
**Reciprocating internal combustion
engines — Exhaust emission
measurement —**

**Part 6:
Report of measuring results and test**

*Moteurs alternatifs à combustion interne — Mesurage des émissions de
gaz d'échappement —*

Partie 6: Rapport de mesure et d'essai



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

STANDARDSISO.COM : Click to view the full PDF of ISO 8178-6:2000

© ISO 2000

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 7494 09 47
E-mail copyright@iso.ch
Web www.iso.ch

Printed in Switzerland

Contents

Page

Foreword.....	iv
Introduction.....	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Symbols and abbreviated terms	2
4.1 General symbols.....	2
4.2 Symbols and abbreviations for the chemical components.....	3
4.3 Abbreviations.....	3
5 Emissions test report	4
5.1 Introduction.....	4
5.2 General information.....	4
5.3 Engine information.....	4
5.4 Ambient and engine test data.....	4
5.5 Gaseous emissions data.....	4
5.6 Particulate emissions data	4
5.7 Smoke test data	5
5.8 Test cell information.....	5
5.9 Fuel characteristics	5
Annex A (normative) Tables for emissions test report	6
Bibliography.....	17

STANDARDSISO.COM : Click to view the full PDF of ISO 8178-6:2000

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 8178 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 8178-6 was prepared by Technical Committee ISO/TC 70, *Internal combustion engines*, Subcommittee SC 8, *Exhaust gas emission measurement*.

ISO 8178 consists of the following parts, under the general title *Reciprocating internal combustion engines — Exhaust emission measurement*.

- *Part 1: Test-bed measurement of gaseous and particulate exhaust emissions*
- *Part 2: Measurement of gaseous and particulate exhaust emissions at site*
- *Part 3: Definitions and methods of measurement of exhaust gas smoke under steady-state conditions*
- *Part 4: Test cycles for different engine applications*
- *Part 5: Test fuels*
- *Part 6: Report of measuring results and test*
- *Part 7: Engine family determination*
- *Part 8: Engine group determination*
- *Part 9: Test cycles and test procedures for test bed measurement of exhaust gas smoke emissions from compression ignition engines operating under transient conditions*
- *Part 10: Test cycles and test procedures for field measurement of exhaust gas smoke emissions from compression ignition engines operating under transitory conditions*

Annex A forms a normative part of this part of ISO 8178.

Introduction

Results of an emissions test shall be presented clearly and should include all information pertinent to the derivation of the emission test results. An accuracy or uncertainty analysis relevant to the test system used and engine being evaluated should be made by the laboratory. A record shall be made of the measurement equipment being used, the ambient conditions, the engine performance and the fuel used. Recommendations for the data to be recorded are given regardless to the type of fuel being used.

The data format recommended in this part of ISO 8178 is intended to be used by individuals measuring emissions using ISO 8178-1, ISO 8178-2, ISO 8178-9 or ISO 8178-10, but is not intended to contradict or replace existing data formats which may be required by some regulatory bodies.

As expressed in ISO 8178-1 and ISO 8178-2, the emission results shall be stated in either "g/kWh" (preferred) or in "g/m³". It should be noted that some regulators require the results to be expressed in unique measurement units; this should be determined prior to testing.

STANDARDSISO.COM : Click to view the full PDF of ISO 8178-6:2000

Reciprocating internal combustion engines — Exhaust emission measurement —

Part 6: Report of measuring results and test

1 Scope

This part of ISO 8178 specifies as a standard data format for reporting the measurement results of exhaust emissions from RIC engines for mobile, transportable and stationary use, excluding engines for motor vehicles primarily designed for road use. This part of ISO 8178 may be applied to engines used e.g. earth-moving machines, generating sets and for other applications. This part of ISO 8178 applies to measurement in the laboratory and at site.

For engines used in machinery covered by additional requirements, (e.g. occupational health and safety regulations, dust regulations for powerplants) additional test conditions and special evaluation methods may apply.

NOTE Since the standard report format defined in this part of ISO 8178 is intended to be applicable to all types of internal combustion engine, in certain cases some items are not necessary for specific engines and/or tests, especially when measuring at site. On the other hand, some additional items might be necessary according to test purposes. Deletion and addition of items to be reported should be based on agreement between the parties involved.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 8178. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 8178 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 8178-1:1996, *Reciprocating internal combustion engines — Exhaust emission measurement — Part 1: Test bed measurement of gaseous and particulate exhaust emissions.*

ISO 8178-2:1996, *Reciprocating internal combustion engines — Exhaust emission measurement — Part 2: Measurement of gaseous and particulate exhaust emissions at site.*

ISO 8178-3:1994, *Reciprocating internal combustion engines — Exhaust emission measurement — Part 3: Definitions and methods of measurement of exhaust gas smoke under steady-state conditions.*

ISO 8178-4:1996, *Reciprocating internal combustion engines — Exhaust emission measurement — Part 4: Test cycles for different engine applications.*

ISO 8178-5:1997, *Reciprocating internal combustion engines — Exhaust emission measurement — Part 5: Test fuels.*

ISO 8178-7:1996, *Reciprocating internal combustion engines — Exhaust emission measurement — Part 7: Engine family determination.*

ISO 8178-8:1996, *Reciprocating internal combustion engines — Exhaust emission measurement — Part 8: Engine group determination.*

ISO 8178-9:2000, *Reciprocating internal combustion engines — Exhaust emission measurement — Part 9: Test cycles and test procedures for test bed measurement of exhaust gas smoke emissions from compression ignition engines operating under transient conditions.*

ISO 8178-10:—¹⁾, *Reciprocating internal combustion engines — Exhaust emission measurement — Part 10: Test cycles and test procedures for field measurement of exhaust gas smoke emissions from compression ignition engines operating under transitory conditions.*

3 Terms and definitions

For the purposes of this part of ISO 8178, the terms and definitions given in ISO 8178-1, ISO 8178-2, ISO 8178-3, ISO 8178-4, ISO 8178-5, ISO 8178-7, ISO 8178-8, ISO 8178-9 and ISO 8178-10 apply.

4 Symbols and abbreviated terms

4.1 General symbols

See Table 1. For the EEC-UNO regulation equivalents of the symbols listed in Table 1 see ISO 8178-1.

Table 1 — General symbols

Symbol	Term	Unit
D	Dilution factor	1
F_h	Fuel specific factor used for the calculations of wet concentrations from dry concentrations	1
p_{Rv}	Reid vapour pressure	kPa
q^*_{mdx}	Equivalent diluted exhaust gas mass flow rate on wet basis	kg/h
q_{mdx}	Diluted exhaust gas mass flow rate on wet basis	kg/h
S_L	Lug smoke value	m^{-1}
S_P	Peak smoke value	m^{-1}
S_S	Steady state smoke value	m^{-1}
q^*_{Vdx}	Equivalent diluted exhaust gas volume flow rate on wet basis	m^3/h
q_{Vdx}	Diluted exhaust gas volume flow rate on wet basis	m^3/h
W_f	Weighting factor	1
W_{fe}	Effective weighting factor	1

1) To be published.

4.2 Symbols and abbreviations for the chemical components

CO	Carbon monoxide
CO ₂	Carbon dioxide
HC	Hydrocarbons
NO _x	Oxides of nitrogen
O ₂	Oxygen
PT	Particulates
SO ₂	Sulfur dioxide

4.3 Abbreviations

CCAI	Calculated carbon aromaticity index
CFPP	Cold filter plugging point
CFV	Critical flow venturi
CNG	Compressed natural gas
CVS	Constant volume sampling
DPT	Differential pressure transducer
EGA	Exhaust gas analyser
EOPL	Effective optical path length
FBP	Final boiling point
IBP	Initial boiling point
LHV	Lower heating value
LPG	Liquefied petroleum gas
MON	Motor octane number
PDP	Positive displacement pump
RME	Rapeseed methyl ester
RON	Research octane number

5 Emissions test report

5.1 Introduction

The recommended test report consists of eleven data sheets (see annex A) that contain all the information pertinent to a test run in a very compact way. The test report is a single document that can be filed easily for later review of the test results by authorities, customers and engine manufacturers. It incorporates the final test results and the information needed to trace the final results to the values originally measured, as well as the information on the test engine, the test cell equipment and the test fuel. The report format is applicable to all test cycles and fuels.

5.2 General information

Table A.1 includes the information essential for engine approval, such as engine identification, engine application, test cycle and test identification. The emission test results may be listed for five different test cycles, if applicable. The gaseous and particulate emissions shall be expressed in grams per kilowatt hour whenever possible. Other units shall be indicated if used according to the provisions laid down in the scope. The smoke test results shall be listed for the smoke cycle applicable to the indicated application. The smoke values shall be expressed per metre whenever possible. Exceptions are only allowed if regulators require other units.

5.3 Engine information

Table A.2 contains the basic features of the engine under test. This information is sufficient to build up an engine with the same emission behaviour for confirmatory testing. If more information is demanded by authorities or customers, this may be appended to the test report. Table A.3 and Table A.4 contain other information to identify the features of the engine family and group respectively. These features are derived from ISO 8178-7 for engine family and ISO 8178-8 for engine group. If the engine family or group concept does not apply for the engine under test, Table A.3 or Table A.4 does not have to be submitted.

5.4 Ambient and engine test data

Table A.5 includes in the upper part the relevant ambient data, in the lower part the relevant engine data required to be recorded in ISO 8178-1. In most cases, mechanical shaft power will be used for the calculation of the final results. If other kinds of power are used, e.g. electrical, thermal or total power, this shall be indicated. Fuel flow, air flow and exhaust flow may be expressed as volume or mass flow rates, and the unit used shall be filled in. The measurement values shall be recorded for each mode individually (up to a maximum of 11), and the cycle value shall be calculated for the power and recorded in the column " $\Sigma(C) \times W_{fe}$ " where (C) stands for the component under consideration. The number of modes shall be used in accordance with ISO 8178-4.

5.5 Gaseous emissions data

Table A.6 contains in the upper part the originally measured (or calculated for SO₂) concentrations of the gaseous emissions either in the raw or dilute exhaust gas for each individual mode. The number of modes shall be used in accordance with clause 8 of ISO 8178-4:1996. The way of measurement (wet or dry) shall be indicated in the second column. In the case of dilute measurement the (average) background concentrations shall be reported in column B. The second block contains some correction or calculation factors whose values shall be recorded only if applicable. The third block contains the mode and average cycle ($\Sigma(C) \times W_{fe}$) mass flow rates corrected for humidity (NO_x only) and to wet conditions where (C) stands for the component under consideration. The mass flow rates are the basis for the calculation of the other units like grams per kilowatt hour or grams per cubic metre.

5.6 Particulate emissions data

Table A.7 contains in the upper three blocks the measurement values required for the calculation of particulates for each individual mode. If the single filter method is used, the corresponding values shall be filled in under column "sum" (Σ). The number of modes shall be used in accordance with clause 8 of ISO 8178-4:1996. Use of a partial or full flow dilution system shall be indicated. For the dilution tunnel flow rate, the equivalent diluted exhaust gas flow rate on wet basis (q_{mdx}^* or q_{vdx}^*) or diluted exhaust gas flow rate on wet basis (q_{mdx} or q_{vdx}) shall be reported

depending on the system used. Some values (e.g. dilution ratio) are not required for certain systems. The particulate mass corresponds to the sum of the masses of both filters, including if weighed separately. If the particulate mass is corrected for background, the "b" shall be circled. The mass flow shall be reported as uncorrected and corrected for humidity for each individual mode and for the average cycle value ($\Sigma(C) \times W_{fe}$) where (C) stands for the component under consideration. Reporting of the smoke values during the emissions test cycle is optional. The unit of the smoke measurement value depends upon the system used. For the calculation of the soot concentration from the smoke value, the correlation function used shall be reported.

5.7 Smoke test data

Table A.8 contains the measurement values of the smoke cycles. The ambient data shall be reported for each test run to determine if the smoke values are to be corrected. If applicable, ambient density correction shall be applied, but the uncorrected smoke values shall also be reported. The mean values and the maximum difference between the test runs shall be reported whenever required according to Table A.8. Since different smoke cycles apply to different engine applications, the smoke values shall be reported in the appropriate lines. For the loaded transient test (C1 applications), the smoke values S_{P3} , S_{P6} and S_{P9} shall be reported under the columns run 1, run 2 and run 3 respectively.

5.8 Test cell information

Tables A.9 and A.10 contain information on the test cell and the measurement equipment. Not all of the information is required in ISO 8178-1 and ISO 8178-2, but filling in all applicable data is useful for confirmatory testing and interlaboratory comparisons. For the analysers, all measuring ranges used shall be reported, and the deviation shall be the maximum value found. The calibration curves, converter check results, hydrocarbon response factors and interference results shall be appended to the report. The values of the different pressure transducers, temperature sensors, and humidity sensors shall be reported in Table A.10. The type of dilution system shall be e.g. PDP, CFV, isokinetic, twin venturi or EGA, etc. The weighing chamber conditions may be reported as average values or as the range over the cycle.

5.9 Fuel characteristics

Table A.11 contains all fuel properties listed in ISO 8178-5. The fuel type shall be indicated, and the values required for the respective fuel shall be reported. In order to facilitate the use of this sheet, properties of different fuels with similar attributes (e.g. burning quality: cetane No. for diesel, RON for petrol) are combined in blocks.

Annex A
(normative)

Tables for emissions test report

Table A.1 — ISO 8178 Emissions test report — General information

ENGINE	MANUFACTURER:					
	TYPE (MODEL):					
	FAMILY:					
	RATED POWER:					
	RATED SPEED:					
	SERIAL NUMBER:					
APPLICATION ^a	CUSTOMER:					
	FINAL INSTALLATION:					
EMISSIONS TEST RESULTS						
CYCLE						UNIT
NO _x						g/kWh ^b
HC						g/kWh ^b
CO						g/kWh ^b
SO ₂						g/kWh ^b
PT						g/kWh ^b
SMOKE CYCLE						
PEAK (s _p) ^d						m ⁻¹ ^c
LUG (s _L) ^d						m ⁻¹ ^c
STEADY STATE (s _S) ^d						m ⁻¹ ^c
TEST IDENTIFICATION	DATE/TIME :					
	TEST SITE/BENCH :					
	TEST NUMBER :					
TESTING COMPANY						
DATE OF REPORT						
PLACE OF TEST						
MANAGER OF THE TEST						
SIGNATURE						
NOTE						
<p>^a If applicable or if known</p> <p>^b Units other than g/kWh to be indicated</p> <p>^c Units other than m⁻¹ to be indicated</p> <p>^d To be indicated in accordance with the requirements of the applicable smoke cycle</p>						

Table A.2 — ISO 8178 Emissions test report — Test engine information

MANUFACTURER	
ENGINE TYPE (MODEL)	
FAMILY IDENTIFICATION	
SERIAL NUMBER	
RATED SPEED	min ⁻¹
RATED POWER	kW
INTERMEDIATE SPEED	min ⁻¹
MAXIMUM TORQUE AT INTERMEDIATE SPEED	Nm
LOW IDLE SPEED	min ⁻¹
HIGH IDLE SPEED	min ⁻¹
STATIC INJECTION/IGNITION TIMING	° BTDC (BEFORE TOP DEAD CENTRE)
INJECTION/IGNITION TIMING CONTROL	NO YES
BORE	mm
STROKE	mm
DISPLACEMENT PER CYLINDER	cm ³
CYLINDER NUMBER and CONFIGURATION	
AUXILIARIES (SEE ISO 8178-1:1996, ANNEX B)	
MAXIMUM INLET DEPRESSION	kPa
MAXIMUM EXHAUST BACK PRESSURE	kPa
INTERCOOLER SETPOINT ^a	K
COOLING MEDIUM TEMPERATURE SPECIFICATION	K
FUEL TEMPERATURE SPECIFICATION	K
LUBRICATING OIL	
^a If applicable	

Table A.3 — ISO 8178 Emissions test report — Engine family information

NOTE If applicable, see ISO 8178-7:1996, clause 5.

MANUFACTURER	
FAMILY IDENTIFICATION	
COMBUSTION CYCLE	
COOLING MEDIUM	
INDIVIDUAL CYLINDER DISPLACEMENT	cm ³
CYLINDER NUMBER and CONFIGURATION	
METHOD OF AIR ASPIRATION	
FUEL TYPE	
COMBUSTION CHAMBER TYPE	
VALVE and PORTING CONFIGURATION SIZE and NUMBER CYLINDER HEAD CYLINDER WALL CRANKCASE	
FUEL SYSTEM TYPE	
MISCELLANEOUS FEATURES	
– EXHAUST GAS RECIRCULATION	NO YES
– WATER INJECTION/EMULSION	NO YES
– AIR INJECTION	NO YES
– CHARGE COOLING SYSTEM	NO YES
– EXHAUST AFTERTREATMENT	NO YES (TYPE:)
– DUAL FUEL	NO YES
– IGNITION TYPE	

STANDARDSISO.COM; Click to view the full PDF of ISO 8178-6:2000

Table A.4 — ISO 8178 Emissions test report — Engine group information

NOTE If applicable, see ISO 8178-8.

MANUFACTURER	
GROUP IDENTIFICATION	
BORE DIAMETER	mm
STROKE	mm
METHOD OF PRESSURE CHARGING	
CHARGE AIR COOLING SYSTEM	
MAXIMUM DECLARED POWER PER CYLINDER AT MAXIMUM DECLARED SPEED	kW
INJECTION TIMING RANGE	° BTDC (BEFORE TOP DEAD CENTRE)
FUEL DELIVERY RANGE	mg/INJECTION

STANDARDSISO.COM : Click to view the full PDF of ISO 8178-6:2000

Table A.5 — ISO 8178 Emissions test report — Ambient and engine test data

ENGINE _____ TEST SITE _____
 RATED SPEED _____ min⁻¹ TEST NUMBER _____
 INTERMEDIATE SPEED _____ min⁻¹ TEST CYCLE _____
 COMMENTS _____

MODE	1	2	3	4	5	6	7	8	9	10	11	$\Sigma \times W_{fe}^a$
TIME AT BEGINNING OF EACH MODE												
AMBIENT DATA												
BAROMETRIC PRESSURE												XXXXXX
INTAKE AIR TEMPERATURE												XXXXXX
INTAKE AIR HUMIDITY												XXXXXX
ATMOSPHERIC FACTOR												XXXXXX
ENGINE DATA												
SPEED												XXXXXX
AUXILIARY POWER ^b												XXXXXX
DYNO SETTING												XXXXXX
POWER ^c												XXXXXX
SPECIFIC FUEL CONSUMPTION												XXXXXX
FUEL FLOW												XXXXXX
AIR FLOW												XXXXXX
EXHAUST FLOW												XXXXXX
EXHAUST TEMPERATURE												XXXXXX
FUEL TEMPERATURE												XXXXXX
COOLANT TEMPERATURE												XXXXXX
TEMPERATURE INTERCOOLED AIR												XXXXXX
LUBRICANT TEMPERATURE												XXXXXX
INLET DEPRESSION												XXXXXX
EXHAUST BACKPRESSURE												XXXXXX

^a If applicable.

^b If applicable; calculated value to be used according to ISO 8178-1:1996, 5.3.

^c Other kind of power than mechanical (electrical, thermal, total) to be indicated; uncorrected.

^d Units to be indicated.

Table A.6 — ISO 8178 Emissions Test Report: Gaseous Emissions Data

ENGINE _____ Raw _____ Dilute _____ TEST SITE _____
 RATED SPEED _____ min⁻¹ TEST NUMBER _____
 INTERMEDIATE SPEED _____ min⁻¹ TEST CYCLE _____
 COMMENTS _____

MODE	a	1	2	3	4	5	6	7	8	9	10	11	B ^b
TIME AT BEGINNING OF EACH MODE													
NO _x CONCENTRATION	ppm												
HC CONCENTRATION (C1)	ppm												
CO CONCENTRATION	ppm												
CO ₂ CONCENTRATION	% ^c												
O ₂ CONCENTRATION	% ^c												
NO _x HUMIDITY CORRECTION FACTOR K_h	—												XXXXX
FUEL SPECIFIC FACTOR F_h	— ^b												XXXXX
DRY/WET CORRECTION FACTOR K_w	— ^b												XXXXX
DILUTION FACTOR D	— ^b												XXXXX
NO _x MASS FLOW ^d	g/h												$\Sigma \times W_{fe}$
NO _x MASS FLOW ^e	g/h												
HC MASS FLOW	g/h												
CO MASS FLOW ^e	g/h												
SO ₂ MASS FLOW ^f	g/h												
CO ₂ MASS FLOW ^e	g/h												

^a w(et) or d(ry) to be indicated.
^b If applicable; B = Background.
^c Units other than % to be indicated.
^d Corrected for humidity (K_h) and to wet conditions (K_w).
^e Corrected to wet conditions (K_w).
^f Calculated.

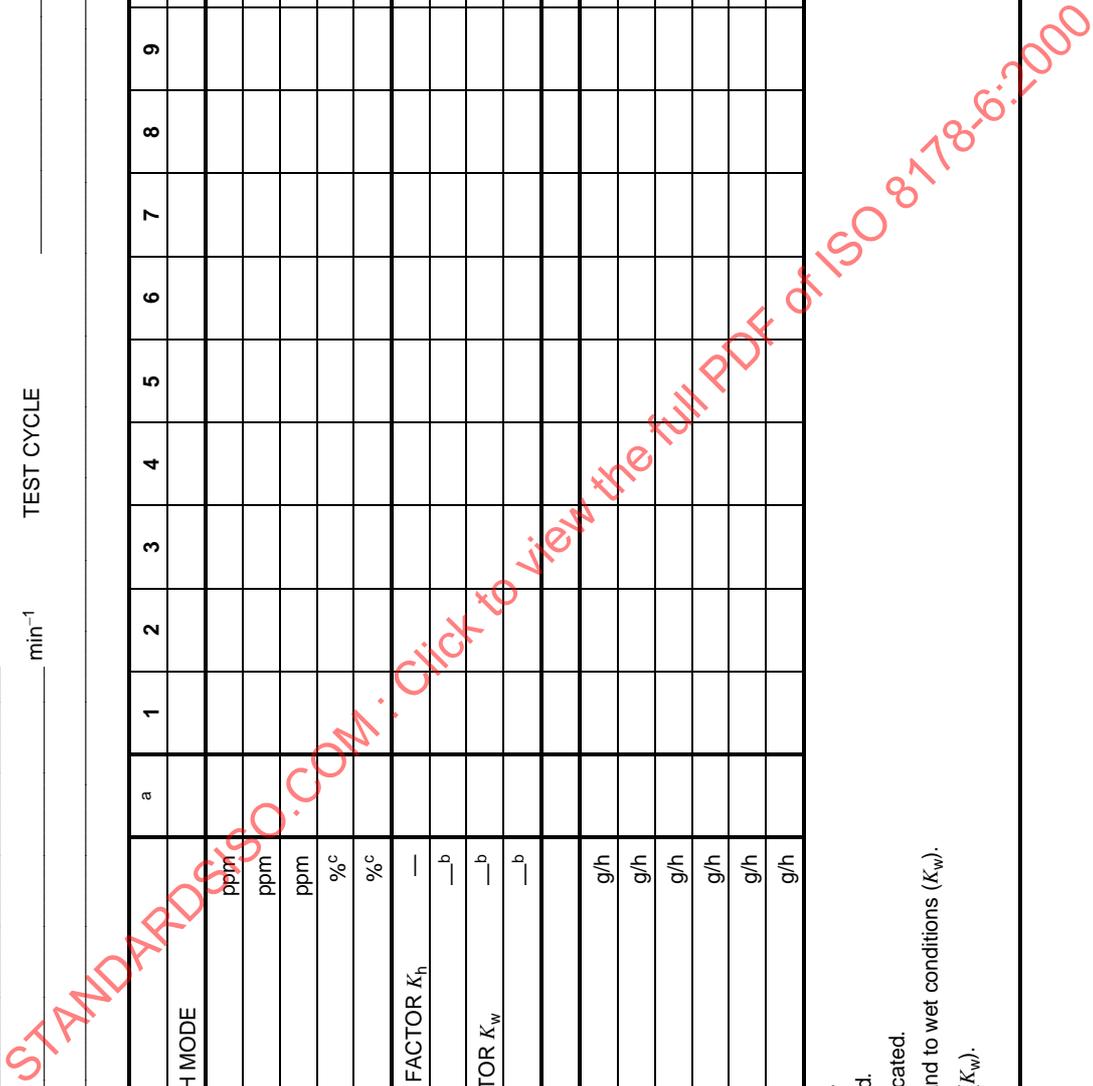


Table A.7 — ISO 8178 Emissions test report — Particulate emissions data

ENGINE _____ PARTIAL/FULL FLOW _____ TEST SITE _____
 RATED SPEED _____ min⁻¹ TEST NUMBER _____
 INTERMEDIATE SPEED _____ min⁻¹ TEST CYCLE _____
 COMMENTS _____

MODE	1	2	3	4	5	6	7	8	9	10	11	Σ ^a
TIME AT BEGINNING OF EACH MODE												
SAMPLING TIME	s											xxxxxxx
EFFECTIVE W_f ^b	—											xxxxxxx
TUNNEL FLOW ^c	d											b
DILUTION AIR FLOW ^a	d											b
DILUTION RATIO ^a	—											xxxxxxx
DILUTION AIR TEMPERATURE	K											xxxxxxx
EXHAUST TEMPERATURE AT PROBE ^a	K											xxxxxxx
TUNNEL TEMPERATURE	K											xxxxxxx
FILTER FACE TEMPERATURE	K											xxxxxxx
FILTER FACE VELOCITY	cm/s											xxxxxxx
FILTER PRESSURE DROP	kPa											b
PARTICULATE MASS ^b	mg											b
SAMPLE MASS	kg											b
PARTICULATE CONCENTRATION	d											b
PARTICULATE HUMIDITY CORRECTION FACTOR	—											b
PARTICULATE MASS FLOW	g/h											Σ × W _f ^e
PARTICULATE MASS FLOW ^f	g/h											
SMOKE	d											xxxxxxx
LIGHT ABSORPTION COEFFICIENT	1/m											xxxxxxx

^a If applicable.
^b To be filled in, if single filter method is used.
^c $q_{max}^*/q_{V,ox}^*$ or $q_{max}/q_{V,ox}$
^d Units to be indicated.
^e To circle, if background corrected.
^f Corrected for humidity.

STANDARDSISO.COM: Click to view the full PDF of ISO 8178-6:2000

Table A.8 — ISO 8178 Emissions test report — Smoke test data

ENGINE _____ TEST SITE _____
 RATED SPEED _____ min⁻¹ INTERMEDIATE SPEED _____ min⁻¹
 IDLE SPEED _____ min⁻¹ TEST NUMBER _____
 COMMENTS _____

RUN		1	2	3	4 ^a	5 ^a	DIFF	MEAN
AMBIENT DATA								
BAROMETRIC PRESSURE	kPa						----	----
INTAKE AIR TEMPERATURE	K						----	----
INTAKE AIR HUMIDITY	g/kg						----	----
SMOKE CORRECTION FACTOR	-						----	----
ATMOSPHERIC FACTOR	-						----	----
FREE ACCELERATION TEST^b								
IDLING TIME	s						----	
FREE ACCELERATION TIME	s						----	
PEAK SMOKE VALUE s_p	c							
CORRECTED s_p^d	c							
LOADED TRANSIENT TEST^b								
IDLING TIME	s						----	
ACCELERATION TIME	s						----	
LINEARITY OF ENGINE SPEED	min ⁻¹						----	
STABILIZING TIME AT RATED SPEED	s						----	
TIME RUNNING AT RATED SPEED	s						----	
LUG DOWN TIME	s						----	
TIME RETURNING TO IDLING	s						----	
PEAK SMOKE VALUE s_p^e	c						----	----
CORRECTED s_p^d	c						----	----
LUG SMOKE VALUE s_L	c						----	
CORRECTED s_L^d	c						----	
ENGINE LOAD STEP^f								
STEADY STATE SMOKE VALUE s_s	c							
CORRECTED s_s^d	c							
PEAK SMOKE VALUE s_p	c							
CORRECTED s_p^d	c							
TRANSIENT LOAD TEST^g								
ACCELERATION TIME	s						----	----
PEAK SMOKE VALUE s_p	c							
CORRECTED s_p^d	c							

^a If required by validation criteria.
^b Diesel powered off-road vehicles and off-road industrial equipment (C1 applications of ISO 8178-4:1996).
^c Units to be indicated.
^d If applicable, corrected for ambient density (see ISO 8178-9:—, 10.3.2).
^e s_{p3} , s_{p6} , s_{p9} under run 1, run 2, run 3, respectively.
^f Constant speed off-road engines (D2, G1 and G2 applications of ISO 8178-4:1996).
^g Engines for marine propulsion and rail traction (E1, E2, E3, E5 and F applications of ISO 8178-4:1996).

Table A.9 — ISO 8178 Emissions Test Report: Test Cell Information

ENGINE _____ TEST SITE _____
 TEST DATE _____
 TEST NUMBER _____

EXHAUST PIPE	DIAMETER	LENGTH	INSULATING LENGTH		
	mm	m	m		
	MANUFACTURER	MODEL	MEASURING RANGES	CALIBRATION DATE	DEVIATION ^a
NO _x ANALYSER ^b			ppm		%
HC ANALYSER ^b			ppm		%
CO ANALYSER ^b			ppm		%
CO ₂ ANALYSER ^b			%		%
O ₂ ANALYSER ^b			%		%
					DEVIATION ^c
SPEED					%
TORQUE			Nm		%
FUEL FLOW ^d					%
AIR FLOW ^d					%
EXHAUST FLOW ^d					%
CVS FLOW ^d					%
PROPANE CHECK	xxxxxxx	xxxxxxx	xxxxxxx		%
DILUTION AIR FLOW ^d					%
DILUTION EXHAUST FLOW ^d					%
PT SAMPLE FLOW ^d					%
SMOKE ^d					%
	TYPE	PARTIAL/FULL	ARRANGEMENT	OPERATING TEMPERATURE	EOPL
	e	e	e	K	mm
DILUTION SYSTEM	PARTIAL/FULL	TUNNEL DIAMETER	MIXING LENGTH	TYPE	HEAT EXCHANGER
		mm	mm		YES/NO
SECONDARY DILUTION TUNNEL	DIAMETER	RESIDENCE TIME	FILTER HOLDER DISTANCE		
	mm	s	mm		
TRANSFER TUBE	LENGTH	DIAMETER			
	mm	mm			
PT TRANSFER TUBE	mm	mm			
PARTICULATE FILTER	MANUFACTURER	TYPE	DIAMETER	STAIN DIAMETER	
			mm	mm	
WEIGHING CHAMBER	TEMPERATURE	RELATIVE HUMIDITY	ABSOLUTE HUMIDITY		
	K	%	g/kg		

^a Maximum deviation from linearity see ISO 8178-1:1996, 8.5.6.
^b See ISO 8178-1:1996, 7.4.
^c Measured deviation see ISO 8178-1:1996, Table 2 and Table 3.
^d Units to be indicated.
^e Type: filter type or opacimeter; Arrangement: in-line or end-of-line.