

Prepared by the Ministry of Industry and Technology:

NOTIFICATION ON THE DETERMINATION OF EMISSION LIMITS AND ADMINISTRATIVE REQUIREMENTS ON TYPE APPROVAL FOR INTERNAL COMBUSTION ENGINES INSTALLED ON OFF-ROAD MOBILE MACHINES (2017/656/AB)

DRAFT (SGM: 2021/...)

Objective

Article 1 – (1) The objective of this Notification is in order to complete the framework determined by the Regulation on Gas and Particulate Pollutant Emission Limits for Internal Combustion Engines and Requirements Regarding Type Approval (2016/1628 / EU) published in the Official Gazette dated 11/09/2020 and numbered 31241, laying down the administrative requirements.

Scope

Article 2 – (1) These Notification covers the emission limits for all engines in the categories specified in the first paragraph of Article 5 of the afore mentioned Regulation and for gas and particulate pollutants arising from the engines of these machines, which are installed or intended to be fitted to mobile machines used outside the highway determined by The Regulation on Gas and Particulate Pollutant Emission Limits and Requirements Regarding Type Approval for Internal Combustion Engines Installed on Moving Machines Used Outside the Highway (2016/1628 / EU).

Legal Basis

Article 3 – (1) This Notification was prepared pursuant to; Article 4 of Law No. 7223 on Product Safety and Technical Regulations Law dated 12/03/2021 and 31066 and Articles 385 and 388 of the Presidential Decree No. 1 on the Presidential Organization published in the Official Gazette dated 10/7/2018 and numbered 30474 and the Regulation on Gas and Particulate Pollutant Emission Limits for Internal Combustion Engines and Requirements Regarding Type Approval (2016/1628 / EU) published in the Official Gazette dated 11/09/2020 and numbered 31241.

Definitions and abbreviations

Article 4 – (1) In addition to the definitions included in the aforementioned Regulation (2016/1628 / EU) for in terms of the application of this Notification, the following definitions shall apply:

a) 97/68/EC Regulation: Type Approval Regulation on Measures to be Taken Against Gas and Particulate Pollutant Emissions from Internal Combustion Engines Installed on Moving Machines Used Off-Highway, published in the Official Gazette dated 20/6/2007 and numbered 26558 (97/68 /AT).

b) 2016/1628 /AB Regulation: Regulation on Gas and Particulate Pollutant Emission Limits and Requirements for Type Approval for Internal Combustion Engines Installed in Moving Machines Used Out of the Highway, published in the Official Gazette dated 11/09/2020 and numbered 31241 (2016 / 1628 / AB).

c) 2017/654/AB: Draft Notification On Technical And General Requirements On Emission Limits And Type Approval For Internal Combustion Engines Installed On Off-Road Mobile Machines (2017/654/AB).

ç) 2017/655/AB: Notification On Monitoring Gaseous Pollutants Arising From Internal Combustion Engines Installed In Off-Road Mobile Machinery And In Use (2017/655/AB).

(d) ‘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.

(e) ‘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.

f) IMI: It means internal market database information.

Templates for information folder and information document

Article 5– (1) Manufacturers shall use the templates set out in Annex I to this Notification when providing information folders and information documents in accordance with Article 22 of Regulation No: 2016/1628/AB.

(2) Existing information documents for engines of category RLL issued under Regulation No: 97/68/AT or the information document of an equivalent type approval referred to in Annex XII to Regulation No: 97/68/AT may be submitted for the purposes of type-approval under Regulation No 2016/1628/AB.

(3) Existing information documents for Special Purpose Engines (SPE) issued under Regulation No: 97/68/AT or the information document of an equivalent type approval referenced in Annex XII to Regulation No: 97/68/AT may be submitted for the purposes of type-approval under Regulation No: 2016/1628/AB.

(4) Existing information documents for engines of category NRSh issued under Regulation No: 97/68/AT or the information document of an equivalent type approval referred to in Annex XII to Regulation No: 97/68/AT may be submitted for the purposes of type-approval under Regulation No: 2016/1628/AB.

Templates for statements of conformity

Article 6- (1) Manufacturers shall use the templates set out in Annex II to this Notification when delivering statements of conformity in accordance with Article 32 of Regulation No: 2016/1628/AB .

Templates for the marking of engines

Article 7– (1) Manufacturers shall use the templates set out in Annex III to this Notification when affixing markings to an engine in accordance with Article 32 of Regulation No: 2016/1628/AB .

Templates for the AB type-approval certificate

Article 8– (1) Approval authorities shall use the template set out in Annex IV to this Notification when issuing the EU type-approval certificates in accordance with Article 24 of Regulation No: 2016/1628/AB .

Numbering system of the EU type-approval certificate

Article 9– (1) Approval authorities shall use the harmonised numbering system set out in Annex V to this Notification when numbering EU type-approval certificates in accordance with Article 23 of Regulation No: 2016/1628/AB .

The single format of the test report

Article 10– (1) Technical services shall use the single format set out in Annex VI to this Notification when drawing up the test reports referred to in Article 7(3)(g) and Articles 23(6) and 23(3)(a) of Regulation No: 2016/1628/AB .

(2) Existing test reports for engines of category RLL issued under Regulation No: 97/68/AT may be submitted for the purposes of type-approval under Regulation No: 2016/1628/AB 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 Regulation No: 97/68/AT and the corresponding mode number for test cycle F in Appendix 1 to Annex XVII of Notification No: 2017/654/AB 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 Regulation No: 97/68/AT or the test report of an equivalent type approval referred to in Annex XII to Regulation No: 97/68/AT may be submitted for the purposes of type-approval under Regulation No: 2016/1628/AB 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 Regulation No: 97/68/AT may be submitted for the purposes of type-approval under Regulation No: 2016/1628/AB under the condition that neither the substantive requirements nor the requirements regarding the test procedures have changed since the execution of the test.

Format for the list of engines referred to in Article 38(1) of Regulation No:2016/1628/AB

Article 11– (1) Manufacturers shall use the format set out in Annex VII to this Notification when submitting the list of engines in accordance with Article 38(1) of Regulation No:2016/1628/AB.

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

Article 12– (1) Approval authorities shall use the templates and data structure set out in Annex VIII to this Notification for the exchange of data by means of Internal Market Information System (IMI) in accordance with Article 23(5) of Regulation No: 2016/1628/AB.

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

Article 13– (1) Approval authorities shall use electronic format for the transfer of data with other notified body or commission related to EU type-approvals that are granted, extended, withdrawn or refused data structure for the exchange of data by means of IMI.

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

Article 14– (1) For the purposes of paragraphs 1, 2 and 3 of Article 19 of Regulation No:2016/1628/AB, manufacturers shall use the parameters laid down in Annex IX to this Notification when defining engine types and engine families, and their operation modes.

Technical details for prevention of tampering

Article 15– (1) For the purposes of Article 19(4) of Regulation No: 2016/1628/AB, manufacturers shall apply the technical details laid down in Annex X to this Notification for the prevention of tampering.

Compliance with European Union legislation

Article 16– (1) This Notification, considering Commission Delegated Regulation (EU) 2017/656 of 19 December 2016 supplementing Regulation No: 2016/1628/AB of with regard to monitoring of gaseous pollutant emissions from in-service internal combustion engines installed in non-road mobile machinery has been prepared within the framework of harmonization with the EU legislation.

Entry into force

Article 17– (1) Provisions of this Notification shall apply from date of publication.

Enforcement

Article 18 – (1) The provisions of this Notification shall be enforced by the Minister of Industry and Technology.

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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 22 of Regulation No : 2016/1628/AB shall contain the following :

1.1. A list of contents ;

1.2. Manufacturer's declaration on adherence to all requirements of Regulation No: 2016/1628/AB 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 No :2016/1628/AB with regard to specified liquid fuels, fuel mixtures or fuel emulsions other than those set out in point 1.2.2 of Annex I to Notification No : 2017/654/AB;

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 No: 2016/1628/AB 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 Notification No: 2017/654/AB;

1.5.1. Where applicable, a copy of the demonstration reports set out in points 10.5.1 and 13.4.1 of Appendix 1 of Annex IV to Notification No: 2017/654/AB;

1.5.2. Where applicable, a description of the connection for, and method to read, the records set out in point 5.2.1.1.(e) of Appendix 1 of Annex IV to Notification No: 2017/654/AB and point 4.1 of Appendix 2 of that Annex;

1.5.3. 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 points 1.5, 1.5.1 and 1.5.2 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 Notification No: 2017/654/AB;

1.6.1. Where applicable, a copy of the demonstration report set out in point 9.3.6.1 of Appendix 4 of Annex IV to Notification No: 2017/654/AB;

1.6.2. Where applicable, a description of the connection for, and method to read, the records set out in point 5.4 of Appendix 4 of Annex IV to Notification No: 2017/654/AB and point 4.1 of Appendix 2 of that Annex;

1.6.3. Where the engine type or engine family is member of a PCD engine family, a justification of its membership together with the information requested in points 1.6, 1.6.1 and 1.6.2 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 26(1)(c) of Regulation No: 2016/1628/ABand in Annex III to Notification No: 2017/654/AB;

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 Notification No: 2017/654/AB;

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 19(4) of Regulation No: 2016/1628/ABand 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 Notification No: 2017/655/AB 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 Notification No: 2017/654/AB;

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;

3.10.	<i>Miscellaneous devices : Yes/No</i>								
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:

- (a) 'Test' means information required for the conduct of the emissions test,
- (b) 'Installation' means information required for the installation in non-road mobile machinery, and
- (c) 'Homologation' means information required for any inspection to confirm that the engine matches with the characteristics of the specified engine type, and, where applicable, of the specified engine family.

The columns 'test', 'installation' and 'homologation' are for information only, and may be omitted from the information document submitted to the approval authority.

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 Part B 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 No: 2016/1628/AB

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

Hereby declares that the following engine type/engine family (*) complies in all respects with the requirements of Regulation No: 2016/1628/AB Notification No: 2017/654/AB, Notification No: 2017/655/AB and Regulation (EU) 2017/656 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 Notification No: 2017/654/AB, 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' including data for verification): ...

Explanatory notes to Appendix 1:

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

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 swept volume per cylinder (cm³): ...

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 suitable for use by the engine, as declared by the manufacturer in accordance with point 1.2.3 of Annex I to Notification No: 2017/654/AB (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: Yes/No

(if yes, complete section 3.10.4 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: Yes/No

(if yes, complete section 3.11.7)

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	<i>Engine Identification</i>									
3.1.1.	Engine type designation			X						
3.1.2.	Engine type			X						

	<i>e</i> <i>Para</i> <i>meter</i> <i>s</i>									
3.2.1.	Decla red rated speed (rpm):	X								
3.2.1. 1.	Fuel delive ry/stro ke (mm ³) for diesel engin e, fuel flow (g/h) for other engin es, at rated net power :			X						
3.2.1. 2.	Decla red rated net power (kW):	X								
3.2.2.	Maxi mum power speed (rpm):			X						If differ ent from rated speed
3.2.2. 1.	Fuel delive ry/stro ke (mm ³) for diesel engin			X						

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 cham	X								For NRSh only

	ber permitted by manufacturer: Yes/No									
3.4.2.1.	Exhaust mixing chamber description, photograph and/or drawing:	X								If applicable
3.4.3.	Manufacturers chosen NRS C: RMC/Discrete mode	X								
3.4.4.	Additional NRS C: E2/D2/C1	X								Only where additional cycles are declared in entries 1.12.1 or 1.12.2 of Part A

3.5.1.1.	Minimum (deg. C):	X								
3.5.1.2.	Maximum (deg. C):	X								
3.6.	<i>Combustion Cylinder</i>									
3.6.1.	Bore (mm):			X						
3.6.2.	Stroke (mm):			X						
3.6.3.	Number of cylinders:			X						
3.6.4.	Engine total swept volume (cm ³):			X						
3.6.5.	Swept volume per cylinder as % of parent engine:			X						If engine family
3.6.6.	Volu metric compr ession ratio:			X						Specif y tolera nce

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.	<i>Valve timing</i>									
3.6.10.1.	Maximum lift and angles of opening and closing in relation to dead centre or equiv			X						

	<i>cooling</i>									
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.	<i>Air cooling</i>									
3.7.2.1.	fan: Yes/No			X						

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.	<i>Aspiration</i>									
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	X							

3.8.3.1.	Type: air- air/air - water/ other(specif y)		X						
3.8.3.2.	Maxi mum charg e air cooler outlet tempe rature at 100 % speed and 100 % load (deg. C):	X	X						
3.8.3.3.	Maxi mum allow able pressu re drop across charg e cooler at 100 % engin e speed and at 100 % load (kPa):	X	X						
3.8.4.	Intake throttl e			X					

	valve: Yes/No									
3.8.5.	Device for recycling crank case 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 Notification No: 2017/654/A B: Yes/No	X								
3.8.6.	<i>Inlet path</i>									<i>2-stroke, NRS and NRSh only</i>
3.8.6.1.	Description of inlet path,			X						

	(with drawings, photographs and/or part numbers):									
3.8.7.	<i>Air filter</i>			X						<i>2-stroke, NRS and NRSh only</i>
3.8.7.1.	Type:			X						
3.8.8.	<i>Intake air-silencer</i>									<i>2-stroke, NRS and NRSh only</i>
3.8.1.1.	Type:			X						
3.9.	<i>Exhaust system</i>									
3.9.1.	Description of the exhaust system (with drawings, photos and/or part numbers as			X						<i>2 stroke, NRS and NRSh only</i>

	required):									
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	X								

	restriction after-treatment at start of test (kPa):									
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			X						

	(specify):									
3.10.2	<i>Water injection</i>									
3.10.2.1.	Operation principle:			X						
3.10.3.	Air injection									
3.10.3.1.	Operation principle:			X						
3.10.4.	Other(s)									
3.10.4.1.	Type(s):			X						
3.11.	<i>Exhaust after-treatment system</i>									
3.11.1.	<i>Location</i>		X							
3.11.1.1.	Place(s) and maximum/minimum distance(s) from engine to first after-treatment		X							

	device:									
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 1.3.	Minimum temperature at inlet to first after-treatment device (deg. C), if stated :	X	X							

3.11.1 .3.1.	Test conditions for measurement:	X	X							
3.11.2	<i>Oxidation catalyst</i>									
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						
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 .	<i>Catalytic exhaust after-treatment system for NO_x or three way catalyst</i>									
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			X						

	the catalytic converter(s) :									
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						

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.	Locati on(s)			X						
3.11.3 .14.	Oxyg en sensor (s): Yes/N o			X						
3.11.3 .14.1.	Type:			X						
3.11.3 .14.2.	Locati on(s):			X						
3.11.4 .	<i>Partic ulate after- treat ment syste m</i>									
3.11.4 .1.	Type of filtrati on: wall- flow/ non- wall- flow/ other (speci fy)			X						
3.11.4 .2.	Type:			X						
3.11.4 .3.	Dime nsions and capaci ty of the partic ulate after- treatm ent			X						

	system:									
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			X						

	(deg. C):									
3.11.4 .6.	Catalytic coating: Yes/No			X						
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						

	feature(s)									
3.11.7.1.	Type(s):			X						
3.12.	<i>Fuel feed for liquid - fuelled CI or, where applicable, dual-fuel engines</i>									
3.12.1.	<i>Feed pump</i>									
3.12.1.1.	Pressure (kPa) or characteristic diagram:			X						
3.12.2.	<i>Injection system</i>									
3.12.2.1.	Pump									
3.12.2.1.1.	Type(s):			X						
3.12.2.1.2.	Rated pump speed (rpm):			X						
3.12.2.1.3.	mm ³ per			X						Specify

	stroke or cycle at full injection at rated pump speed:									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.	<i>Injection timing</i>									
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.	<i>Injection piping</i>									
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 .	<i>Injector(s)</i>									
3.12.3 .1.	Type(s):			X						
3.12.3 .2.	Opening pressure (kPa):			X						Specify tolerance

	<i>matio n)</i>									
3.14.1	Fuel: LPG /NG- H/NG -L /NG- HL/L NG/F uel specif ic LNG	X		X						
3.14.2	<i>Press ure regul ator(s)vapo riser(s)</i>									
3.14.2 .1.	Type(s)			X						
3.14.2 .2.	Numb er of pressu re reduct ion stages			X						
3.14.2 .3.	Press ure in final stage mini mum and maxi mum. (kPa)			X						
3.14.2 .4.	Numb er of main adjust ment			X						

	points :									
3.14.2 .5.	Number of idle adjust ment points :			X						
3.14.3 .	Fuelling system: mixing unit/g as injection/liq uid injection/direct injection			X						
3.14.3 .1.	<i>Mixture strength regulation</i>									
3.14.3 .1.1.	System description and/or diagram and drawings:			X						
3.14.4 .	<i>Mixing unit</i>									
3.14.4 .1.	Number:			X						
3.14.4 .2.	Type(s):			X						

	(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.	<i>Approvals of engines for several fuel compositions</i>									
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 specif	X	X	X						

	ic LNG									
3.14.8 .3.	Transformation for a specific gas composition: NG-HT/N G-LT/N G-HLT	X	X	X						
3.14.9 .	<i>Fuel temperature pressure regulator final stage</i>									
3.14.9 .1.	Minimum (deg. C):	X								
3.14.9 .2.	Maximum (deg. C):	X								
3.15.	<i>Ignition system</i>									
3.15.1 .	<i>Ignition coil(s)</i>									
3.15.1 .1.	Type(s):			X						
3.15.1 .2.	Number:			X						

3.15.2	<i>Spark plug(s)</i>									
3.15.2 .1.	Type(s):			X						
3.15.2 .2.	Gap setting:			X						
3.15.3	<i>Magneto</i>			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:

- (¹) As defined in Annex II to Notification No: 2017/654/AB.
- (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 32(5) of Regulation No: 2016/1628/AB, 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' including the signature verification data.

Appendix 1

MODEL FOR THE STATEMENT OF CONFORMITY

STATEMENT OF CONFORMITY ACCOMPANYING EACH ENGINE SUBJECT TO AN EXEMPTION OR A TRANSITIONAL PROVISION (ARTICLE 32(1)(a) AND (b) OF REGULATION NO: 2016/1628/AB)

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): ...
- 3.1.6. Engine identification number: ...

conforms in all respects with the requirements of Regulation No: 2016/1628/AB 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 36(4) of Regulation No: 2016/1628/AB, 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 (TR) ⁽⁶⁾: ...
4. Comments ⁽⁷⁾: ...

Explanatory notes to Appendix 1:

- (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 No : 2016/1628/AB (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 (TR) (column 4)	Text for supplementary information (column 5)
35(1)	Not Applicable		EM-EXP	ENGINE NOT FOR USE IN EU NON-ROAD MOBILE MACHINERY
35(2)	<p>Engine only for use by armed forces in accordance with Article 35(2) of Regulation 2016/1628.</p> <p>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.</p> <p>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.</p>		EM-AFE	ARMED FORCES ENGINE
35(4)	<p>Engine for field testing in accordance with Article 35(4) of Regulation 2016/1628.</p> <p>This engine shall only be placed on the market and entry into service as part of a field testing programme.</p> <p>By the date given the engine shall be either removed from</p>	<p>End date of exemption dd/mm/yyyy</p> <p>Name and address of the approval authority that has been informed of</p>	EM-FTE	FIELD TEST ENGINE

	use in the European Union or brought into conformity with the requirements set out in Regulation 2016/1628.	the testing program		
35(5)	<p>SPE for use in potentially explosive atmospheres in accordance with Article 35(5) of Regulation No: 2016/1628/AB.</p> <p>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 (1) of Article 4 of Directive 2014/34/AB.</p>	Type approval in accordance with Regulation No: 2016/1628/A Bnumber and issue date	EM-ATX	ATEX ENGINE
35(6)	<p>SPE for launch and recovery of lifeboats operated by a national rescue service in accordance with Article 35(6) of Regulation 2016/1628.</p> <p>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.</p>	Type approval in accordance with Regulation No: 2016/1628/A Bnumber and issue date	EM-LLV	LIFE BOAT LAUNCH ENGINE
35(7) first paragraph	<p>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 35(7) of Regulation 2016/1628.</p> <p>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</p>	<p>Approval authority that authorised the replacement</p> <p>Replacement project approval reference</p> <p>Type approval in accordance with Directive 97/68/EC approval</p>	EM-REA	RAIL REPLACEMENT A ENGINE

	<p>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 No: 2016/1628/AB will involve significant technical difficulties.</p> <p>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.</p>	number and issue date		
35(7) second paragraph	<p>Replacement engine for category RLL or RLR placed on Union market after 31 December 2011 in accordance with the second paragraph of Article 35(7) of Regulation 2016/1628.</p> <p>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.</p>	Type approval in accordance with Directive 97/68/EC approval number and issue date	EM-REB	RAIL REPLACEMENT B ENGINE
35(8)	<p>RLL or RLR engine to be part of a project at an advanced stage of development as defined by Directive 2008/57/AT on 6 in accordance with Article 35(8) of Regulation 2016/1628.</p> <p>This engine shall only be placed on the market as part of a project at an advanced stage of development as</p>	<p>Member state that has authorised the project</p> <p>Authorised Project reference.</p> <p>Type approval in accordance with Directive</p>	EM-PRR	RAIL PROJECT ENGINE

	<p>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 2016/1628.</p>	<p>97/68/EC approval number and issue date</p>		
36(4)	<p>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 No: 2016/1628/AB.</p> <p>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 36(4) of Regulation 2016/1628.</p>	<p>Provisional type approval number and issue date</p> <p>Date at which the provisional EU type-approval ends</p> <p>Restrictions in accordance with Article 36(3) of Regulation No: 2016/1628/A B</p>	EM-NTE	NEW TECHNOLOGY ENGINE
59(9)	<p>Engines of category RLL with a maximum net power greater than 2000 kW to be installed in locomotives which only run on a technically isolated 1520 mm railway network, in accordance with Article 59(9) of Regulation No : 2016/1628/AB.</p> <p>This engine shall only be placed on the market for use on a technically isolated 1520 mm railway network where it has been authorised by the approval authority of a Member State.</p>	<p>Type approval in accordance with Directive 97/68/EC approval number and issue date</p>	TR-RWG	BROAD-GAUGE RAIL ENGINE

	<p>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.</p>			
59(10)	<p>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 59(10) of regulation 2016/1628/AB.</p> <p>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.</p>		TR-RES	REPLACEMENT ENGINE
59(11)	<p>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 59(11) of Regulation 2016/1628/AB.</p> <p>This engine shall only be placed on the market to replace an engine of category NRE with a reference power</p>	<p>Where applicable, Type approval in accordance with Directive 97/68/EC approval number and issue date</p>	TR-REE	REPLACEMENT ENGINE

	<p>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</p> <p>This engine¹ 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.</p>			
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¹ Only applicable to replacement engines of category NRE with a reference power no less than 19 kW and no greater than 560 kW.

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 33 of Regulation No : 2016/1628/AB.

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 9(6) of Regulation No: 2016/1628/AB 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 34(1) and (2) of Regulation No: 2016/1628/AB 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

<i>Mandatory essential information and, where applicable, supplementary information in the statutory marking of engines</i>													
Mandatory essential information and, where applicable, supplementary information	Stage V engines EU type - approved in accordance with Regulation No: 2016/1628/AB ²	Stage V engines provisionally EU type - approved in accordance with Article 35 of Regulation No: 2016/1628/AB ³	Engines using the exemption or transition provision set out in Article 33(2) of Regulation No: 2016/1628/AB										
			Paragraph number of Article 35 of Regulation No: 2016/1628/AB						Paragraph number of Article 59 of Regulation No: 2016/1628/AB				
			1	2	4	5	6	7	8	5 ⁴	10	11(a)	11(b)
Name, registered trade name or register	X	X	X	X	X	X	X	X			X	X	X

² Including engines exempted by Article 34(3) of Regulation (EU) 2016/1628.

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

⁴ Including engines exempted by Article 34(3) of Regulation (EU) 2016/1628.

ed trad e mar k of man ufac ture r													
Eng ine type desi gnat ion or, in the case of an engi ne type with in an engi ne fam ily, eith er the FT or the engi ne fam ily desi gnat ion	X	X				X	X	X			X	X	X
Uni que engi ne iden tific	X	X			X	X	X	X			X	X	X

ation number unequivocally attributed to the particular engine													
EU type - approval number as described in Annex V, or alternatively the mark of the EU type - approval number set out in App	X	X				X	X						

endi x 2													
Eng ine pro duct ion date 5	X	X			X	X	X		X	X			
Lo wer case lette r 'e' foll owe d by the disti ngui shin g num ber of the Me mbe r Stat e info rme d of the fiel d testi ng pro gra m, as set out in poin					X								

⁵ 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.

t 2.1 of Ann ex V													
Mar king s in acc orda nce with the appl icab le legi slati on on 5 Oct ober 201 6									X	X			
EC type - appr oval num ber issu ed in acc orda nce with Dire ctiv e 97/6 8/E C ⁶								X				X	
Ap plic able	X	X	X	X	X	X	X	X	X		X	X	X

⁶ Alternatively, indicate the EC type-approval number of the equivalent EC type-approval set out in Annex XII to Directive 97/68/EC.

exemption code (EM) or transition code (TR) from column 4 of Table 1 of Appendix 2 to Annex II													
Applicable text for supplementary information from column 5 of Table 1 of App	X	X	X	X	X	X	X	X	X		X	X	X

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 No: 2016/1628/AB 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

<i>Lay-out 1</i>	<i>Lay-out 2</i>	<i>Lay-out 3</i>

2.2. *Example 2*

Mark of the EU type-approval number:

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

<i>Lay-out 1</i>	<i>Lay-out 2</i>	<i>Lay-out 3</i>

2.3. *Example 3*

Mark of the EU type-approval number:

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

<i>Lay-out 1</i>	<i>Lay-out 2</i>	<i>Lay-out 3</i>

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 NO: 2016/1628/AB

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 No: 2016/1628/AB, 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 No: 2016/1628/AB.

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

3. The approval is granted in accordance with Article 36 of Regulation No: 2016/1628/AB 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 36(4) of Regulation No: 2016/1628/AB, 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 Notification No: 2017/654/AB (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. Other after-treatment devices (specify): ...

2.11.9. 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 total swept volume (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):				
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 $0,93 \times$ ECU torque: Yes/No ⁽¹⁾

3.8.2. ECU torque correction factor in case that dynamometer torque less than $0,93 \times$ 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 CO₂ result:

11.3. In service monitoring reference values ⁽⁹⁾

11.3.1. Reference work (kWh): ...

11.3.2. Reference CO₂ mass (g): ...

Explanatory notes to Annex IV:

⁽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 No: 2016/1628/AB, 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 36 of Regulation No: 2016/1628/AB.
- (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 No: 2016/1628/AB.
- (⁹) Only applicable to engines of sub-categories NRE-v-5 and NRE-v-6 tested on NRTC.

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
		37	Turkey
17	Finland	49	Cyprus
18	Denmark	50	Malta

2.2. Section 2: denotes the number Regulation No: 2016/1628/AB.

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 a EU type-approval number of an NRSh-v-1b engine operating 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 EU type-approval number of a NRE-c-3 type 1A dual fuel engine operating on 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 Notification No: 2017/654/AB 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 Notification No: 2017/654/AB 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 EU type-approval number of a RLL-v-1 engine according to the SPE emission limits operating 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

<i>Engine Category Identification Code for type approval mark</i>						
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 No: 2016/1628/AB						
Engines Subject to the exhaust emission limits in Annex VI to Regulation No: 2016/1628/AB SPE						
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			
	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	NRS-vr-1a	Cat 1	TRA1			

(Engines tested at low temperature only for use in snow thrower)		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			
RLR	RLR-v-1		RV1			
	RLR-c-1		RC1			
SMB	SMB-v-1		SM1			
ATS	ATS-v-1		AT1			
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

<i>Fuelling type codes for approval marks</i>		
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
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 Notification No: 2017/654/AB 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# ⁷
	for dual-fuel engines of Type 1B	1B# ⁸
	for dual-fuel engines of Type 2A	2A# ⁹
	for dual-fuel engines of Type 2B	2B# ¹⁰
	for dual-fuel engines of Type 3B	3B# ¹¹

Table 3

<i>Dual Fuel Suffix</i>	
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 the 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
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	6

⁷ Replace '#' with approved gas specification from Table 3.

⁸ Replace '#' with approved gas specification from Table 3.

⁹ Replace '#' with approved gas specification from Table 3.

¹⁰ Replace '#' with approved gas specification from Table 3.

¹¹ Replace '#' with approved gas specification from Table 3.

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	
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 Notification No: 2017/654/AB 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 or 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 $0,93 \times$ ECU torque: Yes/No

3.8.2. ECU torque correction factor in case that dynamometer torque less than $0,93 \times \text{ECU torque}$: ...

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 $S\lambda$ 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

<i>Power absorbed by engine auxiliaries</i>							
Auxiliary type and identifying details	Power absorbed by auxiliary (kW) at indicated engine speed (complete relevant columns)						
	Idle	63 %	80 %	91 %	Inter-mediate	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

<i>Power absorbed by non-road mobile machinery auxiliaries</i>							
Auxiliary type and identifying details	Power absorbed by auxiliary (kW) at indicated engine speed (complete relevant columns)						
	Idle	63 %	80 %	91 %	Inter-mediate	Max. power	100 %

Total ($P_{r,i}$):							
----------------------	--	--	--	--	--	--	--

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

Table 3

<i>Engine net power</i>			
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 $P_i = P_{m,i} - P_{f,i} + P_{r,i}$			

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

<i>NRSC test cycle</i>										
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

<i>Dynamometer setting</i>						
% Load at point or % of rated power (as applicable)	Dynamometer setting (kW) at indicated engine speed after adjustment for auxiliary power ¹² (complete relevant columns)					
	Idle	63 %	80 %	91 %	Inter-mediate	100 %
5 %						
10 %						
25 %						
50 %						
75 %						
100 %						

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

<i>NRSC cycle DF values and weighted emissions results</i>						
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}						

¹² 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.

mult/add						
test result with infrequent regeneration adjustment factors (IRAFs)						
<i>Final test result with DF</i>						

9.3.3. Cycle weighted CO₂ (g/kWh): ...

9.3.4. Cycle weighted NH₃ (ppm): ...

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

Table 7

<i>Additional control area test points</i>								
Emissions at test point	Engine Speed	Load (%)	CO (g/kWh)	HC (g/kWh)	NO _x (g/kWh)	HC+N O _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 transient test (if applicable)*

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

Table 8

<i>Transient test cycle</i>	
NRTC	
LSI-NRTC	

10.2. Transient test deterioration factors:

10.2.1. Deterioration Factor (DF): calculated/fixed

10.2.2. DF values and the emissions results to be stated in Table 9 or Table 10

10.3. NRTC emission results:

Table 9

<i>DF values and the emissions results for NRTC</i>						
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						
<i>k_{ru}/k_{rd}</i> mult/add						
Weighted test result with IRAFs						
<i>Final test result with DF</i>						

10.3.1. Hot cycle CO₂ (g/kWh):

10.3.2. Cycle average NH₃ (ppm):

	(g/kWh)	(g/kWh)	(g/kWh)	(g/kWh)	(g/kWh)	(#/kWh)	
NRSC final result with DF ⁽²⁾ .							
Final transient test result with DF ⁽³⁾							

11.2. CO₂ result ⁽⁴⁾:

11.3. In service monitoring reference values ⁽⁵⁾

11.3.1. Reference work (kWh) ⁽⁶⁾:

11.3.2. Reference CO₂ mass (g) ⁽⁷⁾:

Explanatory notes to Appendix 1:

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

⁽¹⁾ For NRSC indicate the cycle noted in point 9.1 (Table 4); for transient test indicate cycle noted in point 10.1 (Table 8).

⁽²⁾ Copy the ‘Final test result with DF’ results from Table 6.

⁽³⁾ Copy ‘Final test result with DF’ results from Table 9 or 10, as applicable.

⁽⁴⁾ For an engine type or engine family that is tested on both the NRSC and a transient cycle, indicate the hot cycle CO₂ emissions values from the NRTC noted in point 10.3.4 or the CO₂ emissions values from the LSI-NRTC noted in point 10.4.4. For an engine only tested on an NRSC indicate the CO₂ emissions values given in that cycle noted in point 9.3.3.

⁽⁵⁾ Only applicable to engines of sub-categories NRE-v-5 and NRE-v-6 tested on NRTC.

⁽⁶⁾ Indicate the cycle work for hot start test value from the NRTC noted in point 10.3.3.

⁽⁷⁾ Indicate the cycle CO₂ for hot start test value from the NRTC noted in point 10.3.4.

ANNEX VII

FORMAT FOR THE LIST OF ENGINES REFERRED TO IN ARTICLE 38(1) OF REGULATION No: 2016/1628/AB

- 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:

(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:

<i>Yearly</i>		for lists submitted within 45 days following the end of each calendar year;
<i>Stage V</i>		for lists submitted immediately after each of the dates for the placing on the market of engines referred to in Annex III to Regulation No: 2016/1628/AB;
<i>TAA</i>		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.

NRSC final result with DF							
NRTC Final test result with DF							

12.2 CO₂ result: ...

Explanatory notes to Annex VIII:

- (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 36 of Regulation No: 2016/1628/AB.
- (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 4(21) and 4(22) of Regulation No: 2016/1628/AB.

1.1.1. Variable speed engines

1.1.1.1. In the case that, as allowed by Article 5(2) of Regulation No: 2016/1628/AB, 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 25(10) of Regulation No: 2016/1628/AB, the applicable transient cycle. As set out in Article 25(5) of Regulation No: 2016/1628/AB, 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 5(2) of Regulation No: 2016/1628/AB(constant speed IWP) and Article 5 (1)(5)(b) of Regulation No: 2016/1628/AB(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 25(5), 25(7) and 25(8) of Regulation No: 2016/1628/AB 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 Notification No: 2017/654/AB 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 4(21) of Regulation No: 2016/1628/AB 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 4(21) of Regulation No: 2016/1628/AB 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 25(5) and 25(6) of Regulation No: 2016/1628/AB 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 Notification No: 2017/654/AB 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 5 (1)(5)(b) of Regulation No: 2016/1628/AB 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 25(5) and 25(8) of Regulation No: 2016/1628/AB 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 Notification No: 2017/654/AB 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 5 (1) of Regulation No: 2016/1628/AB.

2.2.2. The engine family shall comprise only engine types of the same speed operation as set out in Annex I to Regulation No: 2016/1628/AB.

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 19(2) of Regulation No: 2016/1628/AB, 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 No: 2016/1628/AB.

In order to maintain, when the engine is installed in the non-road mobile machinery, the principle of Article 19(2) of Regulation No: 2016/1628/AB, the instructions for OEMs set out in Annex XIV to Notification No: 2017/654/AB 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. Swept volume per cylinder

2.4.4.1. Engine with a swept volume per cylinder $\geq 750 \text{ cm}^3$

In order for engines with a swept volume per cylinder of $\geq 750 \text{ cm}^3$ to be considered to belong to the same engine family, the spread of their swept volume per cylinder shall not exceed 15 per cent of the largest swept volume per cylinder within the engine family.

2.4.4.2. Engine with a swept volume per cylinder $< 750 \text{ cm}^3$

In order for engines with an individual cylinder swept volume of $< 750 \text{ cm}^3$ to be considered to belong to the same engine family, the spread of their swept volume per cylinder shall not exceed 30 per cent of the largest swept volume per cylinder within the engine family.

2.4.4.3. Engine with greater spread in swept volume per cylinder

Notwithstanding points 2.4.4.1 and 2.4.4.2, engines with a swept volume per cylinder that exceeds the spread defined in paragraphs 2.4.4.1 and 2.4.4.2 may be considered to belong to the same engine family subject to the approval of the approval authority. The approval shall be based on technical elements (calculations, simulations, experimental results etc.) showing that exceeding the spread 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 No: 2016/1628/AB 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 IWA 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.