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Emission limits — Specification

Part 1:

Road vehicles

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In order to match with technological development and to keep continuous progress in industries, standards are subject to periodic review. Users shall ascertain that they are in possession of the latest edition

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Foreword

Rwanda Standards are prepared by Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by Technical committees are ratified by members of RSB Board of Directors for publication and gazettment as Rwanda Standards.

DRS 407-1 was prepared by a Joint Technical Committee RSB/TC 41, Environmental protection and RSB/TC 23, Road vehicles.

DRS 407 consists of the following parts, under the general title *Emission limits — Specification*:

— *Part 1: Road vehicles*

— *Part 2: Non-road mobile machinery*

— *Part 3:Thermal power plants*

Committee membership

The following organizations were represented on the Joint Technical Committee on Environmental protection (RSB/TC 41) and RSB/TC 23 on road vehicles in the preparation of this standard.

Akagera Motors

Energy Development Corporation Ltd (EDCL)

Integrated Polytechnic Regional College (IPRC) Kigali

Metropole Motors

Ministry of Environment (MoE)

Ministry of Infrastructure (MININFRA)

Ministry of Trade and Industry (MINICOM)

PurePro® Ltd

Real Contractors Ltd

Rwanda Environment Management Company (RWEMACO)

Rwanda Garages Association (RGA)

Rwanda National Police (RNP)

Rwanda Transport Development Agency (RTDA)

Rwanda Utility Regulatory Agency (RURA)

SAR Motors

Standards for Sustainability (SfS)

Sulfo Industries Rwanda

TUMECO Garage

University of Rwanda - College of Science and Technology (UR - CST)

Rwanda Standards Board (RSB) – Secretariat

Emission limits — Specification — Part 1 — Road vehicles

1 Scope

This Draft Rwanda Standard specifies requirements for emission limits and test methods for road vehicles.

This Standard is applicable to all vehicles designed for road circulation: motor vehicles, towed vehicles, combinations of vehicles, mopeds and motorcycles.

This Standard does not cover vehicles such as agricultural tractors.

2 Normative references

The provisions of this Rwanda Standard have been adopted or adapted from the following referenced documents. For dated references, only the edition cited applies. For undated references, the latest edition of the reference document including amendments applies.

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

ISO 16183, *Heavy duty engines — Measurement of gaseous emissions from raw exhaust gas and of particulate emissions using partial flow dilution systems under transient test conditions*

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

RS ISO 3929, *Road Vehicles — Measurement methods for exhaust gas emissions during inspection or maintenance*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in RS ISO 3833, and the following apply.

3.1

new vehicle

any manufactured motor vehicle, motor cycle or motor tricycle whose legal title has not been issues to an ultimate purchaser and whose only documentation is the manufacturer's statement of origin

3.2

used vehicle

any motor vehicle, motor cycle or motor tricycle which has previously been owned or registered in Rwanda or in any other jurisdiction

3.3

in-use vehicle

any motor vehicle, motor cycle or motor tricycle that is registered in Rwanda is operating on Rwandan public roads

3.4

motor tricycle

motor vehicle, other than a motorcycle or a tractor, that has three wheels and that is designed to be driven by means of the type of controls usually fitted to a motorcycle

3.5

initial inspection

inspection which a new motor vehicle, motor cycle or motor tricycle must receive when it is newly operated

3.6

periodic inspection

inspection which a motor vehicle motor cycle or motor tricycle must receive when it is to be operated continually on Rwandan public roads after the term of validity of its inspection certificate has expired

3.7

modification inspection

inspection which a motor vehicle motor cycle or motor tricycle must receive when there are changes in the length, height, width, maximum payload and other major specifications

3.8

on-road random inspection

an inspection which a motor vehicle, motorcycles and moto tricycles must receive when it is picked up at random on the road by the relevant authority

3.9

towed vehicle

non powered drive road vehicle which on account of its design and appointments , is used to transport persons or goods and is intended to be towed by a motor vehicle

3.10

combination of vehicles

motor vehicle coupled with one or more towed vehicle(s)

3.11

moped vehicles

two wheeled or three wheeled moto driven while with a maximum design speed not exceeding 50km/h

3.12

motorcycles

two wheeled motor driven vehicle or three wheeled moto driven vehicle whose unladen weights does not exceed 400 kg

3.12

emission

discharge of substances from a road vehicle into the atmosphere

3.13

emission limit value

permissible quantity of a substance contained in the waste gases from a road vehicle which may be discharged into the air during a given period

4 Requirements

4.1 General requirements

4.1 All motor vehicles, motor cycles and motor tricycles to be used on Rwandan public roads shall be inspected and tested for compliance with exhaust emissions limits in accordance with the relevant provisions of this Draft Rwanda standard.

4.2 No motor vehicle, motor cycle or motor tricycle shall be registered for the first time without a certificate of compliance with exhaust emission limits in addition to any other requirements on roadworthiness.

4.3 Imported motor vehicles, motor cycles and motor tricycles shall be accompanied by a certificate of compliance with exhaust emission limits issued by a duly approved agency in the exporting country in accordance with relevant provisions of this Draft Rwanda Standard and Rwandan law.

4.4 Motor vehicles, motor cycles and motor tricycles shall be inspected and tested in inspection centres approved by relevant authority.

4.5 Emissions inspection and testing shall be according to the schedule laid out in Annex B.

4.2 Specific requirements

4.2.1 Exhaust emission limits

The following exhaust emission limits shall apply to the different types and categories of vehicles as outlined in Tables 1 – 6.

Table 1 — Type approval/certification maximum emission limits for new diesel powered vehicles (compression ignition engines) (locally manufactured/assembled or imported new), g/kwh

Vehicle Category	CO	HC+ NOx	NOx	PM	Test method
Light duty Passenger Cars Class M	0.50	0.30	0.25	0.025	WLTP*
Light Duty Commercial Vehicles (LDV Class 1, 2 & 3)					
LDV Class 1 (RM ≤ 1 305 kg)	0.50	0.30	0.25	0.025	WLTP
LDV Class 2 (1305 kg < RM ≤ 1 760 kg)	0.63	0.39	0.33	0.04	
LDV Class 3 (RM > 1 760 kg)	0.74	0.46	0.39	0.06	
Medium Duty Vehicles (MDV) (2700 ≤ GVW < 3500 kg)	0.74	0.46	0.39	0.06	WLTP
Heavy Duty Vehicles (N_2, N_3, O)					
N2 (GVW > 3 500 kg < 12 000 kg)	1.50	0.46	3.5	0.02	ISO 16183:2002
N3 (GVW > 12 000 kg)	1.50	0.46	3.5	0.02	
O (Trailers including semi-trailers)	1.50	0.46	3.5	0.02	

*Worldwide Harmonized Light Vehicle Test Procedure

Table 2 — Type approval/certification maximum emission limits for new gasoline and LPG powered vehicles (spark ignition engines) (locally manufactured/assembled or imported new), g/km

Vehicle Category	CO	HC	NOx	Test method
Passenger Cars Class M	1.00	0.10	0.08	WLTP*
Light Duty Commercial Vehicles (LDV Class 1, 2 & 3)				
LDV Class 1 (RM ≤ 1 305 kg)	1.00	0.10	0.08	WLTP
LDV Class 2 (1305 kg < RM ≤ 1 760 kg)	1.81	0.13	0.10	
LDV Class 3 (RM > 1 760 kg)	2.27	0.16	0.11	
Motor Cycles (Class I & II)				
Class I (<150 cc displacement)	5.50	1.20	0.30	ISO 6460-2
Class II (150 cc displacement)	5.50	1.0	0.30	
Tricycles				
All Gasoline	7.0	1.50	0.40	ISO 6460-2

***Worldwide Harmonized Light Vehicle Test Procedure

Table 3 — Emission standard for imported used diesel powered vehicles (compression ignition engine)

Vehicle category	Maximum smoke density	Test method
All Categories	Light absorption coefficient = 1.5 M^{-1}	Metered smoke test

Table 4 — Maximum mission limits for imported used gasoline and LPG powered vehicles (compression ignition engine)

Vehicle Category	CO (% volume)	HC (parts per million)	Test method
Motor Vehicles			
All categories	1.00	400	Basic emission test

NOTE Under the provisions of Aricle 6 of the Ministerial Order No. 02/2018 (official gazette no. 39bis of 24/09/2018), all motorcycles imported into Rwanda must be brand new. Hence, the limits in table 4 above do not apply to motor cycles and motor tricycles. All imported motor cycles and tricycles are subject to the limits in Table 2, except where an exemption is granted pursuant to Article 6 of the Ministerial Order or any other written law of Rwanda.

Table 5 — Maximum emission limits for in-use diesel powered vehicles (compression ignition engine)

Vehicle Category	Date of manufacture (Y/M)	Maximum smoke density	Test method
All Categories	2005/01 upwards	Light absorption coefficient = 1.5 M^{-1}	Metered smoke test
	From 1992/07 - 2004/12	Light absorption coefficient = 2.5 M^{-1}	Metered smoke test
	Before 1992/07	-	Visual Inspection

Table 6 — Maximum emission limits for in-use gasoline and LPG vehicles (spark ignition engines)

Vehicle Category	Date of manufacture (Y/M)	CO (% volume)	HC (Parts per million)	Test method
Motor Vehicles				
All categories	From 2005/01 upwards	1.00	400	Basic emission test
	Before 2005/01	3.0	500	
	Before 1992/07	4.5	600	Non-catalytic test
Motor cycles*				
	After 31/3/2000 (4 stroke)	3.5	4 500	Basic emission test
	After 31/3/2000 (2 stroke)	3.5	6 000	
	on or before 31/3/2000 (2/4 stroke)	4.5	9 000	
Motor tricycles				

All	All	3.5	4 500	Basic emission test

5 Test methods

Emissions inspection and testing for all vehicles subject to this standard shall be carried out in accordance with the Test Methods outlined in Annex C.

Annex A
(informative)

Vehicle categories

Category	Description
Passenger cars (M)	
M	Motor vehicles with at least four wheels designed and constructed for the carriage of passengers.
M_1	Vehicles designed and constructed for the carriage of passengers and comprising no more than eight seats in addition to the driver's seat
M_2	Vehicles designed and constructed for the carriage of passengers, comprising more than eight seats in addition to the driver's seat, and having a maximum mass ("technically permissible maximum laden mass") not exceeding 5,000 kg.
M_3	Vehicles designed and constructed for the carriage of passengers, comprising more than eight seats in addition to the driver's seat, and having a maximum mass exceeding 5,000kg.
Light Commercial Vehicles (N)	
N	Motor vehicles with at least four wheels designed and constructed for the carriage of goods.
N_1	Vehicles designed and constructed for the carriage of goods and having a maximum mass not exceeding 3 500 kg. Light commercial vehicles Classes for N1 are further divided into three Weight classes and two categories based on GVWR and the Reference Mass (RM), defined as the mass of the vehicle in running order less the uniform mass of the driver of 75 kg, and increased by a uniform mass of 100 kg.
N1 Weight Classes	
Class I	RM ≤ 1 305 kg
Class II	1 305 kg < RM ≤ 1 760 kg
Class III	RM>1 760 kg
Heavy Duty Vehicles	
N_2	Vehicles designed and constructed for the carriage of goods and having a maximum mass exceeding 3,500 kg but not exceeding 12,000 kg.
N_3	Vehicles designed and constructed for the carriage of goods and having a maximum mass exceeding 12,000 kg.
O	Trailers (including semi-trailers)
Motor cycles	
Class I	Two-wheeled motor-driven vehicle whose unladen weight does not exceed 400 kg, with <150 cc displacement
Class II	Two-wheeled motor-driven vehicle whose unladen weight does not exceed 400 kg, with 150 cc displacement
Motor tricycles	
Motor tricycle	Three-wheeled motor-driven vehicle whose unladen weight does not exceed 400 kg

Annex B
(normative)

Emissions inspection schedule

Vehicle category	Initial Inspection	Periodic Inspection (frequency)	Modification Inspection	On-road Random Inspection
Passenger cars Class M1, Motor cycles and Tricycles	All	12 Months	Yes	Yes
All other categories	All	6 Months	Yes	Yes

Annex C
(normative)

Test methods

C.1 New vehicles (locally manufactured/assembled or imported new)

C.1.1 Worldwide Harmonized Light Vehicle Test Procedure (WLTP)

For type approval and certification of all categories of light duty and medium duty vehicles, whether locally manufactured/assembled or imported. The WLTP defines a global harmonized standard for determining the levels of pollutants and CO_2 emissions, fuel efficiency, and electric range from light-duty vehicles (passenger cars and light commercial vehicles), and was developed under the guidance of UNECE World Forum for Harmonization of Vehicle Regulations.

C.1.2 World Harmonized Stationary Cycle (WHSC)

For type approval and certification of all categories of heavy duty vehicles, whether locally manufactured/assembled or imported. The WHSC test is a steady-state engine dynamometer schedule defined by the Global Technical Regulation (GTR) No. 4 developed under the guidance of UNECE World Forum for Harmonization of Vehicle Regulations. The GTR is covers a world-wide harmonized heavy-duty certification (WHDC) procedure for engine exhaust emissions.

C.1.3 World Motorcycle Test Cycle (WMTC)

For type approval and certification of all categories of motorcycles and motor tricycles, whether locally manufactured/assembled or imported. The WMTC is a system of driving cycles used to measure fuel consumption and emissions in motorcycles and motor trycles. The methods are stipulated as part of the Global Technical Regulation established under the guidance of UNECE World Forum for Harmonization of Vehicle Regulations.

C.2 Imported used and in-use gasoline and lpg powered vehicles

C.2.1 Vehicles to be tested

In-use exhaust emissions testing are applied to all petrol and LPG-powered motor vehicles, motor cycles and motor tricycles.

C.3 Types of test

The emissions test to which a vehicle is subject will depend upon its date of manufacture as follows:

C.3.1 Non-catalyst test

For all petrol and LPG-powered vehicles first used before 1st July 1992, the non-catalyst test procedure will apply. This is used for petrol and LPG-fuelled vehicles which are not equipped with advance emission control systems such as catalytic converters.

C.3.1.1 Checks on the vehicle before the test

Before carrying out the test, the Examiner will confirm that the engine is at its normal operating temperature which, in most cases, will require the use of an oil temperature probe inserted into the dipstick tube. Before proceeding, the Examiner will also check that the engine has sufficient oil and fuel to complete the test. For vehicles with manual transmission the test will be carried out with the gear lever in the 'neutral' position and with the clutch engaged. For vehicles with automatic transmission the gear selector will be in either the 'neutral' or 'park' position.

C.3.1.2 Test procedure

C.3.1.2.1 Visual inspection (all vehicles)

Once the preliminary checks have been completed, the Examiner will raise the engine speed to around 2500rpm or half the maximum engine speed if this is lower. The engine speed will be held steady for approximately 20 seconds after which the engine will be allowed to return to its natural idle speed. Once the emissions have stabilized the Examiner will assess the smoke emitted from the tailpipe. If the exhaust is emitting dense blue or clearly visible black smoke then the vehicle will fail the test. In exceptional cases, especially on certain vehicles manufactured before 1960 where emissions of smoke are unavoidable due to the engine design, these vehicles will not fail the test.

C.3.1.2.2 Standard emissions test

Emissions will also be checked using an approved analyzer. After completing the visual test, the Examiner will use the analyzer to assess the concentration of carbon monoxide (CO) and hydrocarbons (HC) in the exhaust gases by inserting a sample probe into the exhaust tailpipe. The test is carried out with the engine at its normal idling speed and the analyzer displays the results continuously. Once a stabilized figure is achieved the tester will record the result. The vehicle must comply with the appropriate emissions limits set out in Table 6 of the standard.

C.3.1.3 Basic Emissions Test (BET)

The basic emissions test (also known as the ‘catalyst test’) will be applied to all petrol and LPG fuelled vehicles first used on or after 1st July 1992. This test is primarily aimed at identifying, and assessing emissions from vehicles with advanced emissions control systems such as three-way catalytic converters. As the procedure is more complicated than the non-catalyst test, the emissions analyzers include computer software aimed at guiding the examiner through the test sequence. The test consists of checking the emissions at ‘fast-idle speed’ which involves running the engine at a speed of 2500 - 3000 rpm. During this test the emissions of CO and HC will be checked. The emissions limits to be met are specified in Table 6. Where these limits are not met, a check will be made to identify vehicles (e.g. those without a catalyst) which should only be required to meet the non-catalyst emissions check requirements.

C.4 Imported used and in-use diesel powered vehicles

C.4.1 Vehicles to be tested

This inspection applies to all imported used and in-use diesel engine vehicles with four or more wheels.

C.4.2 Checks on the vehicle before the test

Wherever possible, vehicles should arrive at the inspection centre with the engine at its normal operating temperature (e.g. after a drive of approximately 5 kilometers). Before carrying out the test, the Examiner must confirm that the engine is at its normal operating temperature. In most cases this will require the use of an oil temperature probe inserted into the dipstick tube. The Examiner will also check that the engine has adequate oil and fuel to complete the test before proceeding. In addition the Tester will check the condition of the camshaft drive belt (where visible) and the fuel injection pump (governor) anti-tampering seals. For vehicles with manual transmission the test will be carried out with the gear lever in the 'neutral' position and with the clutch engaged. For vehicles with automatic transmission the gear selector will be in either the 'neutral' or 'park' position.

C.4.3 Test procedure

C.4.3.1 Visual inspection

For all diesel powered vehicles first used before 1st July 1992, a visual test will be carried out. The Examiner will check the smoke emissions by raising the engine speed to around 2500 rpm or half the maximum engine speed if this is lower. This speed will be maintained for 30 seconds to ensure that the inlet and exhaust system has been fully purged. The Examiner will then allow the engine to return to idle. Once the engine has stabilized at this speed, the emissions from the exhaust tailpipe will be assessed. If the exhaust is emitting dense blue or clearly visible black smoke for a period of 5 seconds or more the vehicle will fail the test. The Examiner will then rapidly increase the engine speed to around 2500 rpm or half the maximum engine speed if this is lower and assess whether the smoke emitted from the exhaust is likely to obscure the vision of other road users. If it is likely to do so, in the Examiner's opinion, the vehicle will fail the test. However, vehicles manufactured before 1960 will not be failed if the smoke is unavoidable due to the engine design.

C.4.3.2 Metered smoke test

For all diesel powered vehicles used on or after 1st July 1992, a metered smoke test will be carried out. Before checking the smoke emissions, the Examiner will firstly ensure that the engine inlet and exhaust system is fully purged, and the engine speed governor, where applicable, is functioning correctly. The engine speed will then be raised to around 2500 rpm or half the maximum engine speed if this is lower. Upon reaching this speed, the Examiner will hold the engine speed steady for 30 seconds to purge the inlet and exhaust systems, then the engine speed will be slowly increased to maximum to check the operation of the fuel pump governor. Where the engine speed stabilizes at its maximum speed indicating that the governor is working, the engine will then be returned to idle speed. Where it is clear that the governor is not working, the engine will be returned to idle speed and stopped, the smoke test will not be carried out and the Examiner will be unable to pass the vehicle. Provided the preliminary checks are completed satisfactorily, the Examiner will prepare the smoke meter and insert the sampling probe into the exhaust tailpipe. Having restarted the engine the Examiner will start the smoke test as follows:

a) Diesel Fast Pass

The smoke meter will indicate to the Examiner to accelerate the engine. The accelerator pedal will be depressed quickly and continuously but not violently, to reach the full fuel position in less than 1 second. After the release prompt is given, the Examiner will immediately release the throttle. The meter will calculate the maximum smoke emission during the acceleration and display the result. If, after the first acceleration, the meter reading is at or below the limits specified in Table 5, the vehicle will pass the meter test and a pass result will be displayed on the meter; if it exceeds, the vehicle will fail the test and a fail result will be displayed on the meter.

b) Standard diesel test

If the smoke level reading is greater than the limits in Table 5, a further two accelerations will be requested by the meter. Provided the average of the 3 tests is at or below the appropriate limit in Table 5, the vehicle will have passed the test. The Examiner will stop the engine and remove the smoke meter probe from the tailpipe. Where the average smoke emission at the end of the third acceleration exceeds the limit in Table 5, the meter will request further tests. This will continue until either the average of the three preceding accelerations is at or below the limit in the Table 5, or a maximum of six accelerations have been completed. Once the vehicle has either passed the test or a maximum of six accelerations have been completed the Examiner will stop the test and remove the smoke meter probe from the exhaust tailpipe. As a final check the Examiner will assess visually whether the smoke emitted from the exhaust, regardless of measured smoke density, is likely to obscure the vision of other road users. If it is likely to do so the vehicle will fail the test.

ICS 13.040.50