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From: Secretary-General of the European Commission,  
signed by Mr Jordi AYET PUIGARNAU, Director

date of receipt: 19 December 2016

To: Mr Jeppe TRANHOLM-MIKKELSEN, Secretary-General of the Council of  
the European Union

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Subject: COMMISSION DELEGATED REGULATION (EU) .../... of 19.12.2016  
supplementing Regulation (EU) 2016/1628 of the European Parliament and  
of the Council with regard to technical and general requirements relating to  
emission limits and type-approval for internal combustion engines for non-  
road mobile machinery

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Delegations will find attached document C(2016) 8381 final.

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Encl.: C(2016) 8381 final



Brussels, 19.12.2016  
C(2016) 8381 final

**COMMISSION DELEGATED REGULATION (EU) .../...**

**of 19.12.2016**

**supplementing Regulation (EU) 2016/1628 of the European Parliament and of the Council with regard to technical and general requirements relating to emission limits and type-approval for internal combustion engines for non-road mobile machinery**

## EXPLANATORY MEMORANDUM

### 1. CONTEXT OF THE DELEGATED ACT

The term non-road mobile machinery "NRMM" covers a wide range of different machinery, including small handheld equipment (lawn mowers, chain saws,...), construction machinery (excavators, loaders, dozers,...) or agricultural & farming machinery (harvesters, cultivators,...), but also railcars, locomotives and inland waterway vessels.

Engines installed in NRMM contribute significantly to air pollution and are accountable for roughly 15% of the nitrogen oxide (NO<sub>x</sub>) and 5% of the particulate matter (PM) emissions in the EU. Pollutant emissions are a problem not only for the air quality but primarily for the health and life of people.

Type-approval requirements applying to engines installed in NRMM are set out in Directive 97/68/EC of the European Parliament and of the Council of 16 December 1997 on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery<sup>1</sup>.

In the legislative process leading to the adoption of Regulation (EU) 2016/1628 of the European Parliament and of the Council of 14 September 2016 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, amending Regulations (EU) No 1024/2012 and (EU) No 167/2013, and amending and repealing Directive 97/68/EC<sup>2</sup>, which will apply as from first January 2017, the following key concerns as regards the current provisions for the type-approval of engines to be installed in NRMM were addressed:

- reducing the complexity of the current legal framework by replacing and repealing the currently extremely complex Directive that comprises 15 Annexes and has been amended on eight occasions;
- addressing health-damaging effects of ultrafine particulate matter by the inclusion of emission limits for particular number (PN) and particulate mass (PM);
- aligning the gaseous pollutant emission limits with (higher) US EPA standards, where applicable;
- extending the scope to cover smaller (<19kW) and larger (>560kW) combustion engines and larger spark-ignition engines (>19kW);
- extending the scope to cover engines for Snowmobiles, All-Terrain Vehicles (ATV's) Side-by Side vehicles (SbS) and generating sets;
- extending the scope to cover gas-fuelled engines (partial/mono);
- simplifying the categorisation of engines;

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<sup>1</sup> OJ L 59, 27.2.1998, p. 1

<sup>2</sup> OJ L 252, 16.9.2016, p. 53.

- simplifying the application of the legislation to stage V in accordance with three sets of engine categories;
- simplifying the transitional provisions for engines type-approved under Directive 97/68/EC;
- providing for a new system for the electronic exchange of data and information between approval authorities on type-approved engines (Internal Market Information System);
- making public the basic information on the type-approved engines (Internal Market Information System);
- clear identification of those engines subject to exemptions or benefiting from special transitional provisions;
- the application of harmonised and enhanced market-surveillance provisions to NRMM engines;
- setting up relevant obligations on the Original Equipment Manufacturer (OEM); and
- the monitoring of gaseous pollutant emissions of in-service engines operated during their normal operating duty cycles to determine to which extent the emissions measured from the test cycle correspond to the actual operation;

Based on the empowerments in Regulation (EU) 2016/1628, this delegated act sets out the technical and general requirements relating to emission limits and type-approval for internal combustion engines for non-road mobile machinery.

## **2. CONSULTATIONS PRIOR TO THE ADOPTION OF THE ACT**

In the preparation of this act, the Commission carried out appropriate consultations at expert level comprising the relevant industrial stakeholders, social partners and Member State experts.

Discussions with stakeholders for preparing the delegated act started in February 2015 at the level of four sub-groups of the main NRMM stakeholder group, Expert Group on Emissions from non-road mobile machinery engine (GEME). Two of these sub-working groups have specifically contributed to the discussions on the content of this delegated act, and in particular to defining the detail arrangements with regard technical and general requirements relating to emission limits and type-approval for internal combustion engines for non-road mobile machinery.

This act has been subject to a public consultation through the Better Regulation Portal from 10 November to 8 December 2016; comments received have been duly considered.

## **3. LEGAL ELEMENTS OF THE DELEGATED ACT**

The legal basis of this delegated act is Regulation (EU) No 2016/1628 of the European Parliament and of the Council of 14 September 2016 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for

non-road mobile machinery, amending Regulations (EU) No 1024/2012 and (EU) No 167/2013, and amending and repealing Directive 97/68/EC.

The use of a Regulation is considered to be appropriate in that it provides the required assurance for compliance while not requiring transposition into Member States' legislation.

Regulation (EU) 2016/1628 uses the 'split-level approach' originally introduced at the request of the European Parliament and used in other legislation for EU type-approval of motor vehicles. This approach provides for legislation in three steps:

– the fundamental provisions and scope are laid down by the European Parliament and the Council in Regulation (EU) 2016/1628 based on Article 114 of TFEU in accordance with the ordinary legislative procedure;

– the technical specifications associated with the fundamental provisions are laid down in two delegated acts (Article 290 of TFEU):

(a) a Regulation with regard to technical and general requirements relating to emission limits and type-approval for internal combustion engines for non-road mobile machinery, containing requirements regarding:

- (1) conformity of production;
- (2) adaptation of the emission laboratory test results to include the deterioration factors;
- (3) emission control strategies;
- (4) NO<sub>x</sub> control measures;
- (5) area associated with the relevant non-road steady-state cycles (NRSC), within which there is control on the amount that the emissions shall be permitted to exceed the limit values;
- (6) test Conditions for conduct of tests;
- (7) method for accounting for emissions of crankcase gases;
- (8) method for determining and accounting for continuous and periodic regeneration of after-treatment systems;
- (9) technical characteristics of the reference fuels;
- (10) specifications and characteristics of the steady-state and transient test cycles;
- (11) method for determination of the load and speed settings in the cycles;
- (12) procedures for conduct of tests;
- (13) procedures for emission measurement and sampling;
- (14) method for data evaluation and calculation;

- (15) apparatus for emission measurement and sampling;
  - (16) specifications and conditions for delivering an engine separately from its exhaust after-treatment system;
  - (17) specifications and conditions for the temporary placing on the market, for the purposes of field testing;
  - (18) specifications and conditions for the EU type-approval and placing on the market of engines that meet the gaseous and particulate emission limit values for special purpose engines;
  - (19) acceptance of equivalent engine type-approval;
  - (20) details of the relevant information and instructions for the OEMs;
  - (21) details of the relevant information and instructions for the end-users; and
  - (22) performance standards and assessment of technical services;
- (b) a Regulation with regard to monitoring of emissions of in-service internal combustion engines installed on non-road mobile machinery;
- (c) a Commission Implementing Regulation sets out the administrative requirements relating to emission limits and type-approval of internal combustion engines for non-road mobile machinery in accordance with Regulation (EU) 2016/1628 of the European Parliament and of the Council – C(2016) 8382.

**COMMISSION DELEGATED REGULATION (EU) .../...**

**of 19.12.2016**

**supplementing Regulation (EU) 2016/1628 of the European Parliament and of the Council with regard to technical and general requirements relating to emission limits and type-approval for internal combustion engines for non-road mobile machinery**

THE EUROPEAN COMMISSION,

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

Having regard to Regulation (EU) 2016/1628 of the European Parliament and of the Council of 14 September 2016 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, amending Regulations (EU) No 1024/2012 and (EU) No 167/2013, and amending and repealing Directive 97/68/EC<sup>3</sup>, and in particular Article 24(11), Article 25(4)(a), (b) and (c), Article 26(6), Article 34(9), Article 42(4), Article 43(5) and Article 48 thereof,

Whereas:

- (1) In order to complete the framework established by Regulation (EU) 2016/1628, it is necessary to set out the technical and general requirements and test methods relating to emission limits, EU type-approval procedures for internal combustion engines for non-road mobile machinery, arrangements with regard to conformity of production and the requirements and procedures relating to technical services for those engines.
- (2) By Council Decision 97/836/EC<sup>4</sup>, the Union has acceded to the Agreement of the United Nations Economic Commission for Europe (UNECE) concerning the adoption of uniform technical prescriptions for wheeled vehicles, equipment and parts which can be fitted to and/or be used on wheeled vehicles and the conditions for reciprocal recognition of approvals granted on the basis of these prescriptions.
- (3) With the aim to ensure that the provisions on the construction of engines to be installed in non-road mobile machinery correspond to the technical progress, the latest versions of CEN/Cenelec or ISO standards which are accessible to the public should be made applicable as regards to certain requirements.
- (4) Checks on the conformity of engines with the applicable technical requirements throughout the production process are an essential part of the EU type-approval process. Therefore, checks on the conformity of production procedures should be

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<sup>3</sup> OJ L 252, 16.9.2016, p. 53.

<sup>4</sup> Council Decision of 27 November 1997 with a view to accession by the European Community to the Agreement of the United Nations Economic Commission for Europe concerning the adoption of uniform technical prescriptions for wheeled vehicles, equipment and parts which can be fitted to and/or be used on wheeled vehicles and the conditions for reciprocal recognition of approvals granted on the basis of these prescriptions ('Revised 1958 Agreement') (OJ L 346, 17.12.1997, p. 78)

further improved and aligned with the stricter procedures applicable to road vehicles in order to increase the overall efficiency of the EU type-approval process.

- (5) In order to ensure that technical services meet the same high level of performance standards in all Member States, this Regulation should set out the harmonised requirements with which technical services have to comply, as well as the procedure for the assessment of that compliance and for the accreditation of those services.
- (6) For the sake of clarity, it is appropriate to align the numbering of test procedures in this Regulation with those in Global Technical Regulation n° 11<sup>5</sup> and in UNECE Regulation 96<sup>6</sup>,

HAS ADOPTED THIS REGULATION:

### *Article 1*

#### ***Definitions***

The following definitions shall apply:

- (1) "wobbe index" or "W" means the ratio of the corresponding calorific value of a gas per unit volume and the square root of its relative density under the same reference conditions:  
$$W = H_{\text{gas}} \times \sqrt{\rho_{\text{air}} / \rho_{\text{gas}}}$$
- (2) "λ-shift factor" or "S<sub>λ</sub>" means an expression that describes the required flexibility of the engine management system regarding a change of the excess-air ratio λ if the engine is fuelled with a gas composition different from pure methane;
- (3) "liquid-fuel mode" means the normal operating mode of a dual-fuel engine during which the engine does not use any gaseous fuel for any engine operating condition;
- (4) "dual-fuel mode" means the normal operating mode of a dual-fuel engine during which the engine simultaneously uses liquid fuel and a gaseous fuel at some engine operating conditions;
- (5) "particulate after-treatment system" means an exhaust after-treatment system designed to reduce emissions of particulate pollutants through a mechanical, aerodynamic, diffusional or inertial separation;
- (6) "governor" means a device or control strategy that automatically controls engine speed or load, other than an over-speed limiter as installed in an engine of category NRSh limiting the maximum engine speed for the sole purpose of preventing the engine operating at speeds in excess of a certain limit;
- (7) "ambient temperature" means, in relation to a laboratory environment (e.g. filter weighing room or chamber), the temperature within the specified laboratory environment;

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<sup>5</sup> [http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29glob\\_registry.html](http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29glob_registry.html)

<sup>6</sup> OJ L 88, 22.3.2014, p. 1



- (8) "base emission control strategy " or "BECS" means an emission control strategy that is active throughout the range of torque and speed over which the engine operates, unless an auxiliary emission control strategy (AECS) is activated;
- (9) "reagent" means any consumable or non-recoverable medium required and used for the effective operation of the exhaust after-treatment system;
- (10) "auxiliary emission control strategy" or "AECS" means an emission control strategy that is activated and temporarily modifies a base emission control strategy (BECS) for a specific purpose and in response to a specific set of ambient and/or operating conditions and only remains in operation as long as those conditions exist;
- (11) "good engineering judgment" means judgments consistent with generally accepted scientific and engineering principles and available relevant information;
- (12) "high speed" or " $n_{hi}$ " means the highest engine speed where 70 % of the maximum power occurs;
- (13) "low speed" or " $n_{lo}$ " means the lowest engine speed where 50 % of the maximum power occurs;
- (14) "maximum power" or " $P_{max}$ " means the maximum power in kW as designed by the manufacturer;
- (15) "partial flow dilution " means the method of analysing the exhaust gas whereby a part of the total exhaust gas flow is separated, then mixed with an appropriate amount of dilution air prior to reaching the particulate sampling filter;
- (16) "drift" means the difference between a zero or calibration signal and the respective value reported by a measurement instrument immediately after it was used in an emission test;
- (17) "to span" means to adjust an instrument so that it gives a proper response to a calibration standard that represents between 75 % and 100 % of the maximum value in the instrument range or expected range of use;
- (18) "span gas" means a purified gas mixture used to span gas analyzers;
- (19) "HEPA filter" means high-efficiency particulate air filters that are rated to achieve a minimum initial particle-removal efficiency of 99,97 % using ASTM F 1471–93;
- (20) "calibration" means the process of setting a measurement system's response to an input signal so that its output agrees with a range of reference signals;
- (21) "specific emissions" means the mass emissions expressed in g/kWh;
- (22) "operator demand" means an engine operator's input to control engine output;
- (23) "maximum torque speed" means the engine speed at which the maximum torque is obtained from the engine, as designed by the manufacturer;
- (24) "engine governed speed" means the engine operating speed when it is controlled by the installed governor;

- (25) "open crankcase emissions" means any flow from an engine's crankcase that is emitted directly into the environment;
- (26) "probe" means the first section of the transfer line which transfers the sample to the next component in the sampling system;
- (27) "test interval" means a duration of time over which brake-specific emissions are determined;
- (28) "zero gas" means a gas that yields the value zero as response to its input in an analyser;
- (29) "zeroed" means that an instrument was adjusted in a manner that it gives a zero response to a zero calibration standard, such as purified nitrogen or purified air;
- (30) "variable-speed non-road steady-state test cycle" (hereinafter "variable-speed NRSC") means an non-road steady-state test cycle that is not a constant-speed NRSC;
- (31) "constant-speed non-road steady-state test cycle" (hereinafter "constant-speed NRSC") means any of the following non-road steady-state test cycles defined in Annex IV to Regulation (EU) 2016/1628: D2, E2, G1, G2 or G3;
- (32) "updating-recording" means the frequency at which the analyser provides new, current, values;
- (33) "calibration gas" means a purified mixture of gases used to calibrate gas analyzers;
- (34) "stoichiometric" means relating to the particular ratio of air and fuel such that if the fuel were fully oxidized, there would be no remaining fuel or oxygen;
- (35) "storage medium" means a particulate filter, sample bag, or any other storage device used for batch sampling;
- (36) "full flow dilution" means the method of mixing the exhaust gas flow with dilution air prior to separating a fraction of the diluted exhaust gas flow for analysis;
- (37) "tolerance" means the interval in which 95 % of a set of recorded values of a certain quantity shall lie, with the remaining 5 % of the recorded values deviating from the tolerance interval;
- (38) "service mode" means a special mode of a dual-fuel engine that is activated for the purpose of repairing, or of moving the non-road mobile machinery to a safe location when operation in the dual-fuel mode is not possible;

## *Article 2*

### ***Requirements for any other specified fuels, fuel mixtures or fuel emulsions***

The reference fuels and other specified fuels, fuel mixtures or fuel emulsions included by a manufacturer in an application for EU type-approval as referred to in Article 25(2) of

Regulation (EU) 2016/1628 shall comply with the technical characteristics and be described in the information folder as laid down in Annex I to this Regulation.

### *Article 3*

#### ***Arrangements with regard to conformity of production***

In order to ensure that the engines in production conform to the approved type in accordance with Article 26(1) of Regulation (EU) 2016/1628, the approval authorities shall take the measures and follow the procedures laid down in Annex II to this Regulation.

### *Article 4*

#### ***Methodology for adapting the emission laboratory test results to include the deterioration factors***

The emission laboratory test results shall be adapted to include the deterioration factors, comprising those related with the measurement of the particle number (PN) and with gaseous fuelled engines, referred to in Article 25(3)(d), Article 25(4)(d) and Article 25(4)(e) of Regulation (EU) 2016/1628, in accordance with the methodology laid down in Annex III to this Regulation.

### *Article 5*

#### ***Requirements with regard to emission control strategies, NO<sub>x</sub> control measures and particulate control measures***

The measurements and tests in respect of the emission control strategies referred to in Article 25(3)(f)(i) of Regulation (EU) 2016/1628 and of the NO<sub>x</sub> control measures referred to in Article 25(3)(f)(ii) of that Regulation and the particulate pollutant emission control measures, as well as the documentation required to demonstrate them, shall be conducted in compliance with the technical requirements laid down in Annex IV to this Regulation.

### *Article 6*

#### ***Measurements and tests with regard to the area associated with the non-road steady-state test cycle***

The measurements and tests with regard to the area referred to in Article 25(3)(f)(iii) of Regulation (EU) 2016/1628 shall be conducted in compliance with the detailed technical requirements laid down in Annex V to this Regulation.

### *Article 7*

#### ***Conditions and methods for the conduct of tests***

The conditions for conduct of the tests referred to in Articles 25(3)(a) and (b) of Regulation (EU) 2016/1628, the methods for determining the engine load and speed settings referred to in

Article 24 of that Regulation, the methods for taking account of emissions of crankcase gases referred to in Article 25(3)(e)(i) of that Regulation and the methods for determining and taking account of continuous and periodic regeneration of exhaust after-treatment systems referred to in Article 25(3)(e)(ii) of that Regulation shall meet the requirements laid down in sections 5 and 6 of Annex VI to this Regulation.

#### *Article 8*

##### ***Procedures for the conduct of tests***

The tests referred to in points (a) and (f)(iv) of Article 25(3) of Regulation (EU) 2016/1628 shall be conducted in accordance with the procedures laid down in section 7 of Annex VI and in Annex VIII to this Regulation.

#### *Article 9*

##### ***Procedures for emission measurement and sampling***

The emission measurement and sampling referred to in Article 25(3)(b) of Regulation (EU) 2016/1628 shall be conducted in accordance with the procedures laid down in section 8 of Annex VI to this Regulation and in Appendix 1 to that Annex.

#### *Article 10*

##### ***Apparatus for the conduct of tests and for emission measurement and sampling***

The apparatus for the conduct of tests as referred to in Article 25(3)(a) of Regulation (EU) 2016/1628 and for emission measurement and sampling as referred to in Article 25(3)(b) of that Regulation shall comply with the technical requirements and characteristics laid down in section 9 of Annex VI to this Regulation.

#### *Article 11*

##### ***Method for data evaluation and calculations***

The data referred to in Article 25(3)(c) of Regulation (EU) 2016/1628 shall be evaluated and calculated in accordance with the method laid down in Annex VII to this Regulation.

#### *Article 12*

##### ***Technical characteristics of the reference fuels***

The reference fuels referred to in Article 25(2) of Regulation (EU) 2016/1628 shall meet the technical characteristics laid down in Annex IX to this Regulation.

#### *Article 13*

##### ***Detailed technical specifications and conditions for delivering an engine separately from its exhaust after-treatment system***

Where a manufacturer delivers an engine separately from its exhaust after-treatment system to an original equipment manufacturer ("OEM") in the Union, as provided for in Article 34(3) of

Regulation (EU) 2016/1628, that delivery shall comply with the detailed technical specifications and conditions laid down in Annex X to this Regulation.

*Article 14*

***Detailed technical specifications and conditions for the temporary placing on the market for the purposes of field testing***

Engines that have not been EU type-approved in accordance with Regulation (EU) 2016/1628 shall be authorised, in accordance with Article 34(4) of that Regulation, to be temporarily placed on the market for the purposes of field testing if they comply with the detailed technical specifications and conditions laid down in Annex XI to this Regulation.

*Article 15*

***Detailed technical specifications and conditions for special purpose engines***

EU type-approvals for special purpose engines and authorisations for the placing on the market of those engines shall be granted in accordance with Article 34(5) and (6) of Regulation (EU) 2016/1628 if the detailed technical specifications and conditions laid down in Annex XII to this Regulation are fulfilled.

*Article 16*

***Acceptance of equivalent engine type-approvals***

The UNECE regulations, or amendments thereto, referred to in Article 42(4)(a) of Regulation (EU) 2016/1628 and the Union acts referred to in Article 42(4)(b) of that Regulation are set out in Annex XIII to this Regulation.

*Article 17*

***Details of the relevant information and instructions for OEMs***

The details of the information and instructions for OEMs referred to in Article 43(2), (3) and (4) of Regulation (EU) 2016/1628 are laid down in Annex XIV to this Regulation.

*Article 18*

***Details of the relevant information and instructions for end-users***

The details of the information and instructions for end-users referred to in Article 43(3) and (4) of Regulation (EU) 2016/1628 are laid down in Annex XV to this Regulation.

*Article 19*

***Performance standards and assessment of technical services***

1. Technical services shall comply with the performance standards laid down in Annex XVI.
2. Approval authorities shall assess the technical services in accordance with the procedure laid down in Annex XVI to this Regulation.

*Article 20*

***Characteristics of the steady-state and transient test cycles***

The steady-state and transient test cycles, referred to in Article 24 of Regulation (EU) 2016/1628, shall meet the characteristics laid down in Annex XVII to this Regulation.

*Article 21*

***Entry into force and application***

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

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

Done at Brussels, 19.12.2016

*For the Commission*  
*The President*  
*Jean-Claude JUNCKER*