COMMISSION IMPLEMENTING REGULATION (EU) 2017/656

of 19 December 2016

laying down the administrative requirements relating to emission limits and type-approval of internal combustion engines for non-road mobile machinery in accordance with Regulation (EU) 2016/1628 of the European Parliament and of the Council

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EU) 2016/1628 of the European Parliament and of the Council of 14 September 2016 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, amending Regulations (EU) No 1024/2012 and (EU) No 167/2013 and amending and repealing Directive 97/68/EC ([1]), and in particular Articles 18(5), 21(3), 22(7), 23(5), 24(12), 31(5), 32(3), 37(5) and 44(5) thereof,

Whereas:

(1) In the interest of clarity, predictability, rationality and simplification and in order to reduce the burden on manufacturers, and taking into account the current practice, it is necessary to further simplify and standardise the documents used for type-approval procedures.

(2) In the interest of rationality and simplification and in order to reduce the burden on manufacturers, certain information documents submitted and test reports drafted in accordance with Directive 97/68/EC should be accepted for the type-approval procedures under Regulation (EU) 2016/1628.

(3) The structure of the information document should be streamlined and simplified in order to avoid that the same information is repeated and to adapt it to the most common electronic format used by manufacturers and technical services.

(4) For the purposes of comprehensiveness and completeness, the information document and the single format of the test reports should include information on those engine categories or fuel types which are new in the legislation on type-approval of engines for non-road mobile machinery.

(5) In order to enhance the market surveillance activities, a new template for the statement of conformity should be established to clearly identify those engines placed on the market which are subject to certain exemptions or transitional provisions.

(6) For the purposes of clarity and easing access to relevant data, the template of the EU type-approval certificate should contain an addendum containing the most relevant information related with the type-approved engine type or engine family.

(7) The numbering system of the type-approval certificate should be revised in order to clearly identify each engine category and subcategory, as well as the fuel type, by a short alpha-numeric code in the interest of clarity and rationality.

(8) For the purposes of clarity and completeness, the format of the list of engines produced should be adapted to the new designation of engine types and engine families and provide for all the information required by Article 37(1) of Regulation (EU) 2016/1628.

(9) The data structure for the exchange of data by means of Internal Market Information System (IMI) should be limited to a basic outline in order to provide a certain level of freedom to the designers of the IT system and avoid the administrative burden of amending recurrently Annex VIII, as it would be necessary in the case of an excessively detailed structure.

([1]) OJ L 252, 16.9.2016, p. 53.

(10) The technical requirements and procedures for the interconnection of IMI with existing national databases should be limited to a basic outline in order to provide a certain level of freedom to the designers of the IT system and avoid the administrative burden of amending recurrently this Regulation, as it would be necessary in the case of setting out excessively detailed interconnection requirements which would not fit with the particular needs of each Member State.

(11) For the purposes of clarity and simplification it is necessary to establish a harmonised system for the designation of engine types, engine families and engine types within the family.

(12) In order to address their possible misuse, it is necessary to provide for detailed provisions on prevention of tampering with the engines.

(13) The measures provided for in this Regulation are in accordance with the opinion of the Technical Committee — Motor Vehicles,

HAS ADOPTED THIS REGULATION:

Article 1

Definitions

For the purposes of this Regulation, the following definition shall apply:

(1) 'adjustable parameter' means any device, system, or element of design that someone can adjust (including those which are difficult to access) and that, if adjusted, may affect emissions or engine performance during emissions testing or normal in-use operation. This includes, but is not limited to, parameters related to injection timing and fuelling rate;

(2) 'wall-flow particulate after-treatment system' means a particulate after-treatment system in which all the exhaust gas is forced to flow through a wall which filters out the solid matter.

Article 2

Templates for information folder and information document

1. Manufacturers shall use the templates set out in Annex I to this Regulation when providing information folders and information documents in accordance with Article 21 of Regulation (EU) 2016/1628.

2. Existing information documents for engines of category RLL issued under Directive 97/68/EC or the information document of an equivalent type approval referred to in Annex XII to Directive 97/68/EC of the European Parliament and of the Council [1] may be submitted for the purposes of type-approval under Regulation (EU) No 2016/1628.

3. Existing information documents for Special Purpose Engines (SPE) issued under Directive 97/68/EC or the information document of an equivalent type approval referenced in Annex XII to Directive 97/68/EC may be submitted for the purposes of type-approval under Regulation (EU) 2016/1628.

4. Existing information documents for engines of category NRSh issued under Directive 97/68/EC or the information document of an equivalent type approval referred to in Annex XII to Directive 97/68/EC may be submitted for the purposes of type-approval under Regulation (EU) 2016/1628.

Article 3

Templates for statements of conformity

Manufacturers shall use the templates set out in Annex II to this Regulation when delivering statements of conformity in accordance with Article 31 of Regulation (EU) 2016/1628.

[1] Directive 97/68/EC of the European Parliament and of the Council of 16 December 1997 on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery (OJ L 59, 27.2.1998, p. 1).

Article 4

Templates for the marking of engines

Manufacturers shall use the templates set out in Annex III to this Regulation when affixing markings to an engine in accordance with Article 32 of Regulation (EU) 2016/1628.

Article 5

Templates for the EU type-approval certificate

Approval authorities shall use the template set out in Annex IV to this Regulation when issuing the EU type-approval certificates in accordance with Article 23 of Regulation (EU) 2016/1628.

Article 6

Numbering system of the EU type-approval certificate

Approval authorities shall use the harmonised numbering system set out in Annex V to this Regulation when numbering EU type-approval certificates in accordance with Article 22 of Regulation (EU) 2016/1628.

Article 7

The single format of the test report

1. Technical services shall use the single format set out in Annex VI to this Regulation when drawing up the test reports referred to in Article 6(3)(g) and Articles 22(6) and 23(3)(a)of Regulation (EU) 2016/1628.

2. Existing test reports for engines of category RLL issued under Directive 97/68/EC may be submitted for the purposes of type-approval under Regulation (EU) 2016/1628 under the condition that neither the substantive requirements nor the requirements regarding the test procedures have changed since the execution of the test. The difference between the per cent load and power and between the weighting factor for the mode number (mode no) of the test cycle given in section 3.7.1.4 of Annex III to Directive 97/68/EC and the corresponding mode number for test cycle F in Appendix 1 to Annex XVII of Commission Delegated Regulation (EU) 2017/654 ([1]) shall not be considered substantive for this purpose.

3. Existing test reports for engines meeting the Special Purpose engine (SPE) emission limit values issued under Directive 97/68/EC or the test report of an equivalent type approval referred to in Annex XII to Directive 97/68/EC may be submitted for the purposes of type-approval under Regulation (EU) 2016/1628 under the condition that neither the substantive requirements nor the requirements regarding the test procedures have changed since the execution of the test.

4. Existing test reports for engines meeting the NRSh emission limit values issued under Directive 97/68/EC may be submitted for the purposes of type-approval under Regulation (EU) 2016/1628 under the condition that neither the substantive requirements nor the requirements regarding the test procedures have changed since the execution of the test.

Article 8

Format for the list of engines referred to in Article 37(1) of Regulation 2016/1628

Manufacturers shall use the format set out in Annex VII to this Regulation when submitting the list of engines in accordance with Article 37(1) of Regulation 2016/1628.

([1]) Commission Delegated Regulation (EU) 2017/654 of 19 December 2016 supplementing Regulation (EU) 2016/1628 of the European Parliament and of the Council with regard to technical and general requirements relating to emission limits and type-approval for internal combustion engines for non-road mobile machinery (see page 1 of this Official Journal).

Article 9

Templates and data structure for the exchange of data by means of IMI

Approval authorities shall use the templates and data structure set out in Annex VIII to this Regulation for the exchange of data by means of Internal Market Information System (IMI) in accordance with Article 22(5) of Regulation (EU) 2016/1628.

Article 10

Technical requirements and procedures for the interconnection of IMI with existing national databases

1. For the purposes of Article 44(3)(c) of Regulation (EU) 2016/1628, IMI shall offer a web-service for the transfer of data related to applications for EU type-approvals from existing national databases to IMI.

2. For the purposes of Article 44(3)(c) of Regulation (EU) 2016/1628, IMI shall offer a web-service for the transfer of data related to EU type-approvals that are granted, extended, withdrawn or refused from IMI to existing national databases.

The first paragraph shall apply only where the Member State concerned has agreed to transfer of such data using web-service of IMI.

Article 11

Parameters for the definition of engine types and engine families, and their operation modes

For the purposes of paragraphs 1, 2 and 3 of Article 18 of Regulation (EU) 2016/1628, manufacturers shall use the parameters laid down in Annex IX to this Regulation when defining engine types and engine families, and their operation modes.

Article 12

Technical details for prevention of tampering

For the purposes of Article 18(4) of Regulation (EU) 2016/1628, manufacturers shall apply the technical details laid down in Annex X to this Regulation for the prevention of tampering.

Article 13

Entry into force

This Regulation shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels, 19 December 2016.

For the Commission

The President

Jean-Claude JUNCKER

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ANNEX I

Templates for information folder and information document

PART A — INFORMATION FOLDER

1. General requirements

An information folder referred to in Article 21 of Regulation (EU) 2016/1628 shall contain the following:

1.1. A list of contents;

1.2. Manufacturer's declaration on adherence to all requirements of Regulation (EU) 2016/1628 in accordance with the template set out in Appendix 1;

1.3. Manufacturer's statement on the compliance of the engine type or engine family with the exhaust emission limits set out in Annex II to Regulation (EU) 2016/1628 with regard to specified liquid fuels, fuel mixtures or fuel emulsions other than those set out in point 1.3.1 of Annex I to Delegated Regulation (EU) 2017/654;

1.4. For electronically controlled engines of categories NRE, NRG, IWP, IWA, RLL and RLR, complying with 'Stage V' emission limits set out in Annex II to Regulation (EU) 2016/1628 and using electronic control to determine both the quantity and timing of injecting fuel or using electronic control to activate, de-activate or modulate the emission control system used to reduce NO_x, a complete overview of the emission control strategy, including the base emission control strategy and the means by which every auxiliary control strategy directly or indirectly controls the output variables;

1.4.1. Additional confidential information as set out in Appendix 2 shall be made available, only for the technical service performing the tests and not included in the information folder;

1.5. Where applicable, a full description of the functional operational characteristics of the NO_x control measures and inducement system as referred to in Annex IV to Delegated Regulation (EU) 2017/654;

1.5.1. Where the engine type or engine family is member of a NCD engine family, a justification of its membership together with the information requested in point 1.5 on the NCD engine family may be supplied alternatively, upon agreement of the approval authority;

1.6. Where applicable, a full description of the functional operational characteristics of the particulate control measures as referred to in Annex IV to Delegated Regulation (EU) 2017/654;

1.6.1. Where the engine type or engine family is a member of a PCD engine family, a justification of its membership together with the information requested in point 1.6 on the PCD engine family may be supplied alternatively, upon agreement of the approval authority;

1.7. Manufacturer's declaration, and supporting test reports or data, on deterioration factors as referred to in Article 25(1)(c) of Regulation (EU) 2016/1628 and in Annex III to Delegated Regulation (EU) 2017/654;

1.7.1 Where the engine type or engine family is a member of an engine after-treatment system family, a justification of its membership together with the information requested in point 1.7 on the after-treatment system family may be supplied alternatively, upon agreement of the approval authority;

1.8. Where applicable, the manufacturer's declaration, and supporting test reports or data, of the infrequent regeneration adjustment factors referred to in Annex VI to Delegated Regulation (EU) 2017/654;

1.8.1 Where the engine type or engine family is a member of an engine-after-treatment system family, a justification of its membership together with the information requested in point 1.8 on the engine-after-treatment system family may be supplied alternatively, upon agreement of the approval authority;

1.9. Manufacturer's declaration and supporting data demonstrating that the emission control strategies fitted are designed in such a way as to prevent tampering to the extent possible, as referred to in Article 18(4) of Regulation (EU) 2016/1628 and in Annex X to this Regulation.

1.9.1. For engine types and engine families that use an Electronic Control Unit (ECU) as part of the emission control system the information shall include a description of the provisions taken to prevent tampering with and modification of the ECU including the facility for updating using a manufacturer approved programme or calibration;

1.9.2. For engine types and engine families that use mechanical devices as part of the emission control system the information shall include a description of the provisions taken to prevent tampering with and modification of the adjustable parameters of the emission control system. This shall include the tamper resistant components such as carburettor limiter caps or sealing of carburettor screws or special screws not adjustable by user;

1.9.3 In order to place engines from different engine families into the same tamper prevention engine family the manufacturer shall provide confirmation to the approval authority that the measures used to prevent tampering are similar.

1.10. A description of the physical connector required to receive the torque signal from the engine ECU during the in-service monitoring test according to Appendix 6 to Commission Delegated Regulation (EU) 2017/655 ([1]) on monitoring of in-service engines, in order to procure such a connector.

1.11. A description of overall quality-assurance management systems for conformity of production in accordance with Annex II to Delegated Regulation (EU) 2017/654;

1.12. A list of scheduled emission-related maintenance requirements and the period at which each should occur including any scheduled exchange of critical emission-related components;

1.13. The completed information document as set out in Part B of this Annex;

1.14. All relevant data, drawings, photographs and other information as required in the information document;

2. Applications submitted on paper shall be in triplicate. Any drawings shall be to an appropriate scale and in sufficient detail on size A4 sheets or in a folder of A4 format. Photographs (if any) shall show sufficient detail.

PART B — INFORMATION DOCUMENT

1. **General requirements**

1.1. The information document shall have a reference number issued by the applicant;

1.2. Where the particulars appearing in the information document for an engine approval have changed, the manufacturer shall submit revised pages to the approval authority showing clearly the nature of the change(s) and the date of re-issue;

2. **Content of information document**

2.1. All information documents shall contain the following:

2.1.1. the general information set out in Part A of Appendix 3;

2.1.2. the information set out in Part B of Appendix 3, to identify the common design parameters of all engine types within an engine family or applicable to the engine type where not part of an engine family, intended for EU type-approval;

([1]) Commission Delegated Regulation (EU) 2017/655 of 19 December 2016 supplementing Regulation (EU) 2016/1628 of the European Parliament and of the Council with regard to monitoring of gaseous pollutant emissions from in-service internal combustion engines installed in non-road mobile machinery (see page 334 of this Official Journal).

2.1.3. the information set out in Part C of Appendix 3 following the format of the matrix set out in point 2.1.3.1 to identify the items applicable to the parent engine or engine type and the engine types within the engine family, if applicable:

2.1.3.1. Engine type or engine family matrix with example data

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)			
						type 2	type 3	type …	type n
3.1	**Engine Identification**								
3.1.1	Engine type designation				A01	A02	A03	A04	A05
3.2	**Performance Parameters**								
3.2.1	Declared rated speed(s) (rpm):	X			2 200	2 200	2 000	1 800	1 800
3.10.	**Miscellaneous devices: Yes/No**								
3.10.1	Exhaust gas recirculation (EGR)								
3.10.1.1.	Characteristics (cooled/uncooled, high pressure/low pressure, etc.):			X					
…	…	…	…	…	…				

2.1.3.2. An (X) in the corresponding column of the table identifies the purpose(s) for which each item is required for: conduct of type approval test (Test), installation of the engine in the non-road mobile machinery (Installation) and control of homologation (Homologation).

2.1.3.3. In the case of constant speed engines with multiple rated speeds an additional set column(s) of data for each speed shall be recorded in section 3.2 (Performance Parameters).

2.1.3.4. In the case of category IWP intended to be used for both variable speed and constant-speed operation an additional column(s) of data for each operation shall be recorded in section 3.2 (Performance Parameters).

3. **Explanatory notes on creation of information document:**

3.1. Upon agreement of the approval authority, the information in point 2.1.2 and 2.1.3 may be presented in an alternative format;

3.2. Each engine type or the parent engine in the matrix set out in point 2.1.3.1 shall be identified in accordance with the engine family designation and engine type designation set out in section 4.

3.3. Only those sections or sub-sections of Parts B and C of Appendix 3 relevant for the particular engine family, engine types within the engine family or engine type shall be listed; in any case, the list shall adhere to the proposed numbering system,

3.4. Where several options separated by forward slash are given for an entry, the unused options shall be struck out, or only the used option(s) shall be shown;

3.5. When the same value for or description of a certain engine characteristic applies for several or all members of an engine family the corresponding cells may be merged.

3.6. Where a picture, diagram or detailed information is required, a reference to an appendix may be given;

3.7. Where a 'type' of a component is requested, the information supplied shall uniquely identify the component; this may be a list of characteristic, a manufacturers' name and part or drawing number, a drawing, or a combination of the aforementioned or other methods that achieves the same result.

4. **Engine type designation and engine family designation**

The manufacturer shall allocate to each engine type and engine family a unique alphanumeric code.

4.1. In the case of an engine type, the code is named *engine type designation* and shall clearly and unequivocally identify those engines presenting a unique combination of technical features for those items set out in Part C of Appendix 3 applicable to the engine type.

4.2. In the case of engine types within an engine family, the whole code is named *Family-Type* or *'FT'*, and is composed of two sections: the first section is named *engine family designation* and identifies the engine family; the second section is the engine type designation of each particular engine type within the engine family;

The engine family designation shall clearly and unequivocally identify those engines presenting a unique combination of technical features for those items set out in Parts B and C of Appendix 3 applicable to the particular engine family.

The FT shall clearly and unequivocally identify those engines presenting a unique combination of technical features for those items set out in Part C of Appendix 3 applicable to the engine type within the engine family.

4.2.1. The manufacturer may use the same engine family designation to identify the same engine family under two or more engine categories.

4.2.2. The manufacturer shall not use the same engine family designation to identify more than one engine family under the same engine category.

4.2.3. Display of the FT

In the FT, a space shall be left between the engine family designation and the engine type designation, as shown in the example below:

'159AF[space]0054'

4.3. Number of characters

The number of characters shall not exceed the following:

(a) 15 for the engine family designation;

(b) 25 for the engine type designation;

(c) 40 for the FT.

4.4. Characters allowed

The engine type designation and engine family designation shall be made up of Roman letters and/or Arabic numerals;

4.4.1. The use of brackets and hyphens is permitted provided they do not replace a letter or a numeral.

4.4.2. The use of variable characters is permitted; variable characters shall be denoted by a '#', where the variable character is unknown at the time of notification;

4.4.2.1. The reasons for using such variable characters shall be explained to the technical service and approval authority.

Appendix 1

Declaration by manufacturer on compliance with Regulation (EU) 2016/1628

The undersigned:[..... (full name and positon)]

Hereby declares that the following engine type/engine family (*) complies in all respects with the requirements of Regulation (EU) 2016/1628 of the European Parliament and of the Council ([1]), Commission Delegated Regulation (EU) 2017/654 ([2]), Commission Delegated Regulation (EU) 2017/655 ([3]) and Commission Implementing Regulation (EU) 2017/656 ([4]) and does not use any defeat strategy.

All emission control strategies comply, where applicable, with the requirements for Base Emission Control Strategy (BECS) and Auxiliary Emission Control Strategy (AECS) set-out in section 2 of Annex IV to Delegated Regulation (EU) 2017/654, and have been disclosed in accordance with that Annex and with Annex I to Implementing Regulation (EU) 2017/656.

1.1. Make (trade name(s) of manufacturer): .....

1.2. Commercial name(s) (if applicable): .....

1.3. Company name and address of manufacturer: .....

1.4. Name and address of manufacturer's authorised representative (if any): .....

1.6. Engine type designation/ engine family designation/ FT (*): .....

(Place) (Date) .....

Signature (or visual representation of an 'advanced electronic signature' according to Regulation (EU) No 910/2014 of the European Parliament and of the Council ([5]), including data for verification): .....

Explanatory notes to Appendix 1:

(Footnote markers, footnotes and explanatory notes not to be stated on the manufacturer's declaration)

(*) Strike out the unused options, or only show the used option(s).

([1]) Regulation (EU) 2016/1628 of the European Parliament and of the Council of 14 September 2016 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, amending Regulations (EU) No 1024/2012 and (EU) No 167/2013, and amending and repealing Directive 97/68/EC (OJ L 252, 16.9.2016, p. 53).

([2]) Commission Delegated Regulation (EU) 2017/654 of 19 December 2016 supplementing Regulation (EU) 2016/1628 of the European Parliament and of the Council with regard to technical and general requirements relating to emission limits and type-approval for internal combustion engines for non-road mobile machinery (OJ L 102, 13.4.2017, p. 1).

([3]) Commission Delegated Regulation (EU) 2017/655 of 19 December 2016 supplementing Regulation (EU) 2016/1628 of the European Parliament and of the Council with regard to monitoring of gaseous pollutant emissions from in-service internal combustion engines installed in non-road mobile machinery (OJ L 102, 13.4.2017, p. 334).

([4]) Commission Implementing Regulation (EU) 2017/656 of 19 December 2016 laying down the administrative requirements relating to emission limits and type-approval of internal combustion engines for non-road mobile machinery in accordance with Regulation (EU) 2016/1628 of the European Parliament and of the Council (OJ L 102, 13.4.2017, p. 364).

([5]) Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC (OJ L 257, 28.8.2014, p. 73).

Appendix 2

Confidential information on emission control strategy

1. This Appendix shall apply to electronically controlled engines, which use electronic control to determine both the quantity and timing of injecting fuel.

2. Additional information shall be presented to the technical service but not annexed to the application for EU type-approval. This information shall include all the parameters modified by any auxiliary emission control strategy and the boundary conditions under which this strategy operates and in particular:

   (a) a description of the control logic, of timing strategies and switch points, during all modes of operation for the fuel and other essential systems, resulting in effective emission control (such as exhaust gas recirculation (EGR) or reagent dosing);

   (b) a justification for the use of any auxiliary emission control strategy applied to the engine, accompanied by material and test data, demonstrating the effect on exhaust emissions. This justification may be based on test data, sound engineering analysis, or a combination of both;

   (c) a detailed description of algorithms or sensors (where applicable) used for identifying, analysing, or diagnosing incorrect operation of the NO_x control system;

   (d) a detailed description of algorithms or sensors (where applicable) used for identifying, analysing, or diagnosing incorrect operation of the particulate control system.

3. The additional information required in point 2 shall be treated as strictly confidential. It shall be retained by the manufacturer and made available for inspection by the approval authority at the time of EU type-approval or upon request at any time during the validity of the EU type-approval. In this case, the approval authority shall treat this information as confidential and shall not disclose it to other parties.

Appendix 3

Template for information document

PART A

1. GENERAL INFORMATION

1.1. Make (trade name(s) of manufacturer): .....

1.2. Commercial name(s) (if applicable): .....

1.3. Company name and address of manufacturer: .....

1.4. Name and address of manufacturer's authorised representative (if any): .....

1.5. Name(s) and address(es) of assembly/manufacture plant(s): .....

1.6. Engine type designation/engine family designation/FT: .....

1.7. Category and sub-category of the engine type/engine family: NRE-v-1/NRE-v-2/NRE-v-3/NRE-v-4/NRE-v-5/NRE-v-6/NRE-v-7/NRE-c-1/NRE-c-2/NRE-c-3/NRE-c-4/NRE-c-5/NRE-c-6/NRE-c-7/NRG-v-1/NRG-c-1/NRSh-v-1a/NRSh-v-1b/NRS-vr-1a/NRS-vr-1b/NRS-vi-1a/NRS-vi-1b/NRS-v-2a/NRS-v-2b/NRS-v-3/IWP-v-1/IWP-v-2/IWP-v-3/IWP-v-4/IWP-c-1/IWP-c-2/IWP-c-3/IWP-c-4/IWA-v-1/IWA-v-2/IWA-v-3/IWA-v-4/IWA-c-1/IWA-c-2/IWA-c-3/IWA-c-4/RLL-v-1/RLL-C-1/RLR-v-1/RLR-C-1/SMB-v-1/ATS-v-1

1.8. Emissions durability period category: Not Applicable/Cat 1 (Consumer products)/Cat 2 (Semi-professional products)/Cat 3 (Professional products)

1.9. Emissions stage: V/ Special Purpose Engine (SPE)

1.10. In case of NRS < 19 kW only, engine family consisting exclusively of engine types for snow throwers: Yes/No

1.11. Reference power is: rated net power/maximum net power

1.12. Primary NRSC test cycle: C1/C2/D2/E2/E3/F/G1/G2/G3/H

1.12.1. In case of variable speed IWP category only, Additional propulsion test cycle: Not applied/E2/E3

1.12.2. In case of IWP category only, additional auxiliary NRSC test cycle: Not applied/D2/C1

1.13. Transient test cycle: Not applicable/NRTC/LSI-NRTC

1.14. Restrictions on use (if applicable):

PART B

2. COMMON DESIGN PARAMETERS OF ENGINE FAMILY [1]

2.1. Combustion Cycle: four stroke cycle/two stroke cycle/rotary/other (specify) .....

2.2. Ignition Type: Compression ignition/spark ignition

2.3. **Configuration of the cylinders**

2.3.1. Position of the cylinders in the block: Single/V/in-line/opposed/radial/other(specify): .....

2.3.2. Bore centre to centre dimension (mm): .....

2.4. **Combustion chamber type/design**

2.4.1. Open chamber/divided chamber/other(specify)

2.4.2. Valve and porting configuration: .....

2.4.3. Number of valves per cylinder: .....

2.5. Range of individual cylinder displacement (cm^3): .....

2.6. Main Cooling medium: Air/Water/Oil

2.7. Method of air aspiration: naturally aspirated/pressure charged/pressure charged with charge cooler

2.8. **Fuel**

2.8.1. Fuel Type: Diesel (non-road gas-oil)/Ethanol for dedicated compression ignition engines (ED95)/Petrol (E10)/ Ethanol (E85)/(Natural gas/Biomethane)/Liquid Petroleum Gas (LPG)

2.8.1.1. Sub Fuel type (Natural gas/Biomethane only): Universal fuel — high calorific fuel (H-gas) and low calorific fuel (L-gas)/Restricted fuel — high calorific fuel (H-gas)/Restricted fuel — low calorific fuel (L-gas)/Fuel specific (LNG);

2.8.2. Fuelling arrangement: Liquid-fuel only/Gaseous-fuel only/Dual-fuel type 1A/Dual-fuel type 1B/Dual-fuel type 2A/Dual-fuel type 2B/Dual-fuel type 3B

2.8.3. list of additional fuels, fuel mixtures or emulsions compatible with use by the engine declared by the manufacturer in accordance with point 1.4 of Annex I to Delegated Regulation (EU) 2017/654 (provide reference to recognised standard or specification): .....

2.8.4. Lubricant added to fuel: Yes/No

2.8.4.1. Specification: .....

2.8.4.2. Ratio of fuel to oil: .....

2.8.5. Fuel supply type: Pump (high pressure) line and injector/in-line pump or distributor pump/Unit injector/ Common rail/Carburettor)/port injector/direct injector/Mixing unit/other(specify): .....

2.9. Engine management systems: mechanical/electronic control strategy [2]

2.10. **Miscellaneous devices: Yes/No**

(if yes provide a schematic diagram of the location and order of the devices)

2.10.1. Exhaust gas recirculation (EGR): Yes/No

(if yes, complete section 3.10.1 and provide a schematic diagram of the location and order of the devices)

2.10.2. Water injection: Yes/No

(if yes, complete section 3.10.2 and provide a schematic diagram of the location and order of the devices)

2.10.3. Air injection: Yes/No

(if yes, complete section 3.10.3 and provide a schematic diagram of the location and order of the devices)

2.10.4. Others (specify and provide a schematic diagram of the location and order of the devices): .....

2.11. **Exhaust after-treatment system: Yes/No**

(if yes provide a schematic diagram of the location and order of the devices)

2.11.1. Oxidation catalyst: Yes/No

(if yes, complete section 3.11.2)

2.11.2. $DeNO_x$ system with selective reduction of NO_x (addition of reducing agent): Yes/No

(if yes, complete section 3.11.3)

2.11.3. Other $DeNO_x$ systems: Yes/No

(if yes, complete section 3.11.3)

2.11.4. Three-way catalyst combining oxidation and NO_x reduction: Yes/No

(if yes, complete section 3.11.3)

2.11.5. Particulate after-treatment system with passive regeneration: Yes/No

(if yes, complete section 3.11.4)

2.11.5.1. Wall-flow/non-wall-flow

2.11.6. Particulate after-treatment system with active regeneration: Yes/No

(if yes, complete section 3.11.4)

2.11.6.1. Wall-flow/non-wall-flow

2.11.7. Other particulate after-treatment systems: Yes/No

(if yes, complete section 3.11.4)

2.11.8. Other after-treatment devices (specify): .....

(if yes, complete section 3.11.5)

2.11.9. Other devices or features that have a strong influence on emissions (specify): .....

PART C

3. ESSENTIAL CHARACTERISTICS OF THE ENGINE TYPE(S)

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)				Explanatory notes (not included in document)
						type 2	type 3	type …	type n	
3.1	**Engine Identification**									
3.1.1.	Engine type designation			X						
3.1.2.	Engine type designation shown on engine marking: yes/no			X						
3.1.3.	Location of the statutory marking:			X						
3.1.4.	Method of attachment of the statutory marking:			X						
3.1.5.	Drawings of the location of the engine identification number (complete example with dimensions):			X						
3.2.	**Performance Parameters**									
3.2.1.	Declared rated speed (rpm):	X								
3.2.1.1.	Fuel delivery/stroke (mm^3) for diesel engine, fuel flow (g/h) for other engines, at rated net power:			X						
3.2.1.2.	Declared rated net power (kW):	X								
3.2.2.	Maximum power speed(rpm):			X						If different from rated speed
3.2.2.1.	Fuel delivery/stroke (mm^3) for diesel engine, fuel flow (g/h) for other engines, at maximum net power:			X						
3.2.2.2.	Maximum net power (kW):	X		X						If different from rated power
3.2.3.	Declared maximum torque speed (rpm):	X								If applicable
3.2.3.1.	Fuel delivery/stroke (mm^3) for diesel engine, fuel flow (g/h) for other engines, at maximum torque speed:			X						

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)				Explanatory notes (not included in document)
						type 2	type 3	type …	type n	
3.2.3.2.	Declared maximum torque (Nm):	X								If applicable
3.2.4.	Declared 100 % test speed:	X								If applicable
3.2.5.	Declared Intermediate test speed:	X								If applicable
3.2.6.	Idle speed (rpm)	X								If applicable
3.2.7.	Maximum no load speed (rpm):	X								If applicable
3.2.8.	Declared minimum torque (Nm)	X								If applicable
3.3.	**Run-in procedure**									Optional at choice of manufacturer
3.3.1.	Run in time:	X								
3.3.2.	Run-in cycle:	X								
3.4.	**Engine test**									
3.4.1.	Specific fixture required: Yes/No	X								For NRSh only
3.4.1.1.	Description, including photographs and/or drawings, of the system for mounting the engine on the test bench including the power transmission shaft for connection to the dynamometer:	X								
3.4.2.	Exhaust mixing chamber permitted by manufacturer: Yes/No	X								For NRSh only
3.4.2.1.	Exhaust mixing chamber description, photograph and/or drawing:	X								If applicable
3.4.3.	Manufacturers chosen NRSC: RMC/Discrete mode	X								
3.4.4.	Additional NRSC: E2/D2/C1	X								Only where additional cycles are declared in entries 1.12.1 or 1.12.2 of Part A

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)				Explanatory notes (not included in document)
						type 2	type 3	type …	type n	
3.4.5.	Number of pre-conditioning cycles prior to transient test	X								If applicable, minimum 1,0
3.4.6.	Number of pre-conditioning RMC prior to NRSC test	X								If applicable, minimum 0,5
3.5.	**Lubrication system**									
3.5.1.	*Lubricant temperature*									If applicable
3.5.1.1.	Minimum (deg. C):	X								
3.5.1.2.	Maximum (deg. C):	X								
3.6.	**Combustion Cylinder**									
3.6.1.	Bore (mm):			X						
3.6.2.	Stroke (mm):			X						
3.6.3.	Number of cylinders:			X						
3.6.4.	Engine displacement (cm^3):			X						
3.6.5.	Cylinder displacement as % of parent engine:			X						If engine family
3.6.6.	Volumetric compression ratio:			X						Specify tolerance
3.6.7.	Combustion system description:			X						
3.6.8.	Drawings of combustion chamber and piston crown:			X						
3.6.9.	Minimum cross sectional area of inlet and outlet ports (mm^2):			X						
3.6.10.	*Valve timing*									

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)				Explanatory notes (not included in document)
						type 2	type 3	type …	type n	
3.6.10.1.	Maximum lift and angles of opening and closing in relation to dead centre or equivalent data:			X						
3.6.10.2.	Reference and/or setting range:			X						
3.6.10.3.	Variable valve timing system: Yes/No			X						If applicable and where intake and/or exhaust
3.6.10.3.1.	Type: continuous/(on/off)			X						
3.6.10.3.2.	Cam phase shift angle:			X						
3.6.11.	*Porting configuration*									2-stroke only, if applicable
3.6.11.1.	positon, size and number:			X						
3.7.	**Cooling system**									Complete relevant section
3.7.1.	*Liquid cooling*									
3.7.1.1.	Nature of liquid:			X						
3.7.1.2.	Circulating pumps: Yes/No			X						
3.7.1.2.1.	type(s):			X						
3.7.1.2.2.	Drive ratio(s):			X						If applicable
3.7.1.3.	Minimum coolant temperature at outlet (deg. C):	X								
3.7.1.4.	Maximum coolant temperature at outlet (deg. C):	X								
3.7.2.	*Air cooling*									
3.7.2.1.	fan: Yes/No			X						

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)				Explanatory notes (not included in document)
						type 2	type 3	type …	type n	
3.7.2.1.1.	type(s):			X						
3.7.2.1.2.	Drive ratio(s):			X						If applicable
3.7.2.2.	Maximum temperature at reference point (deg. C):			X						
3.7.2.2.1.	Reference point location			X						
3.8.	**Aspiration**									
3.8.1.	Maximum allowable intake depression at 100 % engine speed and at 100 % load (kPa)	X	X							
3.8.1.1.	With clean air cleaner:	X	X							
3.8.1.2.	With dirty air cleaner:	X	X							
3.8.1.3.	Location, of measurement:	X	X							
3.8.2.	Pressure charger(s): Yes/No			X						
3.8.2.1.	Type(s):			X						
3.8.2.2.	Description and schematic diagram of the system (e.g. maximum charge pressure, waste gate, VGT, Twin turbo, etc.):			X						
3.8.3.	Charge air cooler: Yes/No			X						
3.8.3.1.	Type: air-air/air-water/other(specify)			X						
3.8.3.2.	Maximum charge air cooler outlet temperature at 100 % speed and 100 % load (deg. C):	X	X							
3.8.3.4.	Maximum allowable pressure drop across charge cooler at 100 % engine speed and at 100 % load (kPa):	X	X							

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)				Explanatory notes (not included in document)
						type 2	type 3	type …	type n	
3.8.4.	Intake throttle valve: Yes/No			X						
3.8.5.	Device for recycling crankcase gases: Yes/No			X						
3.8.5.1.	If yes, description and drawings:			X						
3.8.5.2.	If no, compliance with paragraph 6.10 of Annex VI to Delegated Regulation (EU) 2017/654: Yes/No	X								
3.8.6.	*Inlet path*									*2-stroke, NRS and NRSh only*
3.8.6.1.	Description of inlet path, (with drawings, photographs and/or part numbers):			X						
3.8.7.	*Air filter*			X						*2-stroke, NRS and NRSh only*
3.8.7.1.	Type:			X						
3.8.8.	*Intake air-silencer*									*2-stroke, NRS and NRSh only*
3.8.1.1.	Type:			X						
3.9.	**Exhaust system**									
3.9.1.	Description of the exhaust system (with drawings, photos and/or part numbers as required):			X						*2 stroke, NRS and NRSh only*
3.9.2.	Maximum exhaust temperature (deg. C):	X								
3.9.3.	Maximum permissible exhaust backpressure at 100 % engine speed and at 100 % load (kPa):	X	X							
3.9.3.1.	Location of measurement:	X	X							
3.9.4.	Exhaust backpressure at loading level specified by manufacturer for variable restriction after-treatment at start of test (kPa):	X								

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)				Explanatory notes (not included in document)
						type 2	type 3	type …	type n	
3.9.4.1.	Location and speed/load conditions:	X								
3.9.5.	Exhaust throttle valve: Yes/No			X						
3.10.	**Miscellaneous devices: Yes/No**									
3.10.1.	*Exhaust gas recirculation (EGR)*									
3.10.1.1.	Characteristics: cooled/uncooled, high pressure/low pressure/other (specify):									
3.10.2.	*Water injection*									
3.10.2.1.	Operation principle:			X						
3.11.	**Exhaust after-treatment system**									
3.11.1.	*Location*		X							
3.11.1.1.	Place(s) and maximum/minimum distance(s) from engine to first after-treatment device:		X							
3.11.1.2.	Maximum temperature drop from exhaust or turbine outlet to first after-treatment device (deg. C) if stated:	X	X							
3.11.1.2.1.	Test conditions for measurement:	X	X							
3.11.1.3.	Minimum temperature at inlet to first after-treatment device at 100 % load and speed (deg. C), if stated:	X	X							
3.11.2.	*Oxidation catalyst*									
3.11.2.1.	Number of catalytic converters and elements:			X						
3.11.2.2.	Dimensions and volume of the catalytic converter(s):			X						
3.11.2.3.	Total charge of precious metals:			X						

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)				Explanatory notes (not included in document)
						type 2	type 3	type …	type n	
3.11.2.4.	Relative concentration of each compound:			X						
3.11.2.5.	Substrate (structure and material):			X						
3.11.2.6.	Cell density:			X						
3.11.2.7.	Type of casing for the catalytic converter(s):			X						
3.11.3.	*Catalytic exhaust after-treatment system for NO_x or three way catalyst*									
3.11.3.1.	Type:			X						
3.11.3.2.	Number of catalytic converters and elements:			X						
3.11.3.3.	Type of catalytic action:			X						
3.11.3.4.	Dimensions and volume of the catalytic converter(s):			X						
3.11.3.5.	Total charge of precious metals:			X						
3.11.3.6.	Relative concentration of each compound:			X						
3.11.3.7.	Substrate (structure and material):			X						
3.11.3.8.	Cell density:			X						
3.11.3.9.	Type of casing for the catalytic converter(s):			X						
3.11.3.10.	Method of regeneration:	X		X						If applicable
3.11.3.10.1.	Infrequent regeneration: Yes/No:	X								If yes, complete section 3.11.6
3.11.3.11.	Normal operating temperature range (deg. C):	X	X							
3.11.3.12.	Consumable reagent: Yes/No			X						
3.11.3.12.1.	Type and concentration of reagent needed for catalytic action:			X						

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)				Explanatory notes (not included in document)
						type 2	type 3	type …	type n	
3.11.3.12.2.	Lowest concentration of the active ingredient present in the reagent that does not activate warning system (CD_{min}) (%vol):			X						
3.11.3.12.3.	Normal operational temperature range of reagent:		X							
3.11.3.12.4.	International standard:		X	X						If applicable
3.11.3.13.	NO_x sensor(s): Yes/No			X						
3.11.3.13.1.	Type:			X						
3.11.3.13.2.	Location(s)			X						
3.11.3.14.	Oxygen sensor(s): Yes/No			X						
3.11.3.14.1.	Type:			X						
3.11.3.14.2.	Location(s):			X						
3.11.4.	*Particulate after-treatment system*									
3.11.4.1.	Type of filtration: wall-flow/ non-wall-flow/other (specify)			X						
3.11.4.2.	Type:			X						
3.11.4.3.	Dimensions and capacity of the particulate after-treatment system:			X						
3.11.4.4.	Location place(s) and maximum and minimum distance(s) from engine:		X							
3.11.4.5.	Method or system of regeneration, description and/or drawing:			X						
3.11.4.5.1.	Infrequent regeneration: Yes/No			X						If yes, complete section 3.11.6
3.11.4.5.2.	Minimum exhaust gas temperature for initiating regeneration procedure (deg. C):			X						
3.11.4.6.	Catalytic coating: Yes/No			X						

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)				Explanatory notes (not included in document)
						type 2	type 3	type …	type n	
3.11.4.6.1.	Type of catalytic action:			X						
3.11.4.7.	Fuel borne catalyst (FBC): Yes/No			X						
3.11.4.8.	Normal operating temperature range (deg. C):			X						
3.11.4.9.	Normal operating pressure range (kPa)			X						
3.11.4.10.	Storage capacity soot/ash [g]:			X						
3.11.4.11.	Oxygen sensor(s): Yes/No			X						
3.11.4.11.1.	Type:			X						
3.11.4.11.2.	Location(s):			X						
3.11.5.	*Other after-treatment devices*									
3.11.5.1.	Description and operation:			X						
3.11.6.	*Infrequent Regeneration*									
3.11.6.1.	Number of cycles with regeneration	X								
3.11.6.2.	Number of cycles without regeneration	X								
3.12.	**Fuel feed for liquid-fuelled CI or, where applicable, dual-fuel engines**									
3.12.1.	*Feed pump*									
3.12.1.1.	Pressure (kPa) or characteristic diagram:			X						
3.12.2.	*Injection system*									
3.12.2.1.	Pump									
3.12.2.1.1.	Type(s):			X						

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)				Explanatory notes (not included in document)
						type 2	type 3	type …	type n	
3.12.2.1.2.	Rated pump speed (rpm):			X						
3.12.2.1.3.	mm^3 per stroke or cycle at full injection at rated pump speed:			X						Specify tolerance
3.12.2.1.4.	Torque peak pump speed (rpm):			X						
3.12.2.1.5.	mm^3 per stroke or cycle at full injection at torque peak pump speed			X						Specify tolerance
3.12.2.1.6.	Characteristic diagram:			X						As alternative to entries 3.12.2.1.1 to 3.12.2.1.5.
3.12.2.1.7.	Method used: on engine/on pump bench			X						
3.12.2.2.	Injection timing									
3.12.2.2.1.	Injection timing curve:			X						Specify tolerance, if applicable
3.12.2.2.2.	Static Timing:			X						Specify tolerance
3.12.2.3.	Injection piping									
3.12.2.3.1.	Length(s) (mm):			X						
3.12.2.3.2.	Internal diameter (mm):			X						
3.12.2.4.	Common rail: Yes/No			X						
3.12.2.4.1.	Type:			X						
3.12.3.	*Injector(s)*									
3.12.3.1.	Type(s):			X						
3.12.3.2.	Opening pressure (kPa):			X						Specify tolerance

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)				Explanatory notes (not included in document)
						type 2	type 3	type …	type n	
3.12.4.	ECU: Yes/No			X						
3.12.4.1.	Type(s):			X						
3.12.4.2.	Software calibration number(s):			X						
3.12.4.3.	Communication standard(s) for access to data stream information: ISO 27145 with ISO 15765-4 (CAN-based)/ISO 27145 with ISO 13400 (TCP/IP-based)/SAE J1939-73	X		X						
3.12.5.	*Governor*									
3.12.5.1.	Type(s):			X						
3.12.5.2.	Speed at which cut-off starts under full load:			X						Specify range,if applicable
3.12.5.3.	Maximum no-load speed:			X						Specify range,if applicable
3.12.5.4.	Idle speed:			X						Specify range,if applicable
3.12.6.	Cold-start system: Yes/No			X						
3.12.6.1.	Type(s):			X						
3.12.6.2.	Description:			X						
3.12.7.	*Fuel temperature at the inlet to the fuel injection pump*									
3.12.7.1.	Minimum (deg. C):	X								
3.12.7.2.	Maximum (deg. C):	X								
3.13.	**Fuel feed for liquid fuel spark ignition engine**									
3.13.1.	*Carburettor*									
3.13.1.1.	Type(s):			X						

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)				Explanatory notes (not included in document)
						type 2	type 3	type …	type n	
3.13.2.	*Port fuel injection:*									
3.13.2.1.	single-point / multi-point			X						
3.13.2.2.	Type(s):			X						
3.13.3.	*Direct injection:*									
3.13.3.1.	Type(s):			X						
3.13.4.	*Fuel temperature at location specified by manufacturer*									
3.13.4.1.	Location:	X								
3.13.4.2.	Minimum (deg. C)	X								
3.13.4.3.	Maximum (deg. C)	X								
3.14.	**Fuel feed for gaseous fuel engines or where applicable, dual fuel engines (in the case of systems laid out in a different manner, supply equivalent information)**									
3.14.1.	Fuel: LPG /NG-H/NG-L /NG-HL/LNG/Fuel specific LNG	X		X						
3.14.2.	*Pressure regulator(s) or vaporiser/pressure regulator(s)*									
3.14.2.1.	Type(s)			X						
3.14.2.2.	Number of pressure reduction stages			X						
3.14.2.3.	Pressure in final stage minimum and maximum. (kPa)			X						
3.14.2.4.	Number of main adjustment points:			X						
3.14.2.5.	Number of idle adjustment points:			X						
3.14.3.	Fuelling system: mixing unit/gas injection/liquid injection/direct injection			X						

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)				Explanatory notes (not included in document)
						type 2	type 3	type …	type n	
3.14.3.1.	Mixture strength regulation									
3.14.3.1.1.	System description and/or diagram and drawings:			X						
3.14.4.	*Mixing unit*									
3.14.4.1.	Number:			X						
3.14.4.2.	Type(s):			X						
3.14.4.3.	Location:			X						
3.14.4.4.	Adjustment possibilities:			X						
3.14.5.	*Inlet manifold injection*									
3.14.5.1.	Injection: single-point/multi-point			X						
3.14.5.2.	Injection: continuous/simultaneously timed/ sequentially timed			X						
3.14.5.3.	Injection equipment									
3.14.5.3.1.	Type(s):			X						
3.14.5.3.2.	Adjustment possibilities:			X						
3.14.5.4.	Supply pump									If applicable
3.14.5.4.1.	Type(s):			X						
3.14.5.5.	Injector(s)									
3.14.5.5.1.	Type(s):			X						
3.14.6.	*Direct injection*									
3.14.6.1.	Injection pump/pressure regulator			X						

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)				Explanatory notes (not included in document)
						type 2	type 3	type …	type n	
3.14.6.1.1.	Type(s):			X						
3.14.6.1.2.	Injection timing (specify):			X						
3.14.6.2.	Injector(s)									
3.14.6.2.1.	Type(s):			X						
3.14.6.2.2.	Opening pressure or characteristic diagram:			X						
3.14.7.	*Electronic Control Unit (ECU)*									
3.14.7.1.	Type(s):			X						
3.14.7.2.	Adjustment possibilities:			X						
3.14.7.3.	Software calibration number(s):			X						
3.14.8.	*Approvals of engines for several fuel compositions*									
3.14.8.1.	Self-adaptive feature: Yes/No	X	X	X						
3.14.8.2.	Calibration for a specific gas composition: NG-H/NG-L/NG-HL/ LNG/Fuel specific LNG	X	X	X						
3.14.8.3.	Transformation for a specific gas composition: NG-HT/NG-LT/NG-HLT	X	X	X						
3.14.9.	*Fuel temperature pressure regulator final stage*									
3.14.9.1.	Minimum (deg. C):	X								
3.14.9.2.	Maximum (deg. C):	X								
3.15.	**Ignition system**									
3.15.1.	*Ignition coil(s)*									
3.15.1.1.	Type(s):			X						

Item Number	Item Description	Test	Installation	Homologation	Parent engine/ engine type	Engine types within the engine family (if applicable)				Explanatory notes (not included in document)
						type 2	type 3	type …	type n	
3.15.1.2.	Number:			X						
3.15.2.	*Spark plug(s)*									
3.15.2.1.	Type(s):			X						
3.15.2.2.	Gap setting:			X						
3.15.3.	*Magneto*			X						
3.15.3.1.	Type(s):			X						
3.15.4.	Ignition timing control: Yes/No			X						
3.15.4.1.	Static advance with respect to top dead centre (crank angle degrees):			X						
3.15.4.2.	Advance curve or map:			X						If applicable
3.15.4.3.	Electronic control: Yes/No			X						

Explanatory notes to Appendix 3:

(Footnote markers, footnotes and explanatory notes not to be stated on the information document)

(1) As defined in Annex II to Delegated Regulation (EU) 2017/654.

(2) Refer to section 2.4.13 in Annex IX (engine family definition).

ANNEX II

Templates for statements of conformity

1. **General requirements**

1.1. The statement of conformity shall consist of two sections:

(a) section 1 specifying the particular features applying to the engine in accordance with the template set out in Appendix 1;

(b) section 2 describing the restrictions applicable to the engine in accordance with the information set out in Table 1 of Appendix 2.

1.2. When delivered on paper format, the statement of conformity shall be no bigger than A4 paper format (210 × 297 mm).

1.3. All information on the statement of conformity shall be provided in ISO 8859 series (Information technology — 8-bit single-byte coded graphic character sets) characters (for statements of conformity issued in Bulgarian language in Cyril characters, for statements of conformity issued in Greek language in Greek characters) and Arabic numerals.

2. **Features for protecting the statement of conformity**

In accordance with Article 31(5) of Regulation (EU) 2016/1628, the statement of conformity shall be made in such a way as to prevent any forgery and allowing verification of the secure electronic file.

2.1. Features to prevent forgery on a paper format

The paper used for the statement of conformity shall be protected by a watermark in the form of the registered mark of the manufacturer and by coloured graphics.

2.1.1. As an alternative to the requirements set out in point 2.1, the paper of the statement of conformity may be not protected by a watermark in the form of the registered mark of the manufacturer. In this case, the coloured graphics shall be supplemented with at least one additional security printing feature (e.g. ultraviolet fluorescent ink, inks with viewing angle-dependent colour, inks with temperature-dependent colour, micro printing, guilloche printing, iridescent printing, laser engraving, custom holograms, variable laser images, optical variable images, physically embossed or engraved manufacturer's logo, etc.).

2.1.2. Manufacturers may provide the statement of conformity with security printing features additional to those set out in points 2.1 and 2.1.1.

2.1.3. Where the statement of conformity has more than one sheet, each sheet shall state:

(a) the title of the statement of conformity;

(b) the engine identification number set out in point 3.16 of section 1;

(c) a number with the format 'x of y', where 'x' is the consecutive number of the sheet and 'y' is the total number of sheets of the statement of conformity.

2.2. Features allowing the verification of the secure electronic file

The electronic file shall be supplied in a format so that each modification after signing can be easily identified, and it can be incorporated into another document. In addition, it shall be signed by an 'advanced electronic signature' according to Regulation (EU) No 910/2014 of the European Parliament and of the Council [1], including the signature verification data.

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[1] Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC (OJ L 257, 28.8.2014, p. 73).

Appendix 1

Model for the statement of conformity

STATEMENT OF CONFORMITY ACCOMPANYING EACH ENGINE SUBJECT TO AN EXEMPTION OR A TRANSITIONAL PROVISION (ARTICLE 31(1)(a) AND (b) OF REGULATION (EU) 2016/1628)

SECTION 1

EU STATEMENT OF CONFORMITY

The undersigned: [..... (full name and position)]

hereby certifies that the following engine:

1.1. Make (trade name(s) of manufacturer): .....

1.2. Commercial name(s) (if applicable): .....

1.3. Company name and address of manufacturer: .....

1.4. Name and address of manufacturer's authorised representative (if any): .....

1.5. Name(s) and address(es) of assembly/manufacture plant(s): .....

1.6. Engine type designation/engine family designation/FT ([1]):

1.7. Category and sub-category of the engine type/engine family ([1]) ([2]): .....

3.1.2. Designation on the statutory marking: engine type designation/engine family designation/FT ([1])

3.1.3. Location of the statutory marking(s): .....

3.1.4. Method of attachment of the statutory marking(s): .....

3.16. Engine identification number: .....

conforms in all respects with the requirements of Regulation (EU) 2016/1628 with regard to an exemption or a transitional provision referred to in Article 31(1)(a) and (b) as indicated in Section 2 of this statement of conformity.

(place) (date) .....

Signature (or visual representation of an 'advanced electronic signature' according to Regulation (EU) No 910/2014, including data for verification): .....

NB:

If this model is used for EU type-approval of an engine as an exemption for new technologies or new concepts, pursuant to Article 35(4) of Regulation (EU) 2016/1628, the heading of the statement shall read 'PROVISIONAL EU-STATEMENT OF CONFORMITY VALID ONLY ON THE TERRITORY OF … ([3])'.

SECTION 2

1. Exemption/transition ([1]) ([4]): .....

2. Additional information ([5]): .....

3. Exemption Code (EM)/transition code (TM) ([6]): .....

4. Comments ([7]): .....

Explanatory notes to Appendix 1:

(Footnote markers, footnotes and explanatory notes not to be stated on the statement of conformity)

([1]) Strike out the unused options, or only show the used option(s).

([2]) Indicate the applicable option for the category and sub-category in accordance with entry 1.7 of the information document set out in Part A of Appendix 3 to Annex I.

([3]) Indicate the Member State.

([4]) Indicate the applicable text from column 2 of Table 1 in Appendix 2.

([5]) Indicate the applicable additional information from column 3 of Table 1 in Appendix 2.

([6]) Indicate the applicable code from column 4 of Table 1 in Appendix 2, as shown on the supplementary marking to the statutory marking.

([7]) Additional remarks by the manufacturer to clarify the restrictions on use applicable to the engine.

Appendix 2

Table 1

Article of Regulation (EU) 2016/1628 (column 1)	Information to be stated in Section 2 of the Statement of Conformity		Supplementary information to be stated in the statutory marking in accordance with Annex III Appendix 1 Table 1	
	Text required for entry 1 (column 2)	Additional information required for entry 2 (column 3)	Exemption Code (EM) or transition code (TM) (column 4)	Text for supplementary information (column 5)
34(1)	Not Applicable		EM-EXP	ENGINE NOT FOR USE IN EU MACHINERY
34(2)	Engine only for use by armed forces in accordance with Article 34(2) of Regulation (EU) 2016/1628. This engine shall only be placed on the market for installation in non-road mobile machinery that is exclusively to be used by the armed forces. Fire services, civil defence services, forces responsible for maintaining public order and emergency medical services shall not be considered to be part of the armed forces.		EM-AFE	ARMED FORCES ENGINE
34(4)	Engine for field testing in accordance with Article 34(4) of Regulation (EU) 2016/1628. This engine shall only be placed on the market and entry into service as part of a field testing programme. By the date given the engine shall be either removed from use in the European Union or brought into conformity with the requirements set out in Regulation (EU) 2016/1628.	End date of exemption dd/mm/yyyy Name and address of the approval authority that has been informed of the testing program	EM-FTE	FIELD TEST ENGINE
34(5)	SPE for use in potentially explosive atmospheres in accordance with Article 34(5) of Regulation (EU) 2016/1628. This engine shall only be placed on the market for installation in non-road mobile machinery to be used in potentially explosive atmospheres, as defined in point (5) of Article 2 of Directive 2014/34/EU of the European Parliament and the Council [1].	Type approval in accordance with Regulation (EU) 2016/1628 number and issue date	EM-ATX	ATEX ENGINE
34(6)	SPE for launch and recovery of lifeboats operated by a national rescue service in accordance with Article 34(6) of Regulation (EU) 2016/1628. This engine shall only be placed on the market for installation in non-road mobile machinery exclusively used for the launch and recovery of beach launched lifeboats operated by a national rescue service.	Type approval in accordance with Regulation (EU) 2016/1628 number and issue date	EM-LLV	LIFE BOAT LAUNCH ENGINE

Article of Regulation (EU) 2016/1628 (column 1)	Information to be stated in Section 2 of the Statement of Conformity		Supplementary information to be stated in the statutory marking in accordance with Annex III Appendix 1 Table 1	
	Text required for entry 1 (column 2)	Additional information required for entry 2 (column 3)	Exemption Code (EM) or transition code (TM) (column 4)	Text for supplementary information (column 5)
34(7) first paragraph	Replacement engine for category RLL or RLR placed on Union market on or before 31 December 2011 in accordance with the first paragraph of Article 34(7) of Regulation (EU) 2016/1628. This engine shall only be placed on the market to replace a locomotive or railcar engine that was placed on the market before 31 December 2011 where that replacement is authorised by the approval authority of a Member State due to the recognition that the installation of an engine in compliance with the applicable emission limits set out in Tables II-7 and II-8 of Annex II to Regulation (EU) 2016/1628 will involve significant technical difficulties. This engine shall comply with the emission limits that it would have needed to meet in order to be placed on the Union market on 31 December 2011, or shall comply with more stringent emission limits.	Approval authority that authorised the replacement Replacement project approval reference Type approval in accordance with Directive 97/68/EC approval number and issue date	EM-REA	RAIL REPLACEMENT A ENGINE
34(7) second paragraph	Replacement engine for category RLL or RLR placed on Union market after 31 December 2011 in accordance with the second paragraph of Article 34(7) of Regulation (EU) 2016/1628. This engine shall only be placed on the market to replace a locomotive or railcar engine that was placed on the market after 31 December 2011 where that replacement is authorised by the approval authority of a Member State and the replacement engine complies with the emission limits that the engine to be replaced had to meet when originally placed on the Union market.	Type approval in accordance with Directive 97/68/EC approval number and issue date	EM-REB	RAIL REPLACEMENT B ENGINE
34(8)	RLL or RLR engine to be part of a project at an advanced stage of development as defined by Directive 2008/57/EC of the European Parliament and of the Council [2] on 6 October 2016 in accordance with Article 34(8) of Regulation (EU) 2016/1628. This engine shall only be placed on the market as part of a project at an advanced stage of development as defined by Directive 2008/57/EC of the European Parliament and of the Council where it has been authorised by the approval authority of a Member State due to the disproportionate cost of using engines complying with the emission limits set out in Tables II-7 or II-8 of Annex II to Regulation (EU) 2016/1628.	Member state that has authorised the project Authorised Project reference. Type approval in accordance with Directive 97/68/EC approval number and issue date	EM-PRR	RAIL PROJECT ENGINE

Article of Regulation (EU) 2016/1628 (column 1)	Information to be stated in Section 2 of the Statement of Conformity		Supplementary information to be stated in the statutory marking in accordance with Annex III Appendix 1 Table 1	
	Text required for entry 1 (column 2)	Additional information required for entry 2 (column 3)	Exemption Code (EM) or transition code (TM) (column 4)	Text for supplementary information (column 5)
35(4)	Engine that incorporates new technologies or new concepts and that, as a result of those new technologies or new concepts, is incompatible with one or more requirements of Regulation (EU) 2016/1628. This engine shall only be placed on the market as an engine incorporating new technologies or new concepts where it holds a provisional type approval certificate granted by the approval authority of a Member State in accordance with Article 35(4) of Regulation (EU) 2016/1628.	Provisional type approval number and issue date Date at which the provisional EU type-approval ends Restrictions in accordance with Article 35(3) of Regulation (EU) 2016/1628	EM-NTE	NEW TECHNOLOGY ENGINE
58(9)	Engines of category RLL with a maximum net power greater than 2 000 kW to be installed in locomotives which only run on a technically isolated 1 520 mm railway network, in accordance with Article 58(9) of Regulation (EU) 2016/1628. This engine shall only be placed on the market for use on a technically isolated 1 520 mm railway network where it has been authorised by the approval authority of a Member State. This engine shall, as a minimum, comply with the emission limits that engines had to meet to be placed on the market on 31 December 2011.	Type approval in accordance with Directive 97/68/EC approval number and issue date	TR-RWG	BROAD-GAUGE RAIL ENGINE
58(10)	Replacement engine for category NRS with a reference power no less than 19 kW or belonging to a category equivalent to NRG where the replacement engine and the original engine belong to an engine category or power range that was not subject to type-approval at Union level on 31 December 2016 in accordance with Article 58(10) of regulation (EU) 2016/1628. This engine shall only be placed on the market to replace an engine of category NRS with a reference power no less than 19 kW or category NRG that has no type approval under Directive 97/68/EC.		TR-RES	REPLACEMENT ENGINE

Article of Regulation (EU) 2016/1628 (column 1)	Information to be stated in Section 2 of the Statement of Conformity		Supplementary information to be stated in the statutory marking in accordance with Annex III Appendix 1 Table 1	
	Text required for entry 1 (column 2)	Additional information required for entry 2 (column 3)	Exemption Code (EM) or transition code (TM) (column 4)	Text for supplementary information (column 5)
58(11)	Replacement engine for category NRE with a reference power no less than 19 kW and no greater than 560 kW, or belonging to a category equivalent to NRE and with a reference power greater than 560 kW, where the replacement engine and the original engine belong to an engine category or power range that was not subject to type-approval at Union level on 31 December 2016 in accordance with Article 58(11) of Regulation (EU) 2016/1628. This engine shall only be placed on the market to replace an engine of category NRE with a reference power no less than 19 kW and no greater than 560 kW, or to replace an engine of category NRE with a reference power greater than 560 kW that has no type approval under Directive 97/68/EC This engine (*) shall, comply with an emission stage that expired not more than 20 years before the placing on the market of those engines and that is at least as stringent as the emission limits that the engine to be replaced had to meet when it was placed on the market originally.	Where applicable, Type approval in accordance with Directive 97/68/EC approval number and issue date	TR-REE	REPLACEMENT ENGINE

(*) Only applicable to replacement engines of category NRE with a reference power no less than 19 kW and no greater than 560 kW.

(1) Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres (OJ L 96, 29.3.2014, p. 309).

(2) Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community (OJ L 191, 18.7.2008, p. 1).

ANNEX III

Templates for the marking of engines

1. General requirements

1.1. All text included in the statutory and temporary markings shall be provided in ISO 8859 series (Information technology — 8-bit single-byte coded graphic character sets) characters (for Bulgarian language in Cyril characters, for Greek language in Greek characters) and Arabic numerals.

1.2. The manufacturer shall affix to each engine the statutory marking set out in Section A before the engine leaves the production line.

1.2.1. Notwithstanding point 1.2, manufacturers shall amend the statutory marking of an engine after it left the production line when the mandatory essential information and, where applicable, the supplementary information required for that engine has changed before it is placed on the market.

SECTION A — STATUTORY MARKING

1. Mandatory essential information and supplementary information

The information on the statutory marking shall contain at least the information set out in Table 1 of Appendix 1. The character 'X' indicates the mandatory essential information and, where applicable, the supplementary information required for the marking of engines as set out in Art 32 of Regulation (EU) 2016/1628.

2. Location of the statutory marking

2.1. The statutory marking shall be located so as to be readily visible after the engine has been completed with all the auxiliaries necessary for engine operation.

2.2. The location of the statutory marking shall be declared in the information document set out in Annex I.

2.3. Where required for the purpose of Article 8(6) of regulation (EU) 2016/1628 the OEM shall be provided with a duplicate of the statutory marking to be affixed to the engine or non-road mobile machinery in a readily visible and easily accessible position when the engine is installed in the non-road mobile machinery.

3. Method of affixing the statutory marking

3.1. The statutory marking shall be affixed to an engine part necessary for normal engine operation and not normally requiring replacement during engine life.

3.2. It shall be affixed in such a manner that will remain durable for the emission durability period of the engine and shall be clearly legible and indelible.

3.3. If labels or plates are used, they must be affixed in such a manner that they cannot be removed without being destroyed or defaced.

SECTION B — TEMPORARY MARKINGS

1. Mandatory essential information

The temporary marking set out in Article 33(1) and (2) of Regulation (EU) 2016/1628 shall be affixed before the engine is placed on the market and shall include at least the following information:

1.1. For engines delivered separately from its exhaust after-treatment system the wording 'Separate Shipment Art 34(3) *2016/1628'.

1.2. For engines that are not yet in conformity with the approved type and that are being delivered to the manufacturer of that engine:

(a) the name or trademark of the manufacturer;

(b) the part identification number of the not-in-conformity engine; and

(c) the wording 'Not-in-Conformity Art 33(2)*2016/1628'.

2. **Method of affixing the temporary marking**

The temporary marking shall remain affixed to the engine by a removable label or a robust separate tag (e.g. a laminated sheet attached with a wire-tie) until the engine is in conformity with the approved type.

Appendix 1

Table 1

Mandatory essential information and, where applicable, supplementary information in the statutory marking of engines

Mandatory essential information and, where applicable, supplementary information	Stage V engines EU type-approved in accordance with Regulation (EU) 2016/1628 (1)	Stage V engines provisionally EU type-approved in accordance with Article 35 of Regulation (EU) 2016/1628 (1)	Engines using the exemption or transition provision set out in Article 32(2) of Regulation (EU) 2016/1628										
			Paragraph number of Article 34 of Regulation (EU) 2016/1628							Paragraph number of Article 58 of Regulation (EU) 2016/1628			
			1	2	4	5	6	7	8	5 (1)	10	11(a)	11(b)
Name, registered trade name or registered trade mark of manufacturer	X	X	X	X	X	X	X	X			X	X	X
Engine type designation or, in the case of an engine type within an engine family, either the FT or the engine family designation	X	X				X	X	X			X	X	X
Unique engine identification number unequivocally attributed to the particular engine	X	X			X	X	X	X			X	X	X
EU type-approval number as described in Annex V, or alternatively the mark of the EU type-approval number set out in Appendix 2	X	X				X	X						
Engine production date (2)	X	X			X	X	X		X	X			
Lower case letter 'e' followed by the distinguishing number of the Member State informed of the field testing program, as set out in point 2.1 of Annex V					X								
Markings in accordance with the applicable legislation on 5 October 2016									X	X			
EC type-approval number issued in accordance with Directive 97/68/EC (3)								X				X	
Applicable exemption code (EM) or transition code (TM) from column 4 of Table 1 of Appendix 2 to Annex II		X	X	X	X	X	X	X	X		X	X	X
Applicable text for supplementary information from column 5 of Table 1 of Appendix 2 to Annex II		X	X	X	X	X	X	X	X		X	X	X

(1) Including engines exempted by Article 34(3) of Regulation (EU) 2016/1628.

(2) Alternatively, for engine categories NRSh and NRS excluding sub-categories NRS-v-2b and NRS-v-3 and where engine and non-road mobile machinery are fully integrated and cannot be identified as separate components, indicate the non-road mobile machinery production date.

(3) Alternatively, indicate the EC type-approval number of the equivalent EC type-approval set out in Annex XII to Directive 97/68/EC.

Appendix 2

Mark of the EU type-approval number

1. The mark of the EU type-approval number may be used in the statutory marking instead of the EU type-approval number; it shall consist of:

1.1. A rectangle surrounding the lower case letter 'e', followed by the distinguishing number of the Member State which has granted the EU type-approval, as set out in point 2.1 of Annex V;

1.2. In the vicinity of the rectangle:

(a) the applicable Engine Category Identification Code from column 4 of Table 1 in Appendix 1 to Annex V followed by a slash ('/') and the applicable Fuelling Type Code from column 3 of Table 2 of Appendix 1 to Annex V;

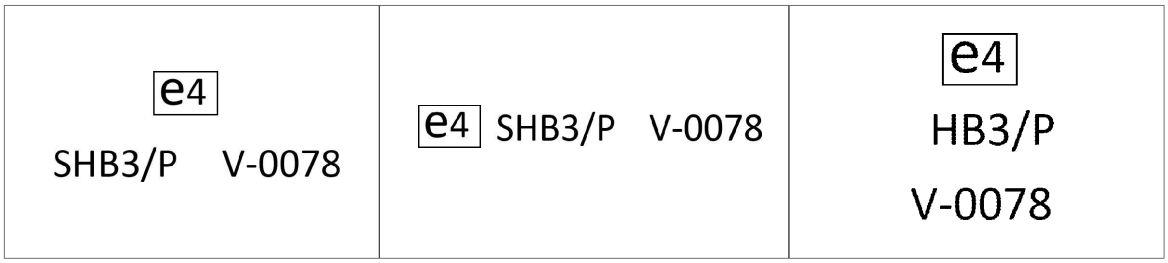
(b) the character 'V' representing the compliance with the provisions of Regulation (EU) 2016/1628 followed by a hyphen ('-') and the sequential number of the EU type-approval set out in point 2.4 of Annex V.

2. Examples of the lay-out of the mark of the EU type-approval number with fictive sequential numbers for explanation purposes shown in various lay-outs:

2.1. *Example 1*

Mark of the EU type-approval number:

e4*2016/1628*2017/RRRSHB3/P*0078*03

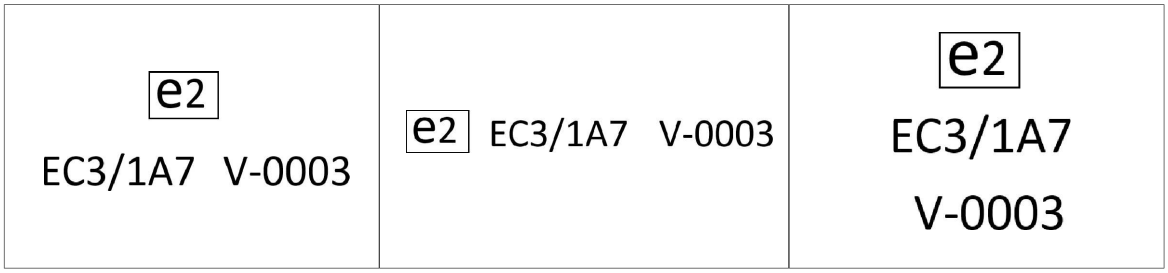


Lay-out 1 **Lay-out 2** **Lay-out 3**

2.2. *Example 2*

Mark of the EU type-approval number:

e2*2016/1628*2017/RRREC3/1A7*0003*00



Lay-out 1 **Lay-out 2** **Lay-out 3**

2.3. *Example 3*

Mark of the EU type-approval number:

e12*2016/1628*2017/RRRLV1S/D*0331*02

e12 LV1S/D V-0331	e12 LV1S/D V-0331	e12 LV1S/D V-0331
Lay-out 1	**Lay-out 2**	**Lay-out 3**

ANNEX IV

Templates for the EU type-approval certificate

EU TYPE-APPROVAL CERTIFICATE

EU TYPE-APPROVAL CERTIFICATE FOR AN ENGINE TYPE OR AN ENGINE FAMILY FOR NON-ROAD MOBILE MACHINERY IN ACCORDANCE WITH REGULATION (EU) 2016/1628

Identification of approval authority

Communication concerning the:

— EU type-approval (1)
— extension of EU type-approval (1)
— refusal of EU type-approval (1)
— withdrawal of EU type-approval (1)

} of an engine type/ engine family (1)

with regard to gaseous and particulate pollutant emission pursuant to Regulation (EU) 2016/1628, as last amended by (Commission Delegated) (1) Regulation …/… (1) (2) (of the European Parliament and of the Council) (1)

EU type-approval number (3): .....

Reason for extension/refusal/withdrawal (1): .....

SECTION I

1.1. Make (trade name(s) of manufacturer): .....

1.2. Commercial name(s) (if applicable): .....

1.3. Company name and address of manufacturer: .....

1.4. Name and address of manufacturer's authorised representative (if any): .....

1.5. Name(s) and address(es) of assembly/manufacture plant(s): .....

1.6. Engine type designation/engine family designation/FT (1): .....

1.7. Category and sub-category of the engine type/engine family (1) (4): .....

1.8. Emissions durability period category: Not Applicable/Cat 1/Cat 2/Cat 3 (1)

1.9. Emissions stage: V/ SPE

1.10. Engine for snow throwers (5): Yes/No (1)

SECTION II

1. Technical service responsible for carrying out the test(s): .....

2. Date(s) of the test report(s): .....

3. Number(s) of the test report(s): .....

SECTION III

The undersigned hereby certifies the accuracy of the manufacturer's description in the attached information document of the engine type/engine family ([1]) described above, for which one or more representative samples, selected by the approval authority, have been submitted as prototypes and that the attached test results apply to the engine type/engine family ([1]).

1. The engine type/engine family ([1]) meets/does not meet ([1]) the requirements laid down in Regulation (EU) 2016/1628.

2. The approval is granted/extended/refused/withdrawn ([1])

3. The approval is granted in accordance with Article 35 of Regulation (EU) 2016/1628 and the validity of the approval is thus limited to dd/mm/yyyy ([3])

4. Restrictions to validity ([3]) ([6]): .....

5. Exemptions applied ([3]) ([6]): .....

Place: .....

Date: .....

Name and signature (or visual representation of an 'advanced electronic signature' according to Regulation (EU) No 910/2014, including data for verification): .....

Attachments:

Information package

Test report(s)

Where applicable, the name(s) and specimen(s) of the signature(s) of the person(s) authorised to sign statement of conformity and a statement of their position in the company

Where applicable, a completed specimen of a statement of conformity

NB:

If this model is used for EU type-approval of an engine as an exemption for new technologies or new concepts, pursuant to Article 35(4) of Regulation (EU) 2016/1628, the heading of the certificate shall read 'PROVISIONAL EU TYPE-APPROVAL CERTIFICATE VALID ONLY ON THE TERRITORY OF … ([7])'.

Addendum

EU type-approval number: .....

PART A — CHARACTERISTICS OF THE ENGINE TYPE/ENGINE FAMILY [1]

2. **Common design parameters of the engine type/engine family** [1]

2.1. Combustion Cycle: four stroke cycle/two stroke cycle/rotary/other: ..... (describe) [1]

2.2. Ignition Type: Compression ignition/spark ignition [1]

2.3.1. Position of the cylinders in the block: V/in-line/radial/other(describe) [1]

2.6 Main Cooling medium: Air/Water/Oil [1]

2.7. Method of air aspiration: naturally aspirated/pressure charged/pressure charged with charge cooler [1]

2.8.1. Fuel Type(s): Diesel (non-road gas-oil)/Ethanol for dedicated compression ignition engines (ED95)/Petrol (E10)/ Ethanol (E85)/(Natural gas/Biomethane)/Liquid Petroleum Gas (LPG) [1]

2.8.1.1. Sub Fuel type (Natural gas/Biomethane only): Universal fuel — high calorific fuel (H-gas) and low calorific fuel (L-gas)/Restricted fuel — high calorific fuel (H-gas)/Restricted fuel — low calorific fuel (L-gas)/Fuel specific (LNG);

2.8.2. Fuelling arrangement: Liquid-fuel only/Gaseous-fuel only/Dual-fuel type 1A/Dual-fuel type 1B/Dual-fuel type 2A/Dual-fuel type 2B/Dual-fuel type 3B [1]

2.8.3. List of additional fuels compatible with use by the engine declared by the manufacturer in accordance with point 1 of Annex I to Delegated Regulation (EU) 2017/654 (provide reference to recognised standard or specification): .....

2.8.4. Lubricant added to fuel: Yes/No [1]

2.8.5. Fuel supply type: Pump (high pressure) line and injector/in-line pump or distributor pump/Unit injector/ Common rail/Carburettor)/port injector/direct injector/Mixing unit/other(specify) [1]

2.9. Engine management systems: mechanical/electronic control strategy [1]

2.10. ***Miscellaneous devices: Yes/No*** [1]

2.10.1. Exhaust gas recirculation (EGR): Yes/No [1]

2.10.2. Water injection: Yes/No [1]

2.10.3. Air injection: Yes/No [1]

2.10.4. Others (specify): .....

2.11. ***Exhaust after-treatment system: Yes/No*** [1]

2.11.1. Oxidation catalyst: Yes/No [1]

2.11.2. DeNO_x system with selective reduction of NO_x (addition of reducing agent): Yes/No [1]

2.11.3. Other DeNO_x systems: Yes/No [1]

2.11.4. Three-way catalyst combining oxidation and NO_x reduction: Yes/No [1]

2.11.5. Particulate after-treatment system with passive regeneration: Yes/No [1]

2.11.6. Particulate after-treatment system with active regeneration: Yes/No [1]

2.11.7. Other particulate after-treatment systems: Yes/No [1]

2.11.8. Three-way catalyst combining oxidation and NO_x reduction: Yes/No [1]

2.11.9. Other after-treatment devices (specify): .....

2.11.10. Other devices or features that have a strong influence on emissions (specify): .....

3. **Essential characteristics of the engine type(s)**

Item Number	Item Description	Parent Engine / Engine type	Engine types within the family (if applicable)		
3.1.1.	Engine Type Designation:				
3.1.2.	Engine type designation shown on engine mark: Yes/No (1)				
3.1.3.	Location of the manufacturer's statutory marking:				
3.2.1.	Declared rated speed (rpm):				
3.2.1.2.	Declared rated net Power (kW):				
3.2.2.	Maximum power speed (rpm):				
3.2.2.2.	Maximum net power (kW):				
3.2.3.	Declared maximum torque speed (rpm):				
3.2.3.2.	Declared maximum torque (Nm):				
3.6.3.	Number of Cylinders:				
3.6.4.	Engine Displacement (cm^3):				
3.8.5.	Device for recycling crankcase gases: Yes/No (1)				
3.11.3.12.	Consumable reagent: Yes/No (1)				
3.11.3.12.1.	Type and concentration of reagent needed for catalytic action:				
3.11.3.13.	NO_x sensor(s): Yes/No (1)				
3.11.3.14.	Oxygen sensor: Yes/No (1)				
3.11.4.7.	Fuel borne catalyst (FBC): Yes/No (1)				

Particular conditions to be respected in the installation of the engine on non-road mobile machinery:

3.8.1.1.	Maximum allowable intake depression at 100 % engine speed and at 100 % load (kPa) with clean air cleaner:				
3.8.3.2.	Maximum charge air cooler outlet temperature at 100 % speed and 100 % load (deg. C):				
3.8.3.3.	Maximum allowable pressure drop across charge cooler at 100 % engine speed and at 100 % load (kPa) (if applicable):				

Item Number	Item Description	Parent Engine / Engine type	Engine types within the family (if applicable)		
3.9.3.	Maximum permissible exhaust gas back-pressure at 100 % engine speed and at 100 % load (kPa):				
3.9.3.1.	Location of measurement:				
3.11.1.2	Maximum temperature drop from exhaust system or turbine outlet to first exhaust after-treatment system (deg. C) if stated:				
3.11.1.2.1.	Test conditions for measurement:				

PART B — TEST RESULTS

3.8. Manufacturer intends to use ECU torque signal for in-service monitoring: Yes/No (1)

3.8.1. Dynamometer torque greater than or equal to 0,93 × ECU torque: Yes/No (1)

3.8.2. ECU torque correction factor in case that dynamometer torque less than 0,93 × ECU torque:

11.1 Cycle emissions results

Emissions	CO (g/kWh)	HC (g/kWh)	NO_x (g/kWh)	HC+NO_x (g/kWh)	PM (g/kWh)	PN #/kWh	Test Cycle (8)
NRSC final result with DF.							
NRTC Final test result with DF							

11.2 CO_2 result:

Explanatory notes to Annex IV:

(Footnote markers, footnotes and explanatory notes not to be stated on the EU type-approval certificate)

(1) Strike out the unused options, or only show the used option(s).

(2) Indicate only the latest amendment in case of an amendment of one or more Articles of Regulation (EU) 2016/1628, according to the amendment applied for the EU type-approval.

(3) Delete this entry when not applicable.

(4) Indicate the applicable option for the category and sub-category in accordance with entry 1.7 of the information document set out in Part A of Appendix 3 to Annex I.

(5) Indicate whether the approval is for a NRS (< 19 kW) engine family consisting exclusively of engine types for snow throwers.

(6) Applicable only for EU type-approval of an engine type or an engine family as an exemption for new technologies or new concepts, pursuant to Article 35 of Regulation (EU) 2016/1628.

(7) Indicate the Member State.

(8) Indicate the test cycle in accordance with the fifth column of the Tables set out in Annex IV to Regulation (EU) 2016/1628.

ANNEX V

Numbering system of the EU type-approval certificate

1. EU type-approval certificates shall be numbered in accordance with the method set out in this Annex.

2. The EU type-approval number shall consist of a total of five sections as detailed below. In all cases, the sections shall be separated by an asterisk ('*').

2.1. Section 1 denotes the Member State issuing the EU type-approval; begins with the lower-case letter 'e' and is followed by the distinguishing number of the Member State, applicable for all EU type-approval numbers:

1	Germany	19	Romania
2	France	20	Poland
3	Italy	21	Portugal
4	The Netherlands	23	Greece
5	Sweden	24	Ireland
6	Belgium	25	Croatia
7	Hungary	26	Slovenia
8	Czech Republic	27	Slovakia
9	Spain	29	Estonia
11	United Kingdom	32	Latvia
12	Austria	34	Bulgaria
13	Luxembourg	36	Lithuania
17	Finland	49	Cyprus
18	Denmark	50	Malta

2.2. Section 2: denotes the number Regulation (EU) 2016/1628 of the European Parliament and of the Council in the form 2016/1628.

2.3. Section 3 denotes three separate elements:

2.3.1. the number of the latest amending Regulation applicable to the EU type-approval. If there is no amending Regulation, the Regulation referred to in point 2.2 is repeated;

2.3.2. this number is followed by the applicable Engine Category Identification Code from column 4 of Table 1 in Appendix 1;

2.3.3. to be further followed by a slash ('/') and the applicable Fuel Type Code from column 3 of Table 2 of Appendix 1;

2.3.3.1. in the case of dual fuel engines, the applicable Duel Fuel Suffix from column 2 of Table 3 is added to denote the gaseous fuel;

2.4. Section 4: denotes the EU type-approval number and consists of a sequential number with leading zeros (as applicable) and four digits starting from '0001';

2.5. Section 5: denotes the extension number of the EU type-approval and consists of a two-digit sequential number, with leading zero (as applicable) starting from '00'.

2.6. Where used on the engine's statutory marking only, section 2.5 shall be omitted.

3. Lay-out of the EU type-approval numbers, with fictive sequential numbers for explanation purposes

3.1. Example of an NRSh-v-1b engine type operation on petrol fuel, issued by The Netherlands, which has been extended three times:

e4*2016/1628*2017/RRRSHB3/P*0078*03

e4 = The Netherlands (section 1)

2016/1628 = Regulation (EU) 2016/1628 (section 2)

2017/RRRSHB3/P = Regulation (EU) 2017/RRR to denote the latest amending Regulation and the characters 'SHB3/P' to indicate that is an engine of category and subcategory NRSh-v-1b, with EDP Category 3, operating on petrol, in accordance with the Codes set out in Tables 1 and 2 of Appendix 1 respectively (section 3).

0078 = EU type-approval sequential number (section 4)

03 = extension number (section 5)

Where used for statutory marking this number would be displayed as:

e4*2016/1628*2017/RRRSHB3/P*0078

3.2. Example of a NRE-c-3 type 1A dual fuel engine using a gaseous fuel of type LN2 (a specific liquefied natural gas / liquefied biomethane composition resulting in a λ-shift factor not differing by more than 3 per cent the λ-shift factor of the G20 gas specified in Annex I to Delegated Regulation (EU) 2017/654 and the ethane content of which does not exceed 1,5 per cent), which has not yet been extended, issued by France:

e2*2016/1628*2016/1628EC3/1A7*0003*00

e2 = France (section 1)

2016/1628 = Regulation (EU) 2016/1628 (section 2)

2016/1628EC3/1A7 = repeats Regulation (EU) 2016/1628 to denote that it has not been amended. The characters 'EC3' denote that is a NRE-c-3 engine. The characters '1A' denote it is a dual fuel engine of type '1A'. The suffix 7 to denote that the gaseous fuel is of type 'LN2' (a specific liquefied natural gas / liquefied biomethane composition resulting in a λ-shift factor not differing by more than 3 per cent the λ-shift factor of the G_{20} gas specified in Annex I to Delegated Regulation (EU) 2017/654 and the ethane content of which does not exceed 1,5 per cent), in accordance with the Codes set out in Tables 1 to 3 of Appendix 1 respectively (section 3).

0003 = EU type-approval sequential number (section 4)

00 = extension number (section 5)

Where used for statutory marking this number would be displayed as:

e2*2016/1628*2016/1628 EC3/1A7*0003

3.3. Example of a RLL-v-1 engine type approval according to the SPE emission limits on diesel fuel, issued by Austria, which has been extended 2 times:

e12*2016/1628*2017/RRRLV1S/D*0331*02

e12 = Austria (section 1)

2016/1628 = Regulation (EU) 2016/1628 (section 2)

2017/RRRLV1S/D = Regulation (EU) 2017/RRR to denote the latest amending Regulation and the characters 'LV1S/D' to indicate that is a locomotive engine meeting the SPE emission limits type-approved to run on diesel, in accordance with the Codes set out in Tables 1 and 2 of Appendix 1 respectively (section 3).

0331 = EU type-approval sequential number (section 4)

02 = extension number (section 5)

Where used for statutory marking this number would be displayed as:

e12*2016/1628*2017/RRRLV1S/D*0331

Appendix 1

Engine Category Identification Code for type approval mark

Table 1

Engine Category Identification Code for type approval mark

Engine Category (column 1)	Engine Subcategory (column 2)	EDP Category (where applicable) (column 3)	Engine Category Identification Code (column 4)
Engines Subject to the exhaust emission limits in Annex II to Regulation (EU) 2016/1628			
NRE	NRE-v-1		EV1
	NRE-v-2		EV2
	NRE-v-3		EV3
	NRE-v-4		EV4
	NRE-v-5		EV5
	NRE-v-6		EV6
	NRE-v-7		EV7
	NRE-c-1		EC1
	NRE-c-2		EC2
	NRE-c-3		EC3
	NRE-c-4		EC4
	NRE-c-5		EC5
	NRE-c-6		EC6
	NRE-c-7		EC7
NRG	NRG-v-1		GV1
	NRG-c-1		GC1
NRSh	NRSh-v-1a	Cat 1	SHA1
		Cat 2	SHA2
		Cat 3	SHA3
	NRSh-v-1b	Cat 1	SHB1
		Cat 2	SHB2
		Cat 3	SHB3
NRS (Other than those engines tested at low temperature only for use in snow throwers)	NRS-vr-1a	Cat 1	SRA1
		Cat 2	SRA2
		Cat 3	SRA3
	NRS-vr-1b	Cat 1	SRB1
		Cat 2	SRB2
		Cat 3	SRB3
	NRS-vi-1a	Cat 1	SYA1
		Cat 2	SYA2
		Cat 3	SYA3
	NRS-vi-1b	Cat 1	SYB1
		Cat 2	SYB2
		Cat 3	SYB3

Engine Category (column 1)	Engine Subcategory (column 2)	EDP Category (where applicable) (column 3)	Engine Category Identification Code (column 4)
Engines Subject to the exhaust emission limits in Annex II to Regulation (EU) 2016/1628			
NRS (Engines tested at low temperature only for use in snow thrower)	NRS-v-2a	Cat 1	SVA1
		Cat 2	SVA2
		Cat 3	SVA3
	NRS-v-2b	Cat 1	SVB1
		Cat 2	SVB2
		Cat 3	SVB3
	NRS-v-3	Cat 1	SV31
		Cat 2	SV32
		Cat 3	SV33
	NRS-vr-1a	Cat 1	TRA1
		Cat 2	TRA2
		Cat 3	TRA3
	NRS-vr-1b	Cat 1	TRB1
		Cat 2	TRB2
		Cat 3	TRB3
	NRS-vi-1a	Cat 1	TYA1
		Cat 2	TYA2
		Cat 3	TYA3
	NRS-vi-1b	Cat 1	TYB1
		Cat 2	TYB2
		Cat 3	TYB3
IWP	IWP-v-1		PV1
	IWP-v-2		PV2
	IWP-v-3		PV3
	IWP-v-4		PV4
	IWP-c-1		PC1
	IWP-c-2		PC2
	IWP-c-3		PC3
	IWP-c-4		PC4
IWA	IWA-v-1		AV1
	IWA-v-2		AV2
	IWA-v-3		AV3
	IWA-v-4		AV4
	IWA-c-1		AC1
	IWA-c-2		AC2
	IWA-c-3		AC3
	IWA-c-4		AC4
RLL	RLL-v-1		LV1
	RLL-c-1		LC1

Engine Category (column 1)	Engine Subcategory (column 2)	EDP Category (where applicable) (column 3)	Engine Category Identification Code (column 4)
Engines Subject to the exhaust emission limits in Annex II to Regulation (EU) 2016/1628			
RLR	RLR-v-1		RV1
	RLR-c-1		RC1
SMB	SMB-v-1		SM1
ATS	ATS-v-1		AT1
Engines Subject to the exhaust emission limits in Annex VI to Regulation (EU) 2016/1628 SPE			
SPE-NRE	SPE-NRE-v-1		EV1S
	SPE-NRE-v-2		EV2S
	SPE-NRE-v-3		EV3S
	SPE-NRE-v-4		EV4S
	SPE-NRE-v-5		EV5S
	SPE-NRE-v-6		EV6S
	SPE-NRE-v-7		EV7S
	SPE-NRE-c-1		EC1S
	SPE-NRE-c-2		EC2S
	SPE-NRE-c-3		EC3S
	SPE-NRE-c-4		EC4S
	SPE-NRE-c-5		EC5S
	SPE-NRE-c-6		EC6S
	SPE-NRE-c-7		EC7S
SPE-NRG	SPE-NRG-v-1		GV1S
	SPE-NRG-c-1		GC1S
SPE-RLL	SPE-RLL-v-1		LV1S
	SPE-RLL-c-1		LC1S

Table 2

Fuelling type codes for approval marks

Engine Fuel type (column 1)	Sub-type, where applicable (column 2)	Fuel Type Code (column 3)
Diesel (non-road gas-oil) fuelled CI engine		D
Dedicated Ethanol (ED95) fuelled CI engine		ED
Ethanol (E85) fuelled SI engine		E85
Petrol (E10) fuelled SI engine		P
LPG fuelled SI engine		Q

Engine Fuel type (column 1)	Sub-type, where applicable (column 2)	Fuel Type Code (column 3)
Natural gas/biomethane fuelled SI engine	Engine approved and calibrated for the H-range of gases	H
	Engine approved and calibrated for the L-range of gases	L
	Engine approved and calibrated for both the H-range and L-range of gases	HL
	Engine approved and calibrated for a specific gas composition in the H-range of gases and transformable to another specific gas in the H-range of gases by fine tuning of the engine fuelling	HT
	Engine approved and calibrated for a specific gas composition in the L-range of gases and transformable to another specific gas in the L-range of gases after fine tuning of the engine fuelling	LT
	Engine approved and calibrated for a specific gas composition in either the H-range or the L-range of gases and transformable to another specific gas in either the H-range or the L-range of gases by fine tuning of the engine fuelling	HLT
	Engine approved and calibrated for a specific liquefied natural gas / liquefied biomethane composition resulting in a λ-shift factor not differing by more than 3 per cent the λ-shift factor of the G_{20} gas specified in Annex I to Delegated Regulation (EU) 2017/654 and the ethane content of which does not exceed 1,5 per cent	LN2
	Engine approved and calibrated for any other (than above) liquefied natural gas / liquefied biomethane composition.	LNG
Dual-fuel engines	for dual-fuel engines of Type 1A	1A# (*)
	for dual-fuel engines of Type 1B	1B# (*)
	for dual-fuel engines of Type 2A	2A# (*)
	for dual-fuel engines of Type 2B	2B# (*)
	for dual-fuel engines of Type 3B	3B# (*)

(*) Replace '#' with approved gas specification from Table 3.

Table 3

Dual Fuel Suffix

Approved Gas specification	Dual Fuel Suffix (column 2)
Dual fuel engine approved and calibrated for the H-range of gases as gaseous component of fuel	1
Dual fuel engine approved and calibrated for te L-range of gases as gaseous component of fuel	2
Dual fuel engine being and calibrated for both the H-range and L-range of gases as gaseous component of fuel	3

Approved Gas specification	Dual Fuel Suffix (column 2)
Dual fuel engine approved and calibrated for a specific gas composition in the H-range of gases and transformable to another specific gas in the H-range of gases by fine tuning of the engine fuelling as gaseous component of fuel	4
Dual fuel engine approved and calibrated for a specific gas composition in the L-range of gases and transformable to another specific gas in the L-range of gases after fine tuning of the engine fuelling as gaseous component of fuel	5
Dual fuel engine approved and calibrated for a specific gas composition in either the H-range or the L-range of gases and transformable to another specific gas in either the H-range or the L-range of gases by fine tuning of the engine fuelling as gaseous component of fuel	6
Dual fuel engine approved and calibrated for a specific liquefied natural gas / liquefied biomethane composition resulting in a λ-shift factor not differing by more than 3 per cent the λ-shift factor of the G_{20} gas specified in Annex I to Delegated Regulation (EU) 2017/654 and the ethane content of which does not exceed 1,5 per cent as gaseous component of fuel	7
Dual fuel engine approved and calibrated for any other (than above) liquefied natural gas / liquefied biomethane composition as gaseous component of fuel	8
Dual fuel engine approved for operation on LPG as gaseous component of fuel	9

ANNEX VI

The single format of the test report

1. **General requirements**

One test report shall be completed for each tests required for EU type-approval.

Each additional (e.g. a second speed on a constant speed engine) or supplementary test (e.g. another fuel is tested) will require an additional or supplementary test report.

2. **Explanatory notes on creation of a test report**

2.1. A test report shall contain at least the information set out in Appendix 1;

2.2. Notwithstanding point 2.1, only those sections or sub-sections relevant for the particular test and for the particular engine family, engine types within the engine family or engine type tested need to be stated in the test report (e.g. if a NRTC is not run this section may be omitted);

2.3. The test report may contain more information than that requested in point 2.1 but in any case, shall adhere to the proposed numbering system;

2.4. Where several options separated by forward slash are given for an entry, the unused options shall be struck out, or only the used option(s) shall be shown;

2.5. Where a 'type' of a component is requested, the information supplied shall uniquely identify the component; this may be a list of characteristic, a manufacturers' name and part or drawing number, a drawing, or a combination of the aforementioned or other methods that achieves the same result.

2.6. The test report may be delivered on paper on in an electronic format agreed between the manufacturer, technical service and approval authority.

Appendix 1

Template for the single format of the test report

TEST REPORT FOR NON-ROAD ENGINES

1. **General Information**

1.1. Make(s) (trade name(s) of manufacturer): .....

1.2. Commercial name(s) (if applicable): .....

1.3. Company name and address of manufacturer: .....

1.4. Name of technical service: .....

1.5. Address of technical service: .....

1.6. Location of test: .....

1.7. Date of test: .....

1.8. Test report number: .....

1.9. Information document reference number (if available): .....

1.10. Test report type: Primary test/additional test/supplementary test

1.10.1. Description of the purpose of the test: .....

2. **General engine information (test engine)**

2.1. Engine type designation/engine family designation/FT: .....

2.2. Engine identification number: .....

2.3. Engine Category and subcategory: NRE-v-1/NRE-v-2/NRE-v-3/NRE-v-4/NRE-v-5/NRE-v-6/NRE-v-7/NRE-c-1/NRE-c-2/NRE-c-3/NRE-c-4/NRE-c-5/NRE-c-6/NRE-c-7/NRG-v-1/NRG-c-1/NRSh-v-1a/NRSh-v-1b/NRS-vr-1a/NRS-vr-1b/ NRS-vi-1a/NRS-vi-1b/NRS-v-2a/NRS-v-2b/NRS-v-3/IWP-v-1/IWP-v-2/IWP-v-3/IWP-v-4/IWP-c-1/IWP-c-2/IWP-c-3/IWP-c-4/IWA-v-1/IWA-v-2/IWA-v-3/IWA-v-4/IWA-c-1/IWA-c-2/IWA-c-3/IWA-c-4/RLL-v-1/RLL-C-1/RLR-v-1/RLR-C-1/SMB-v-1/ATS-v-1

3. **Documentation and information Check list (primary test only)**

3.1. Engine mapping documentation reference: .....

3.2. Deterioration factor determination documentation reference: .....

3.3. Infrequent regeneration factors determination documentation reference, where applicable: .....

3.4. NO_x control diagnostic demonstration documentation reference, where applicable: .....

3.5. Particulate control diagnostic demonstration documentation reference, where applicable:

3.6. For engine types and engine families that use an ECU as part of the emission control system anti-tampering declaration documentation reference: .....

3.7. For engine types and engine families that use mechanical devices as part of the emission control system anti-tampering and adjustable parameters declaration and demonstration documentation reference: .....

3.8. Manufacturer intends to use ECU torque signal for in-service monitoring: Yes/No

3.8.1. dynamometer torque greater than or equal to 0,93 × ECU torque: Yes/No

3.8.2. ECU torque correction factor in case that dynamometer torque less than 0,93 × ECU torque: .....

4. **Reference fuel(s) used for test (complete relevant subparagraph(s))**

4.1. *Liquid fuel for spark-ignition engines*

4.1.1. Make: .....

4.1.2. Type: .....

4.1.3. Octane number RON: .....

4.1.4. Octane number MON: .....

4.1.5. Ethanol content (%): .....

4.1.6. Density at 15 Deg.C (kg/m^3): .....

4.2. *Liquid fuel for compression-ignition engines*

4.2.1. Make: .....

4.2.2. Type: .....

4.2.3. Cetane number: .....

4.2.4. Fame content (%): .....

4.2.5. Density at 15 Deg.C (kg/m^3): .....

4.3. *Gaseous fuel — LPG*

4.3.1. Make: .....

4.3.2. Type: .....

4.3.3. Reference fuel type: Fuel A/Fuel B

4.3.4. Octane number MON: .....

4.4. *Gaseous fuel- Methane/biomethane*

4.4.1. Reference fuel type: $G_R/G_{23}/G_{25}/G_{20}$

4.4.2. Source of reference gas: specific reference fuel/pipeline gas with admixture

4.4.3. For specific reference fuel

4.4.3.1. Make: .....

4.4.3.2. Type: .....

4.4.4. For pipeline gas with admixture

4.4.4.1. Admixture(s): Carbon dioxide/Ethane/Methane/Nitrogen/Propane

4.4.4.2. The value of Sλ for the resulting fuel blend: .....

4.4.4.3. The Methane Number (MN) of the resulting fuel blend: .....

4.5. *Dual fuel engine (in addition to relevant sections above)*

4.5.1. Gas energy ratio on test cycle: .....

5. **Lubricant**

5.1. Make(s): .....

5.2. Type(s): .....

5.3. SAE viscosity: .....

5.4. Lubricant and fuel are mixed: yes/no

5.4.1. Percentage of oil in mixture: .....

6. **Engine Speed**

6.1. 100 % speed (rpm): .....

6.1.1. 100 % speed determined by: Declared rated speed/Declared maximum test speed (MTS)/Measured MTS

6.1.2. Adjusted MTS if applicable (rpm): .....

6.2. Intermediate speed: .....

6.2.1. Intermediate speed determined by: Declared intermediate speed/Measured intermediate speed/60 % of 100 % speed/75 % of 100 % speed/85 % of 100 % speed

6.3. Idle speed: .....

7. **Engine Power**

7.1. Engine driven equipment (if applicable)

7.1.1. Power absorbed at indicated engine speeds by necessary auxiliaries for engine operation that cannot be fitted for the test (as specified by the manufacturer) to be stated in Table 1:

Table 1

Power absorbed by engine auxiliaries

Auxiliary type and identifying details	Power absorbed by auxiliary (kW) at indicated engine speed (complete relevant columns)						
	Idle	63 %	80 %	91 %	Intermediate	Max. power	100 %
Total ($P_{f,i}$):							

7.1.2. Power absorbed at indicated engine speeds by auxiliaries linked with the operation of the non-road mobile machinery that cannot be removed for the test (as specified by the manufacturer) to be stated in Table 2:

Table 2

Power absorbed by non-road mobile machinery auxiliaries

Auxiliary type and identifying details	Power absorbed by auxiliary (kW) at indicated engine speed (complete relevant columns)						
	Idle	63 %	80 %	91 %	Intermediate	Max. power	100 %
Total ($P_{r,i}$):							

7.2. Engine net power to be stated in Table 3:

Table 3

Engine net power

Condition	Engine net power (kW) at indicated engine speed (complete relevant columns)		
	Intermediate	Max. power	100 %
Reference power measured at specified test speed ($P_{m,i}$)			
Total auxiliary power from Table 1 ($P_{f,i}$)			
Total auxiliary power from Table 2 ($P_{r,i}$)			
Engine net power $Pi = P_{m,I} - P_{f,i} + P_{r,i}$			

8. **Conditions at test**

8.1. f_a within range 0,93 to 1,07: Yes/No

8.1.1. If f_a is not within specified range state altitude of test facility and dry atmospheric pressure: .....

8.2. Applicable intake air temperature range: 20 to 30/0 to – 5(snow throwers only)/– 5 to – 15(snowmobiles only)/ 20 to 35(NRE greater than 560 kW only)

9. **Information concerning the conduct of the NRSC test:**

9.1. Cycle (mark cycle used with X) to be stated in Table 4:

Table 4

NRSC test cycle

Cycle	C1	C2	D2	E2	E3	F	G1	G2	G3	H
Discrete mode										
RMC									N/A	

9.2. Dynamometer setting (kW) to be stated in Table 5:

Table 5

Dynamometer setting

% Load at point or % of rated power (as applicable)	Dynamometer setting (kW) at indicated engine speed after adjustment for auxiliary power [1] (complete relevant columns)					
	Idle	63 %	80 %	91 %	Inter-mediate	100 %
5 %						
10 %						
25 %						
50 %						

% Load at point or % of rated power (as applicable)	Dynamometer setting (kW) at indicated engine speed after adjustment for auxiliary power [1] (complete relevant columns)					
	Idle	63 %	80 %	91 %	Inter-mediate	100 %
75 %						
100 %						

[1] The dynamometer setting shall be determined using the procedure set out in point 7.7.1.3 of Annex VI to Delegated Regulation (EU) 2017/654. The auxiliary power in that point shall be determined using the total values set out in Tables 1 and 2 of this Appendix.

9.3. NRSC Emissions results

9.3.1. Deterioration Factor (DF): calculated/assigned

9.3.2. DF values and the cycle weighted emissions results to be stated in Table 6:

Note: In the event that a discrete mode NRSC is run where the K_{ru} or K_{rd} factors have been established for individual modes then a table showing each mode and the applied K_{ru} or K_{rd} should replace the shown table

Table 6

NRSC cycle DF values and weighted emissions results

DF mult/add	CO	HC	NO_x	$HC+NO_x$	PM	PN
Emissions	CO (g/kWh)	HC (g/kWh)	NO_x (g/kWh)	$HC+NO_x$ (g/kWh)	PM (g/kWh)	PN #/kWh
Test result with/without regeneration						
k_{ru}/k_{rd} mult/add						
test result with infrequent regeneration adjustment factors (IRAFs)						
Final test result with DF						

9.3.3. Cycle weighted CO_2 (g/kWh): .....

9.3.4. Cycle weighted NH_3 (ppm): .....

9.4. Additional control area test points (if applicable) to be stated in Table 7:

Table 7

Additional control area test points

Emissions at test point	Engine Speed	Load (%)	CO (g/kWh)	HC (g/kWh)	NO_x (g/kWh)	$HC+NO_x$ (g/kWh)	PM (g/kWh)	PN n/kWh
Test result 1								
Test result 2								
Test result 3								

9.5. Sampling systems used for the NRSC test: .....

9.5.1. Gaseous emissions: .....

9.5.2. PM: .....

9.5.2.1. Method: single/multiple filter

9.5.3. Particle number: .....

10. **Information concerning the conduct of the NRTC test (if applicable):**

10.1. Cycle (mark cycle with X) to be stated in Table 8:

Table 8

NRTC test cycle

NRTC	
LSI-NRTC	

10.2. NRTC emissions results

10.2.1. Deterioration Factor (DF): calculated/fixed

10.2.2. DF values and the emissions results to be stated in Table 9 or in Table 10, as applicable (NRTC or LSI-NRTC):

Table 9

DF values and the emissions results for NRTC

DF mult/add	CO	HC	NO_x	$HC+NO_x$	PM	PN
Emissions	CO (g/kWh)	HC (g/kWh)	NO_x (g/kWh)	$HC+NO_x$ (g/kWh)	PM (g/kWh)	PN #/kWh
Cold start						
Hot start test result with/without regeneration						
Weighted test result						
k_{ru}/k_{rd} mult/add						
Weighted test result with IRAFs						
Final test result with DF						

10.2.3 Hot cycle CO_2 (g/kWh): .....

10.2.4. Cycle weighted NH_3 (ppm): .....

10.2.5. Cycle work for hot start test (kWh): .....

10.2.6. Cycle CO_2 for hot start test (g): .....

Table 10

DF values and the emissions results for NRTC-LSI

DF mult/add	CO	HC	NO_x	HC+NO_x	PM	PN
Emissions	CO (g/kWh)	HC (g/kWh)	NO_x (g/kWh)	HC+NO_x (g/kWh)	PM (g/kWh)	PN #/kWh
Test result with/without regeneration						
k_{ru}/k_{rd} mult/add						
Test result with IRAFs						
Final test result with DF						

10.3. Cycle CO_2 (g/kWh): .....

10.4. Cycle NH_3 (ppm): .....

10.4.1. Cycle work (kWh): .....

10.4.2. Cycle CO_2 (g): .....

10.5. Sampling system used for the NRTC test: .....

10.6. Gaseous emissions: .....

10.7. PM: .....

10.7.1. Method: single/multiple filter

10.8. Particle number: .....

11. **Final emissions results**

11.1 Cycle emissions results to be stated in Table 11.

Table 11

Final emissions results

Emissions	CO (g/kWh)	HC (g/kWh)	NO_x (g/kWh)	HC+NO_x (g/kWh)	PM (g/kWh)	PN #/kWh	Test Cycle [1]
NRSC final result with DF [1].							
NRTC Final test result with DF [3]							

11.2 CO_2 result [4]: .....

Explanatory notes to Appendix 1:

(Footnote markers, footnotes and explanatory notes not to be stated on the test report)

([1]) For NRSC note the cycle indicated in point 9.1; for NRTC note cycle indicated in point 10.1.

([2]) Copy the results from Table 9.3.2.

([3]) Copy the results from Table 10.2.2 or 10.3.6, as applicable

([4]) For an engine type or engine family that is tested on both the NRTC and NRSC, indicate the hot cycle CO_2 emissions values from the NRTC noted in point 10.3 or the NRTC-LSI noted in point 10.4. For an engine only tested on an NRSC indicate the CO_2 emissions values given in that cycle from point 9.3.3.

ANNEX VII

Format for the list of engines referred to in Article 37(1) of Regulation (EU) 2016/1628

1.1. Make(s) (trade name(s) of manufacturer): .....

1.2. Commercial name(s) (if applicable): .....

1.3. Company name and address of manufacturer: .....

1.4. Name and address of manufacturer's authorised representative (if any): .....

1.5. Name(s) and address(es) of assembly/manufacture plant(s): .....

1.7. List number ([0]): .....

1.7.1 Reason for list submission ([1]): Yearly/Stage V/TAA ([2])

1.7.2 List period start date (dd/mm/yyyy): .....

1.7.3 List period end date (dd/mm/yyyy): .....

Engine family designation / Engine type designation ([3])	Category and sub category ([4])	Number of engines produced during list period	Engine identification number ([5])		Month and year of cease of production (mm/yyyy) ([6])
			First engine	Last engine	
Engine family 1					
Type 1					
Type …					
Type i					
Engine family …					
Type 1					
Type …					
Type j					
Engine family n					
Type 1					
Type …					
Type k					

Explanatory notes to Annex VII:

(Footnote markers, footnotes and explanatory notes not to be stated on the list of engines produced in accordance with the EU type-approvals granted)

([0]) Use the following code: *yyyy/nn* Where *yyyy* is the year of production of the list and *nn* is the sequential number of the lists presented during that year.

([1]) Indicate one of the following codes:

Yearly for lists submitted within 45 days following the end of each calendar year;

Stage V for lists submitted immediately after each of the dates for the placing on the market of engines referred to in Annex III to Regulation (EU) 2016/1628;

TAA for lists submitted any other date that the approval authority may stipulate.

(2) Strike out the unused options, or only show the used option(s).

(3) Indicate the engine type designation /engine family designation in accordance with entries 1.6 and 3.1.1 of the information document set out in Appendix 3 to Annex I.

(4) Indicate the applicable option for the category and sub-category in accordance with entry 1.7 of the information document set out in Part A of Appendix 3 to Annex I.

(5) Only applicable when the correlation of the engine identification number to the corresponding engine types and, where applicable, engine families and to the EU type-approval numbers is not identified by the engine coding system (engine type designation/ engine family designation).

(6) Only applicable when the manufacturer ceases to produce an approved engine type or engine family; in this case, indicate the month and year of production of the last engine.

ANNEX VIII

Templates and data structure for the exchange of data by means of IMI

The IMI system shall allow for the exchange of at least the following data between approval authorities; the structure and numbering of the data shall be respected.

1. Make(s) (trade name(s) of manufacturer): .....

2. Commercial name(s) (if applicable): .....

3. Company name of manufacturer: .....

3.1. Postal address / Street and number of manufacturer: .....

3.1.1. Postal code: .....

3.1.2. Country / Region: .....

4. Name of manufacturer's authorised representative (if any): .....

4.1. Postal address / Street and number of manufacturer's authorised representative: .....

4.1.1. Postal code: .....

4.1.2. Country / Region: .....

5. Name(s) of assembly/manufacture plant(s): .....

5.1. Postal address (es) / Street(s) and number(s) of assembly/manufacture plant(s): .....

5.1.1. Postal code(s): .....

5.1.2. Country (ies) / Region(s): .....

6. Engine type designation/engine family designation /FT ([1]) ([2]): .....

7. Category and sub-category of the engine type/engine family ([1]) ([3]): .....

7.1. Engine identification number of tested engine ([4]): .....

8. EU type-approval: granted/extended/revised/refused/ withdrawn ([1]) ([5])

8.1. Date of granting/extending/revising/refusing/withdrawing ([1]) the EU type-approval ([5])

9. Number of the EU type-approval (except if refused) ([5]): .....

10. Emissions stage: V/ SPE ([1]) ([5])

11. Exemption for new technologies or new concepts in accordance with Article 35 of Regulation (EU) 2016/1628 ([5]) ([6])

11.1 Validity of the approval limited to dd/mm/yyyy ([5]) ([6])

11.2. Restrictions to validity ([5]) ([6]): .....

11.3. Exemptions applied ([5]) ([6]): .....

12. **Final emissions result** (7)

12.1 Cycle emissions results

Emissions	CO (g/kWh)	HC (g/kWh)	NO_x (g/kWh)	HC+NO_x (g/kWh)	PM (g/kWh)	PN #/kWh	Test Cycle
NRSC final result with DF							
NRTC Final test result with DF							

12.2 CO_2 result: .....

Explanatory notes to Annex VIII:

(Footnote markers, footnotes and explanatory notes not to be stated)

(1) Strike out the unused options, or only show the used option(s).

(2) Indicate the engine type designation /engine family designation in accordance with entries 1.6 and 3.1.1 of the information document set out in Appendix 3 to Annex I.

(3) Indicate the applicable option for the category and sub-category in accordance with entry 1.7 of the information document set out in Part A of Appendix 3 to Annex I.

(4) Indicate the information from entry 2.2 of Appendix 1 to Annex VI (test report).

(5) Indicate the applicable value of the EU type-approval certificate as set out in Annex IV.

(6) State this entry only for EU type-approvals of an engine type or an engine family as an exemption for new technologies or new concepts, pursuant to Article 35 of Regulation (EU) 2016/1628.

(7) Indicate the information from section 11 of Appendix 1 to Annex VI (test report).

ANNEX IX

Parameters for the definition of engine types and engine families, and their operation modes

1. **Engine type**

The technical features of an engine type shall be those defined in its information document drafted in accordance with the template set out in Annex I.

1.1. Operating mode (speed operation)

An engine type may be EU type-approved as a constant speed engine or as a variable speed engine, as defined in Articles 3(21) and 3(22) of Regulation (EU) 2016/1628.

1.1.1. Variable speed engines

1.1.1.1. In the case that, as allowed by Article 4(2) of Regulation (EU) 2016/1628, a variable-speed engine of a particular category is used in place of a constant-speed engine of the same category, the parent engine (for the purposes of EU type-approval) and all engine types within the engine family (for the purposes of conformity of production), shall be tested using the applicable variable speed NRSC and additionally, where required by Article 24(9) or Article 24(10) of Regulation (EU) 2016/1628, the applicable transient cycle. As set out in Article 24(5) of Regulation (EU) 2016/1628, except in the case of engines of category IWP, a variable speed engine of a particular category used in a constant speed operation of the same category need not be additionally tested using the applicable constant speed NRSC.

1.1.1.2. Variable speed engines of category IWP for use in one or more other inland waterway applications

In the case that a variable speed engine of category IWP is to be placed on the market for use in one or more other inland waterway application as permitted by Article 4 (2) of Regulation (EU) 2016/1628 (constant speed IWP) and Article 4 (1)(5)(b) of Regulation (EU) 2016/1628 (variable or constant speed IWA) the requirements of this paragraph shall additionally be met.

1.1.1.2.1. In the case that the engine type is the parent engine, in order to comply with Articles 24(5), 24(7) and 24(8) of Regulation (EU) 2016/1628 the engine shall, in addition to meeting the applicable limit values when tested on the E3 NRSC, also meet the applicable limit values when tested on each additional applicable NRSC (E2/C1/D2). Separate test reports shall be produced and included in the information package for each NRSC.

1.1.1.2.2. In the case of all engine types within the engine family, when subject to a conformity of production emissions test the engine shall, in addition to meeting the applicable limit values when tested on the E3 NRSC, also meet the applicable limit values when tested on each applicable constant speed NRSC.

1.1.1.2.3. Entry 3.4.3 of Appendix 3 of Annex I shall indicate each NRSC applicable for the engine type, together with the corresponding engine speeds.

1.1.1.2.4. The instructions to the OEM set out in Annex XIV to Delegated Regulation (EU) 2017/654 shall set out each category and operating mode (speed operation) for which the engine may be installed.

1.1.2. Constant speed engines

1.1.2.1. The constant speed governor function shall be engaged during constant speed operation. The governors of constant speed engines may not be required to continuously maintain speed exactly constant. The speed may decrease below the speed at zero load, so that the minimum speed occurs near the engine's point of maximum power. This is typically in the region of 0,1 to 10 per cent.

1.1.2.2. In the case that the engine type is equipped with an idle speed for start-up and shut-down as permitted by Article 3(21) of Regulation (EU) 2016/1628 the engine shall be installed in a manner to ensure that the constant speed governor function is engaged prior to increasing the load-demand to the engine from the no-load setting.

1.1.2.3. Constant speed engine types equipped with alternative speeds

A constant speed engine shall not be designed to operate with variable speed. In the case that the engine type is equipped with alternative speeds as permitted by Article 3(21) of Regulation (EU) 2016/1628 the requirements of this paragraph shall additionally be met.

1.1.2.3.1. In the case that the engine type is the parent engine, in order to comply with Articles 24(5) and 24(6) of Regulation (EU) 2016/1628 the engine shall meet the applicable limit values when tested using the applicable NRSC test cycle at each constant speed applicable to the engine type. Separate test reports shall be produced and included in the information package for each NRSC.

1.1.2.3.2. In the case of all engine types within the engine family, when subject to a conformity of production emissions test the engine shall meet the applicable limit values using the applicable NRSC test cycle at each constant speed applicable to the engine type.

1.1.2.3.3. Each constant speed applicable to the engine type that is permitted by the manufacturer shall be listed in Section 3.2.1 of Appendix 3 to Annex I.

1.1.2.3.4. The engine shall be installed in a manner to ensure that:

(a) the engine is stopped prior to resetting the constant speed governor to an alternative speed; and,

(b) the constant speed governor is only set to the alternative speeds permitted by the engine manufacturer.

1.1.2.3.5. The instructions to the OEM and end-users set out in Annexes XIV and XV to Delegated Regulation (EU) 2017/654 shall include information on the correct installation and operation of the engine according to the requirements of paragraphs 1.1.2.2 and 1.1.2.3.

1.1.2.4. Constant speed engines of category IWP for use in place of a constant speed engine of category IWA

In the case that a constant speed engine of category IWP is to be placed on the market for use in place of a constant speed engine of category IWA as permitted by Article 4 (1)(5)(b) of Regulation (EU) 2016/1628 the requirements of this paragraph shall additionally be met.

1.1.2.4.1. In the case that the engine type is the parent engine, in order to comply with Articles 24(5) and 24(8) of Regulation (EU) 2016/1628 the engine shall, in addition to meeting the applicable limit values when tested on the E2 NRSC, also meet the applicable limit values when tested on the D2 NRSC. Separate test reports shall be produced and included in the information package for each NRSC.

1.1.2.4.2. In the case of all engine types within the engine family, when subject to a conformity of production emissions test the engine shall, in addition to meeting the applicable limit values when tested on the E2 NRSC, also meet the applicable limit values when tested on the D2 NRSC.

1.1.2.4.3. Section 3.4.3 of Appendix 3 to Annex I shall indicate each NRSC applicable for the engine type, together with the corresponding engine speeds.

1.1.2.4.4. The instructions to the OEMs set out in Annex XIV to Delegated Regulation (EU) 2017/654 shall set out each category and operating mode (speed operation) for which the engine may be installed.

2. **Engine family criteria**

2.1. General

An engine family is characterised by design parameters. These shall be common to all engines within the engine family. The engine manufacturer may decide, which engines belong to an engine family, as long as the membership criteria listed in paragraph 2.4 are respected. The engine family shall be approved by the approval authority. The manufacturer shall provide to the approval authority the appropriate information relating to the emissions levels of the members of the engine family.

2.2. Engine categories, operating mode (speed operation) and power range

2.2.1. An engine family shall only comprise engine types within the same engine category as set out in Article 4 (1) of Regulation (EU) 2016/1628.

2.2.2. The engine family shall comprise only engine types of the same speed operation as set out in Annex I to Regulation (EU) 2016/1628.

2.2.3. Engine families covering more than one power range

2.2.3.1. An engine family may cover more than one power range for the same speed operation within the same engine (sub-)category. Consistent with Article 18(2) of Regulation (EU) 2016/1628, in this case the parent engine (for the purposes of EU type-approval) and all engine types within the same engine family (for the purposes of conformity of production) shall, with respect to the applicable power ranges:

— meet the most stringent emissions limit values;

— be tested using the test cycles that correspond to the most stringent emissions limit values;

— be subject to the earliest applicable dates for EU type-approval and placing on the market set out in Annex III to Regulation (EU) 2016/1628.

In order to maintain, when the engine is installed in the non-road mobile machinery, the principle of Article 18(2) of Regulation (EU) 2016/1628, the instructions for OEMs set out in Annex XIV to Delegated Regulation (EU) 2017/654 shall include the statement that the installation shall not permanently constrain an engine to only deliver power within the power range of a sub-category with a more stringent emissions limit than the sub-category in which the engine is type-approved.

2.2.3.2. For the purpose of allocating a EU type-approval sub-category to an engine family covering more than one power range the manufacturer and approval authority shall decide the sub-category that most closely reflects the criteria in paragraph 2.2.3.1.

2.3. Special cases

2.3.1. Interactions between parameters

In some cases there may be interaction between parameters, which may cause emissions to change. This shall be taken into consideration to ensure that only engines with similar exhaust emissions characteristics are included within the same engine family. These cases shall be identified by the manufacturer and notified to the approval authority. It shall then be taken into account as a criterion for creating a new engine family.

2.3.2. Devices or features having a strong influence on emissions

In case of devices or features, which are not listed in paragraph 2.4 and which have a strong influence on the level of emissions, this equipment shall be identified by the manufacturer using good engineering judgment, and shall be notified to the approval authority. It shall then be taken into account as a criterion for creating a new engine family.

2.3.3. Additional criteria

In addition to the parameters listed in paragraph 2.4, the manufacturer may introduce additional criteria allowing the definition of families of more restricted size. These parameters are not necessarily parameters that have an influence on the level of emissions.

2.4. Parameters defining the engine family

2.4.1. Combustion cycle

(a) 2-stroke cycle;

(b) 4-stroke cycle;

(c) Rotary engine;

(d) Others.

2.4.2. Configuration of the cylinders

2.4.2.1. Position of the cylinders in the block

(a) Single

(b) V;

(c) In-line;

(d) Opposed;

(e) Radial;

(f) Others (F, W, etc.).

2.4.2.2. Relative position of the cylinders

Engines with the same block may belong to the same engine family as long as their bore centre-to-centre dimensions are the same.

2.4.3. Main cooling medium

(a) Air;

(b) Water;

(c) Oil.

2.4.4. Individual cylinder displacement

2.4.4.1. Engine with a unit cylinder displacement ≥ 0,75 dm^3

In order for engines with a unit cylinder displacement of ≥ 0,75 dm^3 to be considered to belong to the same engine family, the spread of their individual cylinder displacements shall not exceed 15 per cent of the largest individual cylinder displacement within the engine family.

2.4.4.2. Engine with a unit cylinder displacement < 0,75 dm^3

In order for engines with a unit cylinder displacement of < 0,75 dm^3 to be considered to belong to the same engine family, the spread of their individual cylinder displacements shall not exceed 30 per cent of the largest individual cylinder displacement within the engine family.

2.4.4.3. Engine with other unit cylinder displacement limits

Engines with an individual cylinder displacement that exceeds the limits defined in paragraphs 2.3.4.1 and 2.3.4.2 may be considered to belong to the same engine family with the approval of the approval authority. The approval shall be based on technical elements (calculations, simulations, experimental results etc.) showing that exceeding the limits does not have a significant influence on the exhaust emissions.

2.4.5. Method of air aspiration

(a) Naturally aspirated;

(b) Pressure charged;

(c) Pressure charged with charge cooler.

2.4.6. Fuel type

(a) Diesel (non-road gas-oil);

(b) Ethanol for dedicated compression ignition engines (ED95);

(c) Petrol (E10);

(d) Ethanol (E85).

(e) Natural gas/Biomethane:

(1) Universal fuel — high calorific fuel (H-gas) and low calorific fuel (L-gas);

(2) Restricted fuel — high calorific fuel (H-gas);

(3) Restricted fuel — low calorific fuel (L-gas);

(4) Fuel specific (LNG);

(f) Liquid Petroleum Gas (LPG);

2.4.7. Fuelling arrangement

(a) Liquid-fuel only;

(b) Gaseous-fuel only;

(c) Dual-fuel type 1A;

(d) Dual-fuel type 1B;

(e) Dual-fuel type 2A;

(f) Dual-fuel type 2B;

(g) Dual-fuel type 3B.

2.4.8. Combustion chamber type/design

(a) Open chamber;

(b) Divided chamber;

(c) Other types.

2.4.9. Ignition Type

(a) Spark ignition;

(b) Compression ignition.

2.4.10. Valves and porting

(a) Configuration;

(b) Number of valves per cylinder.

2.4.11. Fuel supply type

(a) Pump, (high pressure) line and injector;

(b) In-line pump or distributor pump;

(c) Unit injector;

(d) Common rail;

(e) Carburettor;

(f) Port injector;

(g) Direct injector;

(h) Mixing unit;

(i) Other.

2.4.12. Miscellaneous devices

(a) Exhaust gas recirculation (EGR);

(b) Water injection;

(c) Air injection;

(d) Others.

2.4.13. Electronic control strategy

The presence or absence of an ECU on the engine is regarded as a basic parameter of the engine family.

In the case of electronically controlled engines, the manufacturer shall present the technical elements explaining the grouping of these engines in the same engine family, i.e. the reasons why these engines can be expected to satisfy the same emissions requirements.

The electronic governing of speed does not need to be in a different engine family from those with mechanical governing. The need to separate electronic engines from mechanical engines should only apply to the fuel injection characteristics, such as timing, pressure, rate shape, etc.

2.4.14. Exhaust after-treatment systems

The function and combination of the following devices are regarded as membership criteria for an engine family:

(a) Oxidation catalyst;

(b) $DeNO_x$ system with selective reduction of NO_x (addition of reducing agent);

(c) Other $DeNO_x$ systems;

(d) Particulate after-treatment system with passive regeneration:

(1) wall-flow,

(2) non-wall-flow;

(e) Particulate after-treatment system with active regeneration:

(1) wall-flow,

(2) non-wall-flow;

(f) Other particulate after-treatment systems;

(g) Other devices.

When an engine has been certified without exhaust after-treatment system, whether as parent engine or as member of the engine family, then this engine, when equipped with an oxidation catalyst (not with particulate after-treatment system), may be included in the same engine family, if it does not require different fuel characteristics.

If it requires specific fuel characteristics (e.g. particulate after-treatment systems requiring special additives in the fuel to ensure the regeneration process), the decision to include it in the same engine family shall be based on technical elements provided by the manufacturer. These elements shall indicate that the expected emissions level of the equipped engine complies with the same limit value as the non-equipped engine.

When an engine has been certified with exhaust after-treatment system, whether as parent engine or as member of an engine family, whose parent engine is equipped with the same exhaust after-treatment system, then this engine, when equipped without exhaust after-treatment system, shall not be added to the same engine family.

2.4.15. Dual-fuel engines

All engine types within a dual-fuel engine family shall belong to the same type of dual-fuel engines defined in section 2 (for example type 1A, type 2B, etc.), and operate with the same types of fuel or when appropriate with fuels declared according to this Regulation as being of the same range(s).

In addition to belonging to the same dual fuel type, they shall have a maximum gas energy ratio on the applicable test cycle (GER_{cycle}) within the range 70 to 100 per cent of that of the engine type with the highest GER_{cycle}.

2.4.16. Intake air temperature for engines of category NRS < 19 kW:

(a) consisting of engine types to be used in snow throwers: engines shall be tested with intake air temperature between 0 °C and – 5 °C;

(b) Not exclusively consisting of engine types to be used in snow throwers: engines shall be tested with intake temperature 25 ± 5 °C.

2.4.17. Emissions Durability Period (EDP) Category

In case of engine categories in Table V-3 or V-4 of Annex V to Regulation (EU) 2016/1628 that have alternative values for EDP, the EDP category declared by the manufacturer:

(a) Cat 1 (Consumer products);

(b) Cat 2 (Semi-professional products);

(c) Cat 3 (Professional products).

3. **Choice of the parent engine**

3.1. General

3.1.1. Once the engine family has been agreed by the approval authority, the parent engine of the engine family shall be selected using the primary criterion of the highest fuel delivery per stroke per cylinder at the declared maximum torque speed. In the event that two or more engines share this primary criterion, the parent engine shall be selected using the secondary criterion of highest fuel delivery per stroke at rated speed.

3.1.2. The approval authority may conclude that the worst-case emissions rate of the engine family can best be characterised by testing an alternative or an additional engine. In this case, the parties involved shall have the appropriate information to determine the engines within the engine family likely to have the highest emissions level.

3.1.3. If engines within the engine family incorporate other variable features which may be considered to affect exhaust emissions, these features shall also be identified and taken into account in the selection of the parent engine.

3.1.4. If engines within the engine family meet the same emissions values over different emissions durability periods, this shall be taken into account in the selection of the parent engine.

3.2. Special cases

3.2.1. In order to select the parent engine in the case of any variable speed engine family of category IWP containing one or more engine types to be placed on the market for other inland waterway applications in accordance with paragraph 1.1.1.2, the requirements of paragraph 3.1.1 shall be applied based upon the E3 NRSC. The evaluation of the requirements of paragraphs 3.1.2, 3.1.3 and 3.1.4 shall consider all NRSC for which an engine type is being type-approved.

3.2.2. In order to select the parent engine in the case of any constant speed engine family containing one or more engine types with alternative constant speeds as set out in paragraph 1.1.2.3, the evaluation of the requirements of paragraph 3.1 shall be applied to each constant speed of each engine type.

3.2.3. In order to select the parent engine in the case of any constant speed engine family of category IWP containing one or more engine types to be placed on the market for constant speed IWA applications in accordance with paragraph 1.1.2.4, the requirements of paragraph 3.1.1 shall be applied based upon the E2 NRSC. The evaluation of the requirements of paragraphs 3.1.2, 3.1.3 and 3.1.4 shall consider all NRSC for which an engine type is being type-approved.

ANNEX X

Technical details for prevention of tampering

1. For engine types and engine families that use an ECU as part of the emission control system the manufacturer shall provide to the approval authority a description of the provisions taken to prevent tampering with and modification of the ECU including the facility for updating using a manufacturer-approved programme or calibration;

2. For engine types and engine families that use mechanical devices as part of the emission control system the manufacturer shall provide to the approval authority a description of the provisions taken to prevent tampering with and modification of the adjustable parameters of the emission control system. This shall include the tamper resistant components such as carburettor limiter caps or sealing of carburettor screws or special screws not adjustable by user.

2.1. The manufacturer shall demonstrate to the technical service that the adjustable parameters of the emission control system cannot be easily tampered by applying reasonable forces, either:

— using the tools supplied together with the engine; or,

— using ordinary tools such as screwdriver, pliers (including cutting pliers) or wrenches.

Ordinary tools do not include: most cutting or grinding tools, drills and rotary cutters, or tools that generate excessive heat or flame.

3. For the purpose of this Annex, engines from different engine families may be further combined into families based upon the type and design of tamper prevention measures utilised. In order to place engines from different engine families into the same tamper prevention engine family the manufacturer shall provide confirmation to the approval authority that the measures used to prevent tampering are similar. In this case the requirements of points 1 and 2 may be performed for one representative engine and the corresponding documentation used during the type approval of all engines in the same tamper prevention engine family.

4. Manufacturers shall provide a warning in the operator's manual stating that tampering with the engine voids the EU type-approval of that particular engine.