPTION
  - 4.1. The requirements for the determination of fuel consumption shall be...
  - 4.2. Data evaluation
  - 4.3. Calculation of cycle averaged fuel consumption
  - 4.4. Calculation of brake specific fuel consumption
    - 4.4.1. WHTC
    - 4.4.2. WHSC
- 5. Provisions on CO<sub>2</sub> emissions and fuel consumption for extension...
  - 5.1. The provisions on CO<sub>2</sub> emissions and fuel consumption for...
    - 5.1.1. Paragraph A.1.1.1 of Appendix 1 of Annex 12 to UNECE...
    - 5.1.2. Paragraph A.1.2.1 of Appendix 1 of Annex 12 to UNECE...
  - 5.2. Extension of a type-approval under this Section shall not be...

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## Appendix 1

Provisions on CO2 emissions and fuel consumption for extension of...

1. INTRODUCTION
  - 1.1. ....
2. GENERAL REQUIREMENTS
  - 2.1. ....
    - 2.1.1. ....
    - 2.1.2. Section 5.2.4 of UN/ECE Regulation 101 referred to in point...
    - 2.1.3. Point 1.4.3 of Annex 6 to UN/ECE Regulation 101 referred...
    - 2.1.4. ....

### ANNEX IX

#### SPECIFICATIONS OF REFERENCE FUELS

### ANNEX X

#### ON-BOARD DIAGNOSTICS

1. INTRODUCTION
  - 1.1. This Annex sets out the functional aspects of on-board diagnostic...
2. GENERAL REQUIREMENTS
  - 2.1. The general requirements shall be those set out in paragraph...
    - 2.1.1. Paragraphs 2.3.2.1 and 2.3.2.2 of Annex 9A to UNECE Regulation...
  - 2.2. The Commission shall conduct a review of the monitoring requirements...
  - 2.3. Additional provisions concerning monitoring requirements
    - 2.3.1. ....
      - 2.3.1.1. ....
    - 2.3.2. ....
      - 2.3.2.1. ....
    - 2.3.3. ....
      - 2.3.3.1. ....
      - 2.3.3.2. ....
      - 2.3.3.3. ....
      - 2.3.3.4. ....
  - 2.4. Alternative approval
    - 2.4.1. If requested by the manufacturer, for vehicles of categories M...
      - 2.4.1.1. The OBD standard Euro 6 – plus IUPR in Table...
      - 2.4.1.2. The OBD standard Euro 6 – 1 in Table 1...
      - 2.4.1.3. The OBD standard Euro 6 – 2 in Table 1...
        - 2.4.1.a. If such alternative approval is used, the information related to...
        - 2.4.1.b. The equivalences set out in point 2.4.1. shall apply in...
    - 2.4.2. Small series production
    - 2.4.3. ....
    - 2.4.4. The approval authority shall inform the Commission of the circumstances...
  - 2.5. Conformity of production
  - 2.6. Dual-fuel engines and vehicles

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- 2.6.1. Dual-fuel engines and vehicles shall comply with the requirements applicable...
- 2.6.2. In addition to point 2.6.1, dual-fuel engines and vehicles shall...
- 2.6.3. The provisions for alternative approval set out in point 2.4.1...
- 3. PERFORMANCE REQUIREMENTS
  - 3.1. The performance requirements shall be those set out in Section...
  - 3.2. OBD threshold limits
    - 3.2.1. The OBD threshold limits (hereinafter ‘ OTLs ’ ) applicable...
    - 3.2.2. Until the end of the phase-in period set out in...
- 4. DEMONSTRATION REQUIREMENTS
  - 4.1. The demonstration requirements shall be those set out in paragraph...
  - 4.2. ....
- 5. DOCUMENTATION REQUIREMENTS
  - 5.1. The documentation requirements shall be those set out in paragraph...
- 6. IN-USE PERFORMANCE REQUIREMENTS
  - 6.1. The in-use performance requirements shall be those set out in...
    - 6.1.1. The documentation package shall be provided in accordance with the...
    - 6.1.2. Minimum in-use performance ratio
    - 6.1.3. The conditions set out in paragraph A.1.5 of Appendix 1...
  - 6.2. Assessment of the in-use performance during the phase-in period
    - 6.2.1. During the phase-in period set out in Article 4(7) the...
    - 6.2.2. During the phase-in-period set out in Article 4(7), compliance of...
    - 6.2.3. ....
  - 6.3. Documentation requirements
    - 6.3.1. ....
      - 6.3.1.1. ....
  - 6.4. Statement of OBD in-use Performance compliance
    - 6.4.1. ....
    - 6.4.2. ....
    - 6.4.3. ....
    - 6.4.4. ....
  - 6.5. Assessment of the in-use performance
    - 6.5.1. ....
    - 6.5.2. ....
      - 6.5.2.1. ....
      - 6.5.2.2. ....
      - 6.5.2.3. ....
    - 6.5.3. ....
    - 6.5.4. ....
    - 6.5.5. ....
      - 6.5.5.1. ....

## Appendix 1

### Additional monitoring requirements

- 1. LOW EGR FLOW
  - 1.1. ....

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- 2. EGR COOLER UNDERPERFORMANCE
  - 2.1. ....
    - 2.1.1. ....
- 3. LOW BOOST PRESSURE
  - 3.1. ....
    - 3.1.1. ....
    - 3.1.2. ....
- 4. MALFUNCTIONING INJECTORS
  - 4.1. ....
  - 4.2. ....
    - 4.2.1. ....

## Appendix 2

### Performance monitoring

- 1. GENERAL
  - 1.1. ....
- 2. DEMONSTRATION OF PERFORMANCE MONITORING
  - 2.1. Approval of the failure classification
    - 2.1.1. ....
  - 2.2. Approval of the performance monitoring selected by the manufacturer
    - 2.2.1. ....
    - 2.2.2. The performance threshold selected by the manufacturer for the monitor...
      - 2.2.3. ....
      - 2.2.4. ....
        - 2.2.4.1. ....
  - 2.3. Qualification of a deteriorated component
    - 2.3.1. ....
    - 2.3.2. ....
  - 2.4. Demonstration of the OBD performance
    - 2.4.1. ....

## Appendix 3

### Demonstration requirements in case of performance monitoring of a wall-flow...

- 1. GENERAL
  - 1.1. ....
    - 1.1.1. ....
- 2. QUALIFICATION TEST
  - 2.1. Principle
    - 2.1.1. ....
      - 2.1.1.1. ....
    - 2.1.2. ....
      - 2.1.2.1. ....
  - 2.2. Qualification process
    - 2.2.1. ....
    - 2.2.2. ....
  - 2.3. Demonstration of the OBD performance
    - 2.3.1. ....

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## Appendix 4

Assessment of the in-use performance of the on-board diagnostic system...

1. GENERAL
  - 1.1. ....
2. PROCEDURE FOR DEMONSTRATING OBD IN-USE PERFORMANCE
  - 2.1. ....
    - 2.1.1. ....
    - 2.1.2. ....
      - 2.1.2.1. ....
  - 2.2. ....
  - 2.3. ....
  - 2.4. ....
    - 2.4.1. ....
  - 2.5. ....
3. OBD IN-USE PERFORMANCE DATA
  - 3.1. ....
4. ENGINE OR VEHICLE SELECTION
  - 4.1. Engine selection
    - 4.1.1. ....
    - 4.1.2. ....
  - 4.2. Vehicle selection
    - 4.2.1. Vehicle segments
      - 4.2.1.1. ....
      - 4.2.1.2. ....
      - 4.2.1.3. ....
      - 4.2.1.4. ....
    - 4.2.2. Vehicle qualification
      - 4.2.2.1. ....
      - 4.2.2.2. ....
      - 4.2.2.3. ....
      - 4.2.2.4. ....
      - 4.2.2.5. ....
5. IN-USE PERFORMANCE SURVEYS
  - 5.1. Collection of in-use performance data
    - 5.1.1. ....
    - 5.1.2. ....
  - 5.2. Assessment of the in-use performance
    - 5.2.1. ....
    - 5.2.2. ....
    - 5.2.3. ....
6. REPORT TO THE APPROVAL AUTHORITY

## Appendix 5

Assessment of the in-use performance of the on-board diagnostic system...

1. GENERAL
  - 1.1. This Appendix specifies the process to be followed for the...
2. PROCEDURE FOR OBD IN-USE PERFORMANCE ASSESSMENT
  - 2.1. The in-use performance assessment during the phase-in period set out...
  - 2.2. Each manufacturer's first survey shall start when the first complete...



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- 2.3. The surveys shall be organised and conducted by each manufacturer,...
- 2.4. Data Handling During the Phase-In Period set out in Article...
  - 2.4.1. In order to achieve the aim of the phase-in period...
  - 2.4.2. The passing of information considered confidential or commercially sensitive under...
  - 2.4.3. Examples of the kinds of aspects of the complementary data...
- 2.5. Section 2.4 of Appendix 4 shall apply to the problems...
- 2.6. Engines or vehicles where the collection of in-use performance data...
- 3. OBDD IN-USE PERFORMANCE DATA
  - 3.1. The OBDD in-use performance data to be considered for assessing...
- 4. VEHICLE AND ENGINE SELECTION
  - 4.1. Engine selection
    - 4.1.1. In each of the two surveys required by Section 2.1...
    - 4.1.2. If before 1 July 2015 a manufacturer has placed more...
    - 4.1.3. One of the surveys undertaken shall be performed using vehicles...
    - 4.1.4. Engines of a single engine family or OBDD engine family...
  - 4.2. Vehicle selection
    - 4.2.1. The vehicle selection rules shall be those defined in Section...
- 5. IN-USE PERFORMANCE SURVEYS
  - 5.1. Collection of in-use performance data
    - 5.1.1. The rules concerning the collection of in-use performance data shall...
  - 5.2. Assessment of the in-use performance
    - 5.2.1. An assessment of the in-use performance shall be made for...
    - 5.2.2. The actual performance ratio per group of monitors for an...
    - 5.2.3. The assessment of the in-use performance of the OBDD engine...
    - 5.2.4. If any of the conditions mentioned in Section 6.5.1 of...
- 6. REPORT TO THE APPROVAL AUTHORITY AND THE COMMISSION

## Appendix 6

Model of an OBDD in-use performance compliance statement

## ANNEX XI

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

- 1. INTRODUCTION
  - 1.1. This Annex contains additional requirements for the type-approval of replacement...
- 2. GENERAL REQUIREMENTS
  - 2.1. Marking
    - 2.1.1. Each replacement pollution control device shall bear at least the...
    - 2.1.2. Each original replacement pollution control device shall bear at least...
  - 2.2. Documentation
    - 2.2.1. Each replacement pollution control device shall be accompanied by the...

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- 2.2.2. Each original replacement pollution control device shall be accompanied by...
    - 2.3. For an original replacement pollution control device, the vehicle or...
  3. EC SEPARATE TECHNICAL UNIT TYPE-APPROVAL MARK
    - 3.1. Every replacement pollution control device conforming to the type approved...
    - 3.2. This mark shall consist of a rectangle surrounding the lower-case...
    - 3.3. The EC type-approval mark shall be affixed to the replacement...
    - 3.4. An example of the EC type-approval mark for a separate...
  4. TECHNICAL REQUIREMENTS
    - 4.1. General requirements
      - 4.1.1. The replacement pollution control device shall be designed, constructed and...
      - 4.1.2. The installation of the replacement pollution control device shall be...
      - 4.1.3. If the original equipment pollution control device includes thermal protections,...
      - 4.1.4. Upon request of the applicant for the type-approval of the...
    - 4.2. General durability requirements
    - 4.3. Requirements regarding emissions
      - 4.3.1. Outline of procedure for evaluation of emissions
        - 4.3.1.1. Where the replacement pollution control device does not comprise the...
        - 4.3.1.2. The emissions control system shall be aged according to the...
      - 4.3.2. Procedure for evaluation of emissions performance of a replacement pollution...
        - 4.3.2.1. The engine or engines shall be fitted with a new...
        - 4.3.2.2. Exhaust gas test with replacement pollution control device
        - 4.3.2.3. Initial evaluation of the emission of pollutants of engines equipped...
        - 4.3.2.4. Durability of emissions performance
        - 4.3.2.5. Exhaust gas test with aged replacement pollution control device
        - 4.3.2.6. Determination of ageing factor for the replacement pollution control device...
        - 4.3.2.7. Evaluation of the emission of pollutants of engines equipped with...
      - 4.3.3. Replacement pollution control device technology family
      - 4.3.4. Assessment of the durability of emissions performance of a replacement...
        - 4.3.4.1. Determination of durability performance of family members
      - 4.3.5. Fuels
    - 4.4. Requirements regarding exhaust back-pressure
    - 4.5. Requirements regarding OBD compatibility (applicable only to replacement pollution control...
      - 4.5.1. OBD compatibility demonstration is required only when the original pollution...
      - 4.5.2. The compatibility of the replacement pollution control device with the...
      - 4.5.3. The provisions in UN/ECE Regulation No 49 applicable to components...
      - 4.5.4. The replacement pollution control device manufacturer may use the same...

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- 4.5.5. In order to verify the correct installation and functioning of...
- 4.5.6. The malfunction indicator shall not activate during vehicle operation required...
- 4.6. Requirements regarding compatibility with the NO<sub>x</sub> control measures (applicable...
  - 4.6.1. NO<sub>x</sub> control measures compatibility demonstration is required only when...
  - 4.6.2. The compatibility of the replacement pollution control device with the...
  - 4.6.3. The provisions in UN/ECE Regulation No 49 applicable to components...
  - 4.6.4. The replacement pollution control device manufacturer may use the same...
  - 4.6.5. Point 4.5.5 shall apply to NO<sub>x</sub> control measures monitored...
- 5. CONFORMITY OF PRODUCTION
  - 5.1. Measures to ensure the conformity of production shall be taken...
  - 5.2. Special provisions
    - 5.2.1. The checks referred to in Section 2.2 of Annex X...
    - 5.2.2. For the application of Article 12(2) of Directive 2007/46/EC, the...

## Appendix 1

MODEL Information document No ...

- 0. GENERAL
  - 0.1. Make (trade name of manufacturer): ...
  - 0.2. Type ...
  - 0.3. Means of identification of type: ...
  - 0.5. Name and address of manufacturer: ...
  - 0.7. In the case of components and separate technical units, location...
  - 0.8. Name(s) and address(es) of assembly plant(s): ...
  - 0.9. Name and address of the manufacturer's authorised representative (if any):...
- 1. DESCRIPTION OF THE DEVICE
  - 1.1. Type of the replacement pollution control device: (oxidation catalyst, three-way...
  - 1.2. Drawings of the replacement pollution control device, identifying in particular...
  - 1.3. Description of the engine and vehicle type or types for...
  - 1.4. Description and drawings showing the position of the replacement pollution...
- 2. ACCESS TO VEHICLE REPAIR AND MAINTENANCE INFORMATION
  - 2.1. Address of principal website for access to vehicle repair and...
  - 2.2. Terms and conditions of access to website
  - 2.3. Format of the vehicle repair and maintenance information accessible through...

## Appendix 2

MODEL INFORMATION DOCUMENT (CERTIFICATE)

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## EC TYPE-APPROVAL CERTIFICATE

### SECTION I

0.1. Make (trade name of manufacturer): ...

- 0.1. Make (trade name of manufacturer): ...
- 0.2. Type: ...
- 0.3. Means of identification of type marked on the component/separate technical...
- 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...
- 0.8. Name and address(es) of assembly plant(s): ...
- 0.9. Name and address of manufacturer's representative: ...

### SECTION II

#### 1. Additional information

- 1. Additional information
  - 1.1. Make and type of the replacement pollution control device: (oxidation...
  - 1.2. Engine and vehicle type(s) for which the pollution control device...
  - 1.3. Type(s) of engine on which the replacement pollution control device...
  - 1.3.1. Has the replacement pollution control device demonstrated compatibility with OBD...
- 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: ...

### Appendix 3

Durability procedure for evaluation of emissions performance of a replacement...

- 1. This Appendix sets out the durability procedure referred to in...
- 2. DESCRIPTION OF THE DURABILITY PROCEDURE
  - 2.1. The durability procedure shall consist of a data collection phase...
  - 2.2. Data collection phase
    - 2.2.1. The selected engine, equipped with the complete exhaust after-treatment system...
    - 2.2.2. Immediately after the cold start WHTC test-cycle, the engine shall...
    - 2.2.3. The test sequence set out in points 2.2.1 and 2.2.2...
    - 2.2.4. Alternatively, the relevant data can be collected by driving a...
    - 2.2.5. The type-approval authority shall refuse the temperature data obtained under...

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- 2.2.6. Temperatures in the replacement pollution control device shall be recorded...
- 2.2.7. In cases where the location with the highest temperature varies...
- 2.2.8. The number and locations of the temperature measurements shall be...
- 2.2.9. With the agreement of the type-approval authority, a single catalyst...
- 2.2.10. The temperatures shall be measured and recorded at a minimum...
- 2.2.11. The measured temperatures shall be tabulated into a histogram with...
- 2.2.12. The time in hours corresponding to each temperature bin must...
- 2.2.13. It is allowed to perform the data collection phase for...
- 2.2.14. In the case of systems operating in the presence of...
- 2.2.15. The total lubricant consumed during the data collection period, in...
- 2.3. Calculation of the equivalent ageing time corresponding to a reference...
  - 2.3.1. The temperatures recorded pursuant to points 2.2 to 2.2.15 shall...
  - 2.3.2. In the case specified in point 2.2.13, the value of...
  - 2.3.3. The equivalent ageing time corresponding to the reference temperature shall...
  - 2.3.4. The total equivalent ageing time shall be calculated in accordance...
  - 2.3.5. In the case referred to in point 2.2.13, AT shall...
- 2.4. Service accumulation schedule
  - 2.4.1. General requirements
    - 2.4.1.1. The service accumulation schedule shall allow acceleration of the ageing...
    - 2.4.1.2. The service accumulation schedule shall consist of a thermal accumulation...
    - 2.4.1.3. In the case of replacement pollution control devices operating in...
    - 2.4.1.4. For service accumulation schedules consisting of both thermal and lubricant...
    - 2.4.1.5. It is allowed to perform the service accumulation schedule at...
  - 2.4.2. Thermal accumulation schedule
    - 2.4.2.1. The thermal accumulation schedule shall simulate the effect of thermal...
    - 2.4.2.2. The engine used for the performance of the service accumulation...
    - 2.4.2.3. The temperatures shall be recorded over a minimum of two...
    - 2.4.2.4. The temperatures shall be recorded at suitable locations, chosen in...
    - 2.4.2.5. The effective ageing time corresponding to the thermal sequences referred...
    - 2.4.2.6. The total number of thermal sequences to be included in...

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- 2.4.2.7. It is allowed to reduce N TS and, consequently the...
- 2.4.2.8. When applying the measures referred to in points 2.4.4.6 and...
- 2.4.2.9. It is allowed to increase N TS and, consequently, the...
- 2.4.2.10 In the case referred to in point 2.4.1.5, the following...
- 2.4.2.11 In the case of an assembly of replacement pollution control...
- 2.4.3. Modified thermal accumulation schedule for devices operating in the presence...
  - 2.4.3.1. The modified thermal accumulation schedule for devices operating in the...
  - 2.4.3.2. The engine used for the service accumulation schedule, fitted with...
  - 2.4.3.3. The temperatures shall be recorded over a minimum of two...
  - 2.4.3.4. In order to minimise the time elapsed between the thermal...
  - 2.4.3.5. The effective ageing time corresponding to each modified thermal sequence...
  - 2.4.3.6. The total number of modified thermal sequences to be conducted...
  - 2.4.3.7. It is allowed to reduce N TS , and consequently...
  - 2.4.3.8. In addition to the measures referred to in point 2.4.3.7,...
  - 2.4.3.9. N TS shall never be less than 50 % of...
  - 2.4.3.10 If, as consequence of the application of the minimum number...
  - 2.4.3.11 It is allowed to increase N TS and consequently the...
  - 2.4.3.12 In the case referred to in point 2.4.1.5, points 2.4.2.10...
- 2.4.4. Lubricant consumption accumulation schedule
  - 2.4.4.1. The lubricant consumption accumulation schedule shall simulate the effect of...
  - 2.4.4.2. The lubricant consumed, in g/h, shall be determined over a...
  - 2.4.4.3. The engine shall be equipped with a constant volume oil...
  - 2.4.4.4. The theoretical time, in hours, that the thermal accumulation schedule...
  - 2.4.4.5. The number of thermal sequences or modified thermal sequences corresponding...
  - 2.4.4.6. The value of N shall be compared to the value...
  - 2.4.4.7. A lubricant consumption accumulation schedule may not have to be...
  - 2.4.4.8. Development of the lubricant consumption accumulation schedule
    - 2.4.4.8.1 The lubricant consumption accumulation schedule shall consist of a number...
    - 2.4.4.8.2 Each lubricant consumption sequence shall consist of a steady mode...
    - 2.4.4.8.3 The duration of each lubricant consumption sequence shall be determined...

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- 2.4.4.8.4 The lubricant consumption rate shall always remain below 0,5 %...
- 2.4.4.8.5 It is allowed to add the thermal ageing due to...
- 2.4.5. Development of the complete service accumulation schedule
  - 2.4.5.1. The service accumulation schedule shall be built up alternating a...
- 2.4.6. Operation of the service accumulation schedule
  - 2.4.6.1. The engine, fitted with the exhaust after-treatment system incorporating the...
  - 2.4.6.2. The engine used for the performance of the service accumulation...
  - 2.4.6.3. If the engine used for the performance of the service...
  - 2.4.6.4. In the case referred to in point 2.4.6.2, the engine...
  - 2.4.6.5. The lubricant and the fuel used in the service accumulation...
  - 2.4.6.6. The lubricant shall be changed for maintenance, at the intervals...
  - 2.4.6.7. In the case of an SCR, the urea injection shall...

#### Appendix 4

Sequence for thermal ageing

Note: The sequence of the modes 1 to 11 has been...

#### Appendix 5

Test-cycle for chassis dynamometer or on-road data gathering

#### Appendix 6

Drain and weigh procedure

1. The engine shall be filled with new oil. If a...
2. The engine shall be started and operated over the desired...
3. Once the cycle is complete, oil temperature shall be allowed...
4. A clean, empty oil drain pan shall be weighed.
5. Any clean supplies that are to be used during the...
6. The oil shall be drained for 10 minutes with the...
7. The drained oil shall be weighed.
8. The weight determined in accordance with step 7 shall be...
9. The oil shall be carefully returned to the engine.
10. The empty drain pan shall be weighted.
11. The weight determined in accordance with step 10 shall be...
12. Any dirty supplies which have previously been weighed pursuant to...
13. The weight determined in accordance with step 12 shall be...
14. The residual oil weights calculated in accordance with steps 11...
15. The engine shall be operated under the desired test cycle(s)...
16. Steps 3-8 shall be repeated.
17. The weight of the oil drained pursuant to step 16...

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18. The total weight of the oil consumed calculated pursuant to...

#### Appendix 7

Example of service accumulation schedule including thermal, lubricant consumption and...

#### Appendix 8

Flowchart on the performance of the service accumulation schedule

### ANNEX XII

#### CONFORMITY OF IN-SERVICE ENGINES AND VEHICLES TYPE-APPROVED UNDER DIRECTIVE 2005/55/EC

1. INTRODUCTION
  - 1.1. This Annex sets out requirements for the conformity of in-service...
2. PROCEDURE FOR IN-SERVICE CONFORMITY
  - 2.1. For in-service conformity testing, the provisions set out in Annex...
  - 2.2. On the request of the manufacturer the approval authority that...
  - 2.3. If the procedures described in Annex II are used, the...

### ANNEX XIII

#### REQUIREMENTS TO ENSURE THE CORRECT OPERATION OF NO<sub>x</sub> CONTROL MEASURES

1. INTRODUCTION
2. GENERAL REQUIREMENTS
  - 2.1. Alternative approval
    - 2.1.1. If requested by the manufacturer, for vehicles of categories M...
    - 2.1.2. If the alternative approval is used:
    - 2.1.3. Paragraph 2.2.1 of Annex 11 to UNECE Regulation No 49 shall...
    - 2.1.4. The first paragraph of point 2.2.4 of Annex 11 to...
    - 2.1.5. Paragraph 2.3.1 of Annex 11 to UNECE Regulation No 49 shall...
  - 2.2. Required information
    - 2.2.1. ....
    - 2.2.2. ....
    - 2.2.3. ....
    - 2.2.4. ....
  - 2.3. Operating conditions
    - 2.3.1. ....
    - 2.3.2. ....
  - 2.4. Reagent freeze protection
    - 2.4.1. ....
      - 2.4.1.1. ....



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- 2.4.2. Heated reagent tank and dosing system
  - 2.4.2.1. ....
  - 2.4.2.2. Demonstration
    - 2.4.2.2.1. ....
    - 2.4.2.2.2. ....
    - 2.4.2.2.3. ....
    - 2.4.2.2.4. ....
  - 2.4.3. Non-heated reagent tank and dosing system
    - 2.4.3.1. ....
    - 2.4.3.2. ....
- 2.5. ....
- 3. MAINTENANCE REQUIREMENTS
  - 3.1. The maintenance requirements shall be those set out in paragraph...
  - 3.2. ....
  - 3.3. ....
  - 3.4. ....
  - 3.5. ....
  - 3.6. ....
  - 3.7. ....
- 4. DRIVER WARNING SYSTEM
  - 4.1. The characteristics and operation of the driver warning system shall...
    - 4.1.1. Paragraph 4.8 of Annex 11 to UNECE Regulation No 49 shall...
  - 4.2. ....
  - 4.3. ....
  - 4.4. ....
  - 4.5. ....
  - 4.6. ....
  - 4.7. ....
  - 4.8. ....
  - 4.9. ....
  - 4.10. ....
- 5. DRIVER INDUCEMENT SYSTEM
  - 5.1. The characteristics and operation of the driver inducement system shall...
    - 5.1.1. Paragraph 5.2 of Annex 11 to UNECE Regulation No 49 shall...
  - 5.2. ....
  - 5.3. Low-level inducement system
  - 5.4. Severe inducement system
    - 5.4.1. ....
    - 5.4.2. ....
    - 5.4.3. ....
    - 5.4.4. ....
  - 5.5. ....
    - 5.5.1. ....
  - 5.6. ....
  - 5.7. ....
  - 5.8. ....
- 6. REAGENT AVAILABILITY
  - 6.1. The measures regarding reagent availability shall be those set out...
  - 6.2. Activation of the driver warning system

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- 6.2.1. ....
- 6.2.2. ....
- 6.2.3. ....
- 6.2.4. ....
- 6.2.5. ....
- 6.3. Activation of the driver inducement system
  - 6.3.1. ....
  - 6.3.2. ....
  - 6.3.3. ....
- 7. REAGENT QUALITY MONITORING
  - 7.1. The measures regarding reagent quality monitoring shall be those set...
    - 7.1.1. Paragraph 7.1.1 of Annex 11 to UNECE Regulation No 49 shall...
      - 7.1.1.1. ....
      - 7.1.1.2. ....
    - 7.1.2. Paragraph 7.1.1.1 of Annex 11 to UNECE Regulation No 49 shall...
    - 7.1.3. Paragraph 7.1.1.2 of Annex 11 to UNECE Regulation No 49 shall...
    - 7.1.4. ....
    - 7.1.5. ....
  - 7.2. Activation of the driver warning system
  - 7.3. Activation of the driver inducement system
    - 7.3.1. ....
    - 7.3.2. ....
    - 7.3.3. ....
- 8. REAGENT CONSUMPTION AND DOSING ACTIVITY
  - 8.1. The measures regarding reagent consumption monitoring and dosing activity shall...
    - 8.1.1. Paragraph 8.4.1.1 of Annex 11 to UNECE Regulation No 49 shall...
  - 8.2. Reagent consumption and dosing activity counters
    - 8.2.1. ....
    - 8.2.2. ....
    - 8.2.3. ....
  - 8.3. Monitoring conditions
    - 8.3.1. ....
    - 8.3.2. ....
  - 8.4. Activation of the driver warning system
    - 8.4.1. ....
      - 8.4.1.1. ....
    - 8.4.2. ....
  - 8.5. Activation of the driver inducement system
    - 8.5.1. ....
    - 8.5.2. ....
    - 8.5.3. ....
- 9. MONITORING FAILURES THAT MAY BE ATTRIBUTED TO TAMPERING
  - 9.1. The measures regarding monitoring failures that may be attributed to...
  - 9.2. Monitoring requirements
    - 9.2.1. ....
    - 9.2.2. EGR valve counter
      - 9.2.2.1. ....
      - 9.2.2.2. ....
      - 9.2.2.3. ....

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- 9.2.3. Monitoring system counters
  - 9.2.3.1. ....
  - 9.2.3.2. ....
  - 9.2.3.3. ....
- 9.3. Activation of the driver warning system
- 9.4. Activation of the driver inducement system
  - 9.4.1. ....
  - 9.4.2. ....
  - 9.4.3. ....
- 10. DUAL-FUEL ENGINES AND VEHICLES
- 11. POINT (C) OF PARAGRAPH A.1.4.3 OF APPENDIX 1 TO ANNEX...
- 12. THE FIRST AND SECOND PARAGRAPHS OF APPENDIX 4 OF ANNEX...

### Appendix 1

#### Demonstration requirements

- 1. GENERAL
  - 1.1. ....
  - 1.2. ....
- 2. ENGINE FAMILIES OR OBD ENGINE FAMILIES
  - 2.1. ....
  - 2.2. ....
  - 2.3. ....
- 3. DEMONSTRATION OF THE WARNING SYSTEM ACTIVATION
  - 3.1. ....
  - 3.2. Selection of the failures to be tested
    - 3.2.1. ....
    - 3.2.2. ....
      - 3.2.2.1. ....
    - 3.2.3. ....
  - 3.3. Demonstration
    - 3.3.1. ....
    - 3.3.2. ....
    - 3.3.3. ....
    - 3.3.4. ....
    - 3.3.5. ....
      - 3.3.5.1. ....
    - 3.3.6. ....
      - 3.3.6.1. ....
      - 3.3.6.2. ....
  - 3.4. ....
  - 3.5. ....
- 4. DEMONSTRATION OF THE INDUCEMENT SYSTEM
  - 4.1. ....
    - 4.1.1. ....
    - 4.1.2. ....
  - 4.2. ....
  - 4.3. ....

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- 4.4. ....
- 4.4.1. ....
- 4.5. Demonstration test of the low-level inducement system
  - 4.5.1. ....
  - 4.5.2. ....
    - 4.5.2.1. ....
  - 4.5.3. ....
  - 4.5.4. ....
- 4.6. Demonstration test of the severe inducement system
  - 4.6.1. ....
  - 4.6.2. ....
    - 4.6.2.1. ....
  - 4.6.3. ....
  - 4.6.4. ....
- 5. DEMONSTRATION OF THE VEHICLE SPEED LIMITATION FOLLOWING ACTIVATION OF THE...
  - 5.1. ....
    - 5.1.1. ....
  - 5.2. ....
  - 5.3. ....
  - 5.4. Additional demonstration for confirming the effect of activation of the...
    - 5.4.1. ....
    - 5.4.2. ....
    - 5.4.3. ....
    - 5.4.4. ....
    - 5.4.5. ....
    - 5.4.6. ....
    - 5.4.7. ....

## Appendix 2

- Description of the driver warning and inducement activation and deactivation...
- 1. ....
  - 2. ACTIVATION AND DEACTIVATION MECHANISMS OF THE DRIVER WARNING SYSTEM
    - 2.1. ....
      - 2.1.1. ....
    - 2.2. ....
      - 2.2.1 Erasing of failure information by means of a scan-tool
        - 2.2.1.1. ....
        - 2.2.1.2. ....
        - 2.2.1.3. ....
  - 3. ACTIVATION AND DEACTIVATION MECHANISM OF THE DRIVER INDUCEMENT SYSTEM
    - 3.1. ....
    - 3.2. ....
    - 3.3. ....
  - 4. COUNTER MECHANISM
    - 4.1. General
      - 4.1.1. ....

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- 4.1.2. ....
- 4.1.3. ....
  - 4.1.3.1. ....
- 4.2. Principle of counter mechanisms
  - 4.2.1. ....
- 5. ILLUSTRATION OF THE ACTIVATION AND DEACTIVATION AND COUNTER MECHANISMS
  - 5.1. ....
  - 5.2. ....
  - 5.3. ....
  - 5.4. ....

### Appendix 3

Low-level inducement torque reduction scheme

### Appendix 4

Demonstration of correct installation on a vehicle in the case...

### Appendix 5

Access to 'NO<sub>x</sub> control information'

- 1. ....
- 2. ACCESS METHODS
  - 2.1. ....
  - 2.2. ....
  - 2.3. ....
  - 2.4. ....
  - 2.5. ....
- 3. INFORMATION CONTENT
  - 3.1. The 'NO<sub>x</sub> control information' shall contain at least the following...

### Appendix 6

Demonstration of the minimum acceptable reagent quality CD min

- 1. The manufacturer shall demonstrate the minimum acceptable reagent quality CD...

## ANNEX XIV

### MEASUREMENT OF NET ENGINE POWER

- 1. INTRODUCTION
  - 1.1. This Annex sets out requirements for measuring net engine power...

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2. GENERAL
  - 2.1. The general specifications for conducting the tests and interpreting the...
    - 2.1.1. Measurement of net power according to this Annex shall be...
  - 2.2. Test fuel
    - 2.2.1. For positive-ignition engines fuelled with petrol or E85, paragraph 5.2.3.1...
    - 2.2.2. For positive ignition engines and dual-fuel engines fuelled with LPG:...
    - 2.2.3. For positive ignition engines and dual-fuel engines fuelled with NG/biomethane:...
    - 2.2.4. For compression-ignition engines, paragraph 5.2.3.4 of UN/ECE Regulation 85 shall...
  - 2.3. Engine-driven equipment
    - 2.3.1. For the purpose of measuring the net engine power the...
    - 2.3.2. For the purpose of emissions testing following the procedures provided...

#### ANNEX XV

##### AMENDMENTS TO REGULATION (EC) No 595/2009

Annex I to Regulation (EC) No 595/2009 is replaced by...  
ANNEX I Euro VI Emission Limits The admissible level of...

#### ANNEX XVI

##### AMENDMENTS TO DIRECTIVE 2007/46/EC

Directive 2007/46/EC is amended as follows:  
Annex I is amended as follows: the following point 3.2.1.11...

#### ANNEX XVII

##### ACCESS TO VEHICLE OBD AND VEHICLE REPAIR AND MAINTENANCE INFORMATION

1. INTRODUCTION
  - 1.1. This Annex lays down technical requirements for the accessibility of...
2. REQUIREMENTS
  - 2.1. Vehicle OBD and vehicle repair and maintenance information available through...
  - 2.2. Access to vehicle security features used by authorised dealers and...
  - 2.3. Reprogramming of control units shall be conducted in accordance with...
  - 2.4. The requirements of section 2.3 shall not apply in the...
  - 2.5. All emission-related DTCs shall be consistent with Annex X.
  - 2.6. For access to any vehicle OBD and vehicle repair and...
  - 2.7. Manufacturers shall indicate in their repair information websites the type-approval...
  - 2.8. If requested by the manufacturer, for vehicles of category M...
  - 2.9. The approval authority shall inform the Commission of the circumstances...

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## Appendix 1

Manufacturer's Certificate on Access to Vehicle OBD and Vehicle Repair...

### ANNEX I

to Manufacturer's Certificate on Access to Vehicle OBD and Vehicle Repair and Maintenance Information

Website addresses referred to by this Certificate:

### ANNEX II

to Manufacturer's Certificate on Access to Vehicle OBD and Vehicle Repair and Maintenance Information

Contact details of the manufacturer's representative referred to by this...

## Appendix 2

Vehicle OBD information

1. The information required in this Appendix shall be provided by...
2. Upon request, the following information shall be made available to...
3. Information required for the manufacture of diagnostic tools
  - 3.1. Communication protocol information
  - 3.2. Test and diagnosis of OBD monitored components
  - 3.3. Data required to perform the repair

## Appendix 3

### ANNEX XVIII

#### SPECIFIC TECHNICAL REQUIREMENTS FOR DUAL-FUEL ENGINES AND VEHICLES

1. Scope
  - 1.1. Dual-fuel engines that operate over the hot part of the...
2. A list of types of dual-fuel engines covered by this...
3. Dual-fuel specific approval requirements
  - 3.1. The dual-fuel specific approval requirements shall be those set out...
4. General requirements
  - 4.1. Dual-fuel engines and vehicles shall comply with the general requirements...
5. Performance requirements

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- 5.1. Emission limits applicable to Type 1A and Type 1B dual-fuel...
    - 5.1.1. The emission limits applicable to Type 1A and Type 1B...
    - 5.1.2. The emission limits applicable to Type 1B dual-fuel engines operating...
  - 5.2. Emission limits applicable to Type 2A and Type 2B dual-fuel...
    - 5.2.1. Emission limits applicable over the WHSC test-cycle
    - 5.2.2. Emission limits applicable over the WHTC test-cycle
      - 5.2.2.1. Emission limits for CO, NO<sub>x</sub>, NH<sub>3</sub> and...
      - 5.2.2.2. Emission limits for Hydrocarbons in dual-fuel mode
        - 5.2.2.2.1. Natural Gas/Biomethane engines
        - 5.2.2.2.2. LPG engines
      - 5.2.2.3. Emission limits for PM number in dual-fuel mode
      - 5.2.2.4. Emission limits in diesel mode
  - 5.3. Emission limits applicable to Type 3B dual-fuel engines
6. Demonstration requirements
    - 6.1. Dual-fuel engines and vehicles shall comply with the additional requirements...
  7. Documentation for installing in a vehicle a type approved dual-fuel...
    - 7.1. The manufacturer of a dual-fuel engine type-approved as separate technical...
    - 7.2. In the case where the vehicle manufacturer applying for an...

## Appendix 1



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- (1) OJ L 188, 18.7.2009, p. 1.
- (2) OJ L 263, 9.10.2007, p. 1.
- (3) OJ L 229, 31.8.2010, p. 1.

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