
STATUTORY INSTRUMENTS

1999 No. 1053

ENVIRONMENTAL PROTECTION

The Non-Road Mobile Machinery (Emission of Gaseous and Particulate Pollutants) Regulations 1999

<i>Made</i>	- - - -	<i>28th March 1999</i>
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THE NON-ROAD MOBILE MACHINERY (EMISSION OF GASEOUS AND PARTICULATE POLLUTANTS) REGULATIONS 1999

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SCHEDULE 1 — (Annex 1 to Directive 97/68/EC)

- [1 This section is implemented by regulation 3.]
2. DEFINITIONS, SYMBOLS AND ABBREVIATIONS
 - 2.1 compression ignition (C.I.) engine shall mean an engine which works...
 - 2.2 gaseous pollutants shall mean carbon monoxide, hydrocarbons (assuming a ratio...
 - 2.3 particulate pollutants shall mean any material collected on a specified...
 - 2.4 net power shall mean the power in “EEC kW” obtained...
 - 2.5 rated speed shall mean the maximum full load speed allowed...
 - 2.6 per cent load shall mean the fraction of the maximum...
 - 2.7 maximum torque speed shall mean the engine speed at which...
 - 2.8 intermediate speed shall mean that engine speed which meets one...
 - 2.9 Symbols and Abbreviations
 - 2.9.1 Symbols for test parameters Symbol Unit Term AP m2 Cross...
 - 2.9.2 Symbols for the chemical components CO Carbon monoxide CO2 Carbon...
 - 2.9.3 Abbreviations FID Flame ionization detector HFID Heated flame ionization detector...
3. ENGINE MARKINGS
 - 3.1 The engine approved as a technical unit must bear:
 - 3.1.1 the trade mark or trade name of the manufacturer of...
 - 3.1.2 the engine type, engine family (if applicable), and a unique...
 - 3.1.3 the EC type-approval number as described in Annex VII.
 - 3.2 These marks must be durable for the useful life of...
 - 3.3 These marks must be secured to an engine part necessary...
 - 3.3.1 These marks must be located so as to be readily...
 - 3.3.2 Each engine must be provided with a supplementary movable plate...
 - 3.4 The coding of the engines in context with the identification...
 - 3.5 Before leaving the production line the engines must bear all...
 - 3.6 The exact location of the engine markings shall be declared...
4. SPECIFICATIONS AND TESTS
 - 4.1 General
 - 4.2 Specifications concerning the emissions of pollutants
 - 4.2.1 The emissions of the carbon monoxide, the emissions of hydrocarbons,...
 - 4.2.2 The emission limits given in paragraph 4.2.1 are engine-out limits...
 - 4.2.3 The emissions of the carbon monoxide, the emissions of hydrocarbons,...
 - 4.2.4 Where, as defined according to Section 6 in conjunction with...
 - 4.3 Installation on the mobile machinery
 - 4.3.1 intake depression shall not exceed that specified for the approved...
 - 4.3.2 exhaust back pressure shall not exceed that specified for the...
5. SPECIFICATION OF CONFORMITY OF PRODUCTION ASSESSMENTS
 - 5.1 With regard to the verification of the existence of satisfactory...
 - 5.2 The holder of the approval shall in particular:
 - 5.2.1 ensure existence of procedures for the effective control of the...
 - 5.2.2 have access to the control equipment necessary for checking the...

- 5.2.3 ensure that data of test results are recorded and that...
- 5.2.4 analyse the results of each type of test, in order...
- 5.2.5 ensure that any sampling of engines or components giving evidence...
- 5.3 The competent authority which has granted type approval may at...
- 5.3.1 In every inspection, the test books and production survey record...
- 5.3.2 When the quality level appears unsatisfactory or when it seems...
- 5.3.2.1 an engine is taken from the series and subjected to...
- 5.3.2.2 if the engine taken from the series does not satisfy...
- 5.3.3 The approval authority or the technical service responsible for verifying...
- 5.3.4 The normal frequency of inspections authorized by the competent authority...
- 6. PARAMETERS DEFINING THE ENGINE FAMILY
- 6.1 Combustion cycle: 2 cycle 4 cycle
- 6.2 Cooling medium: air water oil
- 6.3 Individual cylinder displacement: engines to be within a total spread...
- 6.4 Method of air aspiration: naturally aspirated pressure charged
- 6.5 Combustion chamber type/design: pre-chamber swirl chamber open chamber
- 6.6 Valve and porting—configuration, size and number: cylinder head cylinder wall...
- 6.7 Fuel system: pump-line-injector in-line pump distributor pump single element unit...
- 6.8 Miscellaneous features: exhaust gas recirculation water injection/emulsion air injection charge...
- 6.9 Exhaust after-treatment: oxidation catalyst reduction catalyst thermal reactor particulates trap...
- 7. CHOICE OF THE PARENT ENGINE
- 7.1 The parent engine of the family shall be selected using...
- 7.2 If engines within the family incorporate other variable features which...

SCHEDULE 2 — (Annex II to Directive 97/68/EC)

SCHEDULE 3 — (Annex III to Directive 97/68/EC)

- 1. INTRODUCTION
- 1.1 This Annex describes the method of determining emissions of gaseous...
- 1.2 The test shall be carried out with the engine mounted...
- 2. TEST CONDITIONS
- 2.1 General Requirements
- 2.2 Engine test conditions
- 2.2.1 The absolute temperature T_a of the engine intake air expressed...
- 2.2.2 **Test validity**
- 2.2.3 **Engines with charge air cooling**
- 2.3 Engine air inlet system
- 2.4 Engine exhaust system
- 2.5 Cooling system
- 2.6 Lubricating oil
- 2.7 Test fuel
- 2.8 Determination of dynamometer settings
- 3. TEST RUN
- 3.1 Preparation of the sampling filters
- 3.2 Installation of the measuring equipment
- 3.3 Starting the dilution system and engine
- 3.4 Adjustment of the dilution ratio

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- 3.5 Checking the analysers
 - 3.6 Test cycle
 - 3.6.1 Specification A of machinery according to Section I of Annex...
 - 3.6.1.1 The following 8-mode cycle shall be followed in dynamometer operation...
 - 3.6.2 **Conditioning of the Engine**
 - 3.6.3 **Test sequence**
 - 3.6.4 **Analyser response**
 - 3.6.5 **Particulate sampling**
 - 3.6.6 **Engine conditions**
 - 3.7 Re-checking the analysers
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 - 1.2 Exhaust gas flow
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 - 1.2.4 **Total dilute exhaust gas flow**
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 - 1.4.1 **General analyser specifications**
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 - 1.4.1.2 Repeatability
 - 1.4.1.3 Noise
 - 1.4.1.4 Zero drift
 - 1.4.1.5 Span drift
 - 1.4.2 **Gas drying**
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 - 1.4.3.1 Carbon monoxide (CO) analysis
 - 1.4.3.2 Carbon dioxide (CO₂) analysis
 - 1.4.3.3 Hydrocarbon (HC) analysis
 - 1.4.3.4 Oxides of nitrogen (NO_x) analysis
 - 1.4.4 **Sampling for gaseous emissions**
 - 1.5 Determination of the particulates
 - 1.5.1 Particulate sampling filters
 - 1.5.1.1 Filter specification
 - 1.5.1.2 Filter size
 - 1.5.1.3 Primary and back-up filters
 - 1.5.1.4 Filter face velocity
 - 1.5.1.5 Filter loading
 - 1.5.2 Weighing chamber and analytical balance specifications
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- 1.3 Operating procedure for analysers and sampling system
- 1.4 Leakage test
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 - 1.5.1 ***Instrument assembly***
 - 1.5.2 ***Warming-up time***
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 - 1.7.9 ***Test interval***
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 - 1.8.2 ***Hydrocarbon response factors***
 - 1.8.3 ***Oxygen interference check***
 - 1.9 Interference effects with NDIR and CLD analysers
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Appendix 3 —

- 1. DATA EVALUATION AND CALCULATIONS
 - 1.1 Gaseous emissions data evaluation
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 - 1.4 Calculation of the particulate emission
 - 1.4.1 ***Humidity correction factor for particulates***

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- 1.4.2 **Partial flow dilution system**
- 1.4.2.1 Isokinetic systems $G_{EDFW,i} = G_{EXHW,i} \times q_i$...
- 1.4.2.2 Systems with measurement of CO₂ or NO_x concentration $G_{EDFW,i}$...
- 1.4.2.3 Systems with CO₂ measurement and carbon balance method $G_{EDFW,i}$...
- 1.4.2.4 Systems with flow measurement $G_{EDFW,i} = G_{EXHW,i} \times \dots$
- 1.4.3 **Full flow dilution system**
- 1.4.4 **Calculation of the particulate mass flow rate**
- 1.4.5 **Calculation of the specific emissions**
- 1.4.6 **Effective weighting factor**

SCHEDULE 4 — (Annex IV to Directive 97/68/EC)

SCHEDULE 5 — (ANNEX V to Directive 97/68/EC)

- 1.1 Determination of the gaseous emissions
- 1.1.1 **Gaseous exhaust components CO, CO₂, HC, NO_x**

Figure 2

Flow diagram of exhaust gas analysis system for CO, CO₂ and HC

Figure 3

Flow diagram of dilute exhaust gas analysis system for CO, CO₂, NO_x and HC

Descriptions—Figures 2 and 3

- 1.2 Determination of the particulates
- 1.2.1 Dilution system
- 1.2.1.1 **Partial flow system (Figures 4 to 12)**

Figure 4

Partial flow dilution system with isokinetic probe and fractional sampling (SB control)

Figure 5

Partial flow dilution system with isokinetic probe and fractional sampling (PB control)

Figure 6

Partial flow dilution system with CO₂ or NO_x concentration measurement and fractional sampling

Figure 7

Partial flow dilution system with CO₂ concentration measurement, carbon balance and total sampling

Figure 8

Partial flow dilution system with single venturi, concentration measurement and fractional sampling

Figure 9

Partial flow dilution system twin venturi or twin orifice, concentration measurement and fractional sampling

Figure 10

Partial flow dilution system with multiple tube splitting, concentration measurement and fractional sampling

Figure 11

Partial flow dilution system with flow control and total sampling

Figure 12

Partial flow dilution system with flow control and fractional sampling

Description— Figures 4 to 12

- ***EP exhaust pipe***
- ***SP Sampling probe (Figures 6 to 12)***
- ***ISP isokinetic sampling probe (Figures 4 and 5)***
- ***FD1, FD2 flow divider*** (Figure 9)
- ***FD3 flow divider*** (Figure 10)
- ***EGA exhaust gas analyser*** (Figures 6 to 10)
- ***TT Transfer tube*** (Figures 4 to 12)
- ***DPT differential pressure transducer*** (Figures 4, 5 and 10)
- ***FCI flow controller*** (Figures 4, 5 and 10)
- ***PCV1, PCV2 pressure control valve*** (Figure 9)
- ***DC damping chamber*** (Figure 10)

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- *VN venturi* (Figure 8)
- FC2 flow controller* (Figures 6, 7, 11 and 12, optional)
- FM1 flow measurement device* (Figures 6, 7, 11 and 12)
- FM2 flow measurement device* (Figure 12)
- PB pressure blower* (Figures 4, 5, 6, 7, 8, 9 and 12)
- *DAF dilution air filter* (Figures 4 to 12)
- *PSP particulate sampling probe* (Figures 4, 5, 6, 8, 9, 10 and 12)
- *DT dilution tunnel* (Figures 4 to 12)
- *HE heat exchanger* (Figures 9 and 10)
- 1.2.1.2 *Full flow dilution system (Figure 13)*
Descriptions—Figure 13
- *EP exhaust pipe*

Figure 13

Full flow dilution system

- *PDP positive displacement pump*
- *CFV critical flow venturi*
- *HE heat exchanger* (optional if EFC is used)
- *EFC electronic flow compensation* (optional if HE is used)
- *DT dilution tunnel*
- *DAF dilution air filter*
- *PSP particulate sampling probe*
- 1.2.2 *Particulate sampling system (Figures 14 and 15)*
Descriptions—Figures 14 and 15
- *PSP particulate sampling probe (Figures 14 and 15)*

Figure 14

Particulate sampling system

Figure 15

Dilution system (full flow system only)

- *PTT particulate transfer tube* (Figures 14 and 15)
- *SDT secondary dilution tunnel* (Figure 15)
- *FH filter holder(s)* (Figures 14 and 15)
- *P sampling pump* (Figures 14 and 15)
- *DP dilution air pump* (Figure 15) (full flow double dilution only)
- *FC3 flow controller* (Figures 14 and 15)
- *FM3 flow measurement device* (Figures 14 and 15) (particulate sample flow)
- *FM4 flow measurement device* (Figure 15) (dilution air, full flow double dilution only)
- *BV ball valve* (optional)

Schedule 6 —

Schedule 7 — (ANNEX VII to Directive 97/68/EC) APPROVAL CERTIFICATE
NUMBERING SYSTEM (see Article 4(2))

1. The number shall consist of five sections separated by the...
2. Example of the third approval (with, as yet, no extension)...

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3. Example of the second extension to the fourth approval corresponding...
Explanatory Note