Nederlandse norm

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(en)

Motorcycles - Measurement method for gaseous exhaust emissions and fuel consumption - Part 1: General test requirements (ISO 6460-1:2007,IDT)

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INTERNATIONAL STANDARD

ISO 6460-1

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Motorcycles — Measurement method for gaseous exhaust emissions and fuel consumption —

Part 1: General test requirements

Motocycles — Méthode de mesure des émissions de gaz d'échappement et de la consommation de carburant —

Partie 1: Exigences générales d'essai

Reference number
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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.

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The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 6460-1 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 22, *Motorcycles*.

ISO 6460-1, together with ISO 6460-2 and ISO 6460-3, cancels and replaces ISO 6460:1981 and ISO 7860:1995, which have been technically revised.

ISO 6460 consists of the following parts, under the general title *Motorcycles — Measurement method for gaseous exhaust emissions and fuel consumption*:

— *Part 1: General test requirements*

— *Part 2: Test cycles and specific test conditions*

— *Part 3: Fuel consumption measurement at a constant speed*

Introduction

For measurement of motorcycle fuel consumption, the carbon balance method, where the fuel consumption is calculated from analysis of the carbon quantity in the exhaust gas, is now widely used in addition to the conventional fuel flow measurement. Therefore, the measurement of exhaust gas and that of fuel consumption are inseparably related to each other.

ISO 6460 now covers in one single series of standards the two subjects that were previously covered separately by ISO 6460:1981 and ISO 7860:1995. This part of ISO 6460 defines fundamental elements such as the measurement accuracy, test vehicle conditions and the details of the carbon balance method. Measurement of gaseous exhaust emissions and fuel consumption of test cycles can be conducted by means of this part of ISO 6460 and ISO 6460-2:2007. Together with ISO 6460-3, they also give details of those measurements at a constant speed.

While the most up-to-date technologies are reflected in the ISO 6460 series, further technical development in the following aspects will be necessary in the future, when measurement of exhaust gas at a lower level is required:

— cleaning of the background air (i.e. the air in the test room which is used for the dilution air);

— heating of the sampling line;

— control of the test room humidity;

— the exhaust gas analysis system for low level emissions;

— consideration of the evaporated fuel from the test motorcycle.

In addition to the above issues, the chassis dynamometer with electrically simulated inertia is at the stage of practical application. Standardization of the verification method and the allowance of simulated inertia would be necessary for this recent development.

INTERNATIONAL STANDARD **ISO 6460-1:2007(E)**

Motorcycles — Measurement method for gaseous exhaust emissions and fuel consumption —

Part 1: General test requirements

1 Scope

This part of ISO 6460 specifies the general test requirements for measurement for the gaseous exhaust emissions from motorcycles, and for determining the fuel consumption of motorcycles as defined in ISO 3833. It is applicable to motorcycles equipped with a spark ignition engine (four-stroke engine, two-stroke engine or rotary piston engine) or a compression ignition engine.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3833, *Road vehicles — Types — Terms and definitions*

ISO 6460-2:2007, *Motorcycles — Measurement method for gaseous exhaust emissions and fuel consumption — Part 2: Test cycles and specific test conditions*

ISO 6460-3:2007, *Motorcycles — Measurement method for gaseous exhaust emissions and fuel consumption — Part 3: Fuel consumption measurement at a constant speed*

ISO 11486, *Motorcycles — Methods for setting running resistance on a chassis dynamometer*

3 Terms and definitions

For the purposes of this document, the terms defined in ISO 3833 and the following apply.

3.1
motorcycle kerb mass
total unladen mass of the motorcycle, which is filled with fuel in such a way that the normal container for fuel is filled to at least 90 % of the capacity specified by the manufacturer, and which is fitted with a tool kit and a spare wheel (if obligatory)

3.2
reference mass of the motorcycle
kerb mass of the motorcycle increased by a uniform figure of 75 kg, which represents the mass of a rider

3.3
equivalent inertia
total inertia of the rotating masses of the test bench, determined with respect to the reference mass of the motorcycle

3.4
gaseous exhaust emissions
carbon monoxide, hydrocarbons, nitrogen oxides (gaseous pollutants) and carbon dioxide emitted from motorcycles

4 Symbols

Table 1 — Symbols

Symbols	Definition	Unit [a]
a	mixing ratio of lubrication oil and fuel	—
$c_{CO,d}$	carbon monoxide concentration in the dilution air	ppm
$c_{CO,dm}$	carbon monoxide concentration in the dilution air with the water vapour and carbon dioxide absorbent	ppm
$c_{CO,e}$	carbon monoxide concentration in the diluted exhaust mixture	ppm
$c_{CO,ec}$	volumetric concentration of carbon monoxide in the diluted exhaust mixture, corrected to take account of carbon monoxide in the dilution air	ppm
$c_{CO,em}$	carbon monoxide concentration in the diluted exhaust mixture with the water vapour and carbon dioxide absorbent	ppm
$c_{CO2,d}$	carbon dioxide concentration in the dilution air	%
$c_{CO2,e}$	carbon dioxide concentration in the diluted exhaust mixture	%
$c_{CO2,ec}$	volumetric concentration of carbon dioxide in the diluted exhaust mixture, corrected to take account of carbon dioxide in the dilution air	%
$c_{NOx,d}$	nitrogen oxides concentration in the dilution air	ppm
$c_{NOx,e}$	nitrogen oxides concentration in the diluted exhaust mixture	ppm
$c_{NOx,ec}$	volumetric concentration of nitrogen oxides in the diluted exhaust mixture, corrected to take account of nitrogen oxides in the dilution air	ppm
$c_{O2,d}$	oxygen concentration in the dilution air	%
$c_{Pi,ec}$	concentration of the pollutant i in the diluted exhaust mixture, corrected to take account of the amount of the pollutant i contained in the dilution air	ppm
$c_{THC,d}$	hydrocarbon concentration in the dilution air as measured in parts per million carbon equivalent	ppmC
$c_{THC,e}$	hydrocarbon concentration in the diluted exhaust mixture as measured in parts per million carbon equivalent	ppmC
$c_{THC,ec}$	volumetric concentration, expressed in parts per million carbon equivalent, of hydrocarbon in the diluted exhaust mixture, corrected to take account of hydrocarbon in the dilution air	ppmC
C_{THC}	value of HFID (hydrogen flame ionization detection) output	ppm
d_0	relative air density at the standard reference conditions	—
D_f	dilution factor	—
F_c	specific fuel consumption	km/L
F'_c	specific fuel consumption for lubrication oil mixed fuel	km/L
F_{c100}	fuel consumption per 100 km	L/100 km
F_o	lubrication oil consumption for the mixed fuel	km/L
H_a	absolute humidity in grams of water per kilogram of dry air	—
H_d	relative humidity of dilution air	%

Table 1 (*continued*)

Symbols	Definition	Unit [a]
H_r	relative humidity in the test room	%
H_0	standard relative humidity	%
K_H	humidity correction factor used for the calculation of the mass emissions of nitrogen oxides	—
K_1	venturi correction factor	—
K_2	ratio of pressure to temperature at the standard reference conditions	—
L	running distance actually travelled	km
m_{CO}	mass of carbon monoxide in the exhaust gas	g/km
m_{CO2}	mass of carbon dioxide in the exhaust gas	g/km
m_f	fuel consumed	g
m_{NOx}	mass of nitrogen oxides in the exhaust gas	g/km
m_{Pi}	mass emission of the pollutant i	g
m_{THC}	mass of hydrocarbon in the exhaust gas	g/km
N	number of revolutions of positive displacement pump during the test while samples are being collected	—
p_a	mean barometric pressure during the test in the test room	kPa
p_d	saturated water vapour pressure during the test in the test room	kPa
p_p	diluted exhaust mixture absolute pressure at the inlet of positive displacement pump	kPa
p_v	absolute pressure at the venturi inlet	kPa
$p_v\ (t)$	absolute pressure of the diluted exhaust mixture at the venturi inlet	kPa
p_0	total barometric pressure at the standard reference conditions	kPa
Q_a	measured flow rate of venturi at ambient conditions	L/s
Q_{cal}	measured flow rate of venturi using the other gas flowmeter	L/s
$R_{HC,ex}$	atom number ratio of hydrogen and carbon in the exhaust gas	—
$R'_{HC,ex}$	atom number ratio of hydrogen and carbon in the exhaust gas for lubrication oil mixed fuel	—
$R_{HC,f}$	atom number ratio of hydrogen and carbon in the fuel	—
$R_{HC,o}$	atom number ratio of hydrogen and carbon in the lubrication oil	—
$R_{OC,ex}$	atom number ratio of oxygen and carbon in the exhaust gas	—
$R'_{OC,ex}$	atom number ratio of oxygen and carbon in the exhaust gas for lubrication oil mixed fuel	—
$R_{OC,f}$	atom number ratio of oxygen and carbon in the fuel	—
$R_{OC,o}$	atom number ratio of oxygen and carbon in the lubrication oil	—
t	time	s
t_{test}	total test time	s
T_a	measured ambient temperature during the test in the test room	K
T_f	fuel temperature measured at the burette	K
T_p	temperature of diluted exhaust mixture at the positive displacement pump inlet during the test while samples are being collected	K
T_v	temperature at the venturi inlet	K
$T_v\ (t)$	temperature of diluted exhaust mixture at the venturi inlet	K

Table 1 (*continued*)

Symbols	Definition	Unit [a]
T_0	air temperature at the standard reference conditions	K
T_1	mean dry bulb temperature during the test in the test room	K
T_2	mean wet bulb temperature during the test in the test room	K
V	measured volume of fuel consumed	L
V_d	dilution air volume	L
V_e	volume of the diluted exhaust mixture expressed corrected to the standard reference conditions	L/km
V_{ex}	exhaust gas volume	L
V_f	fuel volume of lubrication oil mixed fuel	L
$V_{i,e}$	volume of the diluted exhaust mixture in one test under the standard reference conditions	L
V_o	lubrication oil volume of lubrication oil mixed fuel	L
V_p	diluted exhaust mixture volume pumped by the positive displacement pump per one revolution	L
V_s	total diluted exhaust mixture volume during one test	L
α	coefficient of volumetric expansion for the fuel	K^{-1}
ρ_{CO}	carbon monoxide density at the standard reference conditions	g/L
ρ_{CO2}	carbon dioxide density at the standard reference conditions	g/L
ρ_f	fuel density at 293,15 K	g/L
ρ_{NOx}	nitrogen oxides density under the standard reference conditions, expressed in equivalent NO_2	g/L
ρ_o	lubrication oil density at 293,15 K	g/L
ρ_{Pi}	density of the pollutant i under the standard reference conditions	g/L
ρ_{THC}	hydrocarbon density at the standard reference conditions	g/L
ρ_0	air volumetric mass	kg/m^3

[a] ppm = parts per million.

5 Standard reference conditions

The standard reference conditions shall be as follows:

total barometric pressure, p_0: 101,325 kPa;

air temperature, T_0: 293,15 K;

relative humidity, H_0: 65 %;

air volumetric mass, ρ_0: 1,205 kg/m^3;

relative air density, d_0: 0,931 9.

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