



DENR ADMINISTRATIVE ORDER
No. 2010- 23

SEP 07 2010

SUBJECT: Revised Emission Standards for Motor Vehicles Equipped with Compression-Ignition and Spark-Ignition Engines

Pursuant to Section 21 of Republic Act 8749, otherwise known as the "Philippine Clean Air Act of 1999", Rule XXXIII, Section 1 and Section 3, Part VIII of DENR Administrative Order No. 2000-81, and DENR Administrative Order No. 2007-27, the following guidelines for the revised emission standards for motor vehicles equipped with compression-ignition and spark-ignition engines are hereby prescribed for the guidance and compliance of all concerned.

Section 1. Basic Policy. It is the policy of the State to:

- a) protect and advance the right of people to a balanced and healthful ecology in accord with the rhythm and harmony of nature;
- b) attain and maintain a balance between development and environmental protection; and
- c) maintain a quality of air that protects human health and welfare.

Sec. 2. Scope and Coverage. These emission limits and standards shall apply to all new and in-use motor vehicles equipped with spark-ignition and compression-ignition engines for purposes of registration.

Sec. 3. Objectives. This Order aims to:

- a) revise the emission standards of in-use, rebuilt and imported used motor vehicles equipped with spark-ignition and compression-ignition engines, and to update the emission limits for new motor vehicles through a Certificate of Conformity (COC) issued by the Environmental Management Bureau (EMB) to achieve substantial improvement on air quality for the health, safety and welfare of the general public; and,
- b) give manufacturers of new motor vehicle and local oil companies a lead time to comply with the required emission standards for purposes of planning/design.

Sec. 4. Definition of Terms. The following terms as used in this Order shall be defined as follows:

- a) Certificate of Conformity (COC)- the Certificate issued by the DENR through the EMB to a vehicle manufacturer/assembler or importer certifying that a particular new vehicle or vehicle type meets the requirements provided under RA 8749 and its Implementing Rules and Regulations;
- b) Certificate of Compliance to Emission Standards - the Certificate issued by the Department of Transportation and Communication through the Land Transportation Office to a vehicle importer or owner certifying that a particular imported second-hand or used motor vehicle meets the requirements provided under RA 8749 and its Implementing Rules and Regulations;
- c) Compression Ignition Engine - an internal combustion engine in which atomized fuel temperature is raised through compression, resulting to an ignition, e.g. diesel engines;
- d) Emissions - any measurable air contaminant, pollutant, gas stream or unwanted sound from a known source which is passed into the atmosphere;



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- e) European Emission Standards – set of requirements defining the acceptable limits for exhaust emissions of new vehicles sold in EU member states. The standards are defined in a series of European Union Directives staging the progressive introduction of increasingly stringent standards;
- f) Euro 1 – the set of requirements defining the acceptable limits for exhaust emissions of new vehicles as provided in EC93 and Directives 91/441/EEC or 93/59/EEC;
- g) Euro 2 – the set of requirements defining the acceptable limits for exhaust emissions of new vehicles as provided in either UNECE R 83-03 (Directives 70/220/EEC, as amended by Directive 94/12/EC or 96/44/EC) or UNECE R 83-04 (Directives 70/220/EEC, as amended by 96/69/EC);
- h) EURO I – the set of requirements defining the acceptable limits for exhaust emissions of new vehicles as provided in Directives 88/77/EEC as amended by Directives 91/542/EEC;
- i) EURO II – the set of requirements defining the acceptable limits for exhaust emissions of new vehicles as provided in Directives 88/77/EEC as amended by Directives 91/542/EEC;
- j) Imported Used Vehicle - any imported used motor vehicle allowed by law;
- k) In-Use Vehicle - any motor vehicle previously registered with the LTO;
- l) M/Passenger vehicle - motor vehicles with at least four wheels designed and constructed for the carriage of passengers. M1 refers to the vehicles used for the carriage of passengers and comprising not more than eight (8) seats in addition to the driver's seat;
- m) M2, M3, N2, N3/Heavy Duty Vehicles – motor vehicles whose gross vehicle weights are greater than 3,500 kilograms;
- n) N/Light Duty Vehicle - motor vehicles with at least four wheels designed and constructed for the carriage of goods;
- o) N1/Light Duty Vehicles - motor vehicles whose gross vehicle weights are equal to or less than 3,500 kgs. This also refers to "Light Commercial Vehicles";
- p) Motor Vehicle - any vehicle propelled by a gasoline or diesel engine or by any means other than human or animal power constructed and operated principally for the conveyance of a person or the transportation of goods;
- q) Motor Vehicle Registration - the official recording of a motor vehicle by the Land Transportation Office (LTO) subject to the conformance of the vehicle to the safety and emission standards provided under Section 21 of the Clean Air Act, including the pre-evaluation of the documents requirements pursuant to Section 5 of Republic Act 4136, as amended, otherwise known as the Land Transportation Code;
- r) New Motor Vehicle - a vehicle constructed entirely from new parts that has never been sold or registered with the DOTC or with the appropriate agency or authority, and operated on the highways of the Philippines, any foreign state or country;
- s) Rebuilt Vehicles - locally assembled vehicles using new or used engine, major parts or components as allowed by law;
- t) Reference Mass (RW) - 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.;
- u) Spark Ignition Engine - an internal combustion engine in which the air/fuel mixture is ignited by a spark plug, e.g., a gasoline engine;
- v) **Type Approval - the official ratification of the compliance of a vehicle type with applicable national or international regulations;**



- w) **Vehicle Type** - a category of power driven vehicles which does not differ in such essentials as reference mass or weight, engine type, number of cylinders, body configuration, and manner of transmission, fuel used and similar characteristics.

Sec. 5. Emission Limits for Type Approval of New Motor Vehicles

5.1 All new motor vehicle types introduced in the market from January 01, 2008 shall comply with the EURO 2 & II Emission Limits as indicated under Table 1 and Table 2; provided, however, that the DENR can issue a COC under more stringent standards for compliant new motor vehicle type to be introduced in the market upon effectivity of this Order.

Table 1
Type Approval Emission Limits for Passenger Vehicles (M) and Light Duty Vehicles (N1), (Euro 2)

Category/Class of Vehicle **		Limit Values					
		Reference Mass RW (kg)	Mass of Carbon Monoxide L ₁ (g/km)		Combined Mass of Hydrocarbons and Oxides of Nitrogen L ₂ (g/km)		Mass of Particulates L ₃ (g/km)
Category	Class		Petrol	Diesel	Petrol	Diesel ⁽¹⁾	Diesel ⁽¹⁾
M ⁽²⁾	-	all	2.2	1.0	0.5	0.7	0.08
N ₁ ⁽³⁾	I	RW ≤ 1,250	2.2	1.0	0.5	0.7	0.08
	II	1,250 < RW ≤ 1,700	4.0	1.25	0.6	1.0	0.12
	III	1,700 < RW	5.0	1.5	0.7	1.2	0.17

⁽¹⁾ Until 1 January 2011, for vehicles fitted with diesel engines of the direct injection type, the limit values L₂ and L₃ are the following:

	L ₂	L ₃
- category M ⁽²⁾ and N ₁ ⁽²⁾ class I :	0.9	0.10
- category N ₁ ⁽²⁾ class II :	1.3	0.14
- category N ₁ ⁽²⁾ class III :	1.6	0.20

⁽²⁾ Except:

- vehicles designed to carry more than six occupants including the driver.
- vehicles whose maximum mass exceed 2,500 kg.

⁽³⁾ And those category M vehicles which are specified in footnote ⁽²⁾.

** For purposes of this DAO, "vehicle category" refers to a classification of power-driven vehicles in accordance with PNS 1891.

Table 2
Emission Limits for Heavy Duty Vehicle Type Approval (Euro II)

Type of engine	Class of Vehicle	CO (g/kWh)	HC (g/kWh)	NOx (g/kWh)	PM (g/kWh)
Compression-ignition	Heavy Duty Vehicles	4.0	1.10	7.0	0.15

5.2 Starting January 01, 2016, all new passenger and light duty motor vehicle types to be introduced in the market shall comply with EURO 4 emission limits subject to EURO IV fuel availability.

Sec. 6. Determination of the Exhaust Emissions. In determining compliance with the above emission standards, the following test procedures shall be followed:

- For light-duty vehicles, the emission test procedures specified in European Union Directive 70/220/EEC as amended by Directives 94/12/EC and 96/69/EC;
- For heavy-duty engines, the 13-mode test procedure specified in European Community Directive 88/77/EEC as amended by Directives 91/542/EEC.

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However, while the DOTC/LTO is developing inspection capability of the motor vehicle type approval system test, the previous emission test results of pre-production engine vehicle type duly certified by the manufacturer of subject motor vehicle shall be valid and sufficient.

Sec. 7. Issuance of Certificate of Conformity (COC). A Certificate of Conformity (COC) certifying that a motor vehicle type complies with the emission standards shall be issued by the DENR through EMB.

The application for a COC shall be submitted to the EMB by the motor vehicle manufacturer, assembler, importer or their duly authorized representatives. It shall be accompanied by the following particulars in triplicate:

- a. Complete and detailed description of motor vehicle and the engine;
- b. Description of the emission control system installed in the motor vehicle;
- c. Details of the fuel feed system;
- d. Vehicle Type Approval System test result by DOTC/LTO (while the DOTC/LTO is developing inspection capability of the motor vehicle type approval system test, the previous emission test results of pre-production engine vehicle type duly certified by the manufacturer of subject motor vehicle shall be valid and sufficient; and
- e. Other particulars which may be required by the Department.

Sec. 8. Validity of COC. For purposes of vehicle registration, the COC issued as a compliance with the above-mentioned emission limits shall be valid for six (6) years from the date of issue unless otherwise revoked or suspended. In case of suspension, the 6-year validity period shall not be extended by the period of suspension.

Sec. 9. Emission Standards for In-Use Motor Vehicles. All in-use motor vehicles registered for the first time on dates indicated below shall comply with the following emission standards:

Table 3
Emission Standards for Vehicles with Spark-Ignition Engines (Gasoline)*, **
Except motorcycles

Vehicle Registration	CO (% by Volume)	HC (ppm as Hexane)
Registered for the first time after December 31, 2007	0.5	250
Registered for the first time on or after January 1, 2003 but before January 1, 2008	3.5	600
Registered for the first time prior to December 31, 2002	4.5	800

*at idle

** Subject to Sec.8, Validity of COC

Table 4
Emission Standards for Vehicles with Compression-Ignition Engines (Diesel)*, **
(Light absorption coefficient, m-1), k

Vehicle Registration	Light absorption coefficient, m-1, k
Registered for the first time after December 31, 2007	2.0
Registered for the first time on or after January 1, 2003 but before January 1, 2008	2.5
Registered for the first time on or before December 31, 2002	2.5 3.5 (turbocharged) 4.5 (1,000m increase in elevation)

using the acceleration test

** Subject to Sec.8, Validity of COC



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Sec. 10. Emission Standards for Rebuilt and Imported Used Vehicles. All rebuilt vehicles, imported used vehicles or pre-registered vehicles retrofitted with used engines shall comply with the following emission standards:

**Table 5
Emission Standards for Rebuilt and Imported Used Vehicles***

Vehicle Registration	CO ^a (% by Volume)	HC ^a (ppm as Hexane)	Light absorption coefficient, m-1, k (turbo charged) ^b
Registered for the first time after December 31, 2007	0.5	250	2.0

a – for spark-ignition (gasoline) motor vehicles

b – for compression-ignition (diesel) motor vehicles

* – applicable only to vehicles listed in Sec 3.1.1 – 3.1.5 of Executive Order 156

All rebuilt vehicles, imported used vehicles or pre-registered vehicles retrofitted with used engines as defined herein shall only be allowed registration or renewal of registration upon submission of a valid Certificate of Compliance to Emission Standard (CCES) issued by DOTC-LTO.

As a requirement for the issuance of a CCES by DOTC for imported second hand vehicles, a Certificate of Emission Compliance from the country of origin shall be valid and sufficient. The DOTC may however, seek verification through actual testing at the Motor Vehicle Inspection Station (MVIS).

In the case of rebuilt vehicles, a CCES issued by the DOTC-LTO on the basis of an inspection by the DOTC Vehicle Type Approval System if available, or initially by LTO MVIS, is required.

Sec. 11. Test Procedures for Measurement of Exhaust Emissions of In-Use Motor Vehicles. The emission test procedures for registered in-use motor vehicles equipped with compression-ignition and spark ignition engines as prescribed in Annexes A and B of this Order shall be used in determination of the k value, CO and HC respectively.

Sec. 12. Repealing Clause. All Orders, Circulars and Instructions inconsistent herewith are hereby repealed or amended accordingly.

Sec. 13. Effectivity. This Order shall take effect fifteen (15) days after its publication in a newspaper of general circulation and acknowledgement by the Office of the National Administrative Registry (ONAR).


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ANNEX "B"
EMISSION TEST PROCEDURE FOR REGISTERED OR IN-USE MOTOR VEHICLES EQUIPPED WITH SPARK-IGNITION ENGINES

1. Scope

The test procedure is for the determination of the concentration of exhaust carbon monoxide (CO) and hydrocarbon (HC) emissions from in-use motor vehicles equipped with spark-ignition engines running at idle speed.

2. Test Equipment (Reference: ISO - 3930)

- a. Carbon monoxide analyzer - a NDIR (Non-dispersive Infrared) CO exhaust gas analyzer.
- b. Hydrocarbon analyzer - a NDIR HC exhaust gas analyzer, HC as hexane (C₆H₁₄).
- c. Tachometer - An easily installed and operated tachometer to measure engine speed (RPM).

3. Vehicle Preparation

- d. Set the vehicle transmission at neutral with the hand-brake engaged.
- e. Ensure that the idling speed or the engine rpm with the accelerator in the rest position, conforms with the vehicle manufacturer's recommendation.
- f. All accessories like rear window heating, air conditioning system, air fan and other equipment necessary for the vehicle operation at idle should be switched-off.
- g. Check that the temperature of the engine is at least 70°C; otherwise, run the vehicle for at least 15 minutes on a normal road before testing.
- h. Ensure that the vehicle exhaust system is reasonably leakproof and will allow the insertion of the sampling probe by at least 30 cm. from the tailpipe outlet. If this is not possible due to tailpipe configuration, use the appropriate correction factor.

4. Measurement

- a. Immediately preceding the measurement, adjust the instrument to zero and accelerate the engine to about 2,500 rpm, using the tachometer, if available. Maintain this speed from ten (10) to fifteen (15) seconds, then release the pedal to return the engine at idle speed.
- b. While the engine idles, insert the sampling probe into the exhaust pipe as deeply as possible which shall not be less than thirty (30) cm. Wait for twenty (20) seconds and take the CO/HC reading.
- c. If the vehicle has multiple exhaust outlets the arithmetic average of the CO/HC readings in each exhaust outlet is taken as the final result.

5. Instrument Calibration, Adjustments (Reference: ISO 3929)

- (a) Prepare, use and maintain the analyzer following the directions given in the instrument manufacturer's operation manual and service the instrument at such intervals as to ensure accuracy.
- (b) Carry out a span and zero calibration within a period of four (4) hours before the instrument is moved or transferred to a new location. The calibration shall be performed well away from the exhaust of motor vehicles whose engines are running.

If the instrument is not self-compensated for non-standard conditions of altitude and ambient temperature or not equipped with a manually controlled system of compensation, the scale calibration shall be performed using calibration gas.

(c) If the sample handling system is not integral with the analyzer, make certain that the effectiveness of the gas sampling system are leakproof. Check that filters are clean, that filter holders are fitted with their gaskets and that these are all in good condition.

- (d) Ensure that the sample handling line and probe are free from contaminants.

ANNEX "C"
FREE ACCELERATION TEST FOR IN-USE COMPRESSION-IGNITION MOTOR VEHICLES

1. Scope

The test is a smoke opacity measurement for in-use motor vehicles equipped with compression-ignition (diesel) engines, using the free acceleration from low idle speed method.

2. Motor Vehicle Test Condition

a. The test shall be carried out on a stationary vehicle and the engine shall be first brought to normal operating conditions during a road run or dynamic test. In particular, cooling water and oil should be at normal temperature.

b. The combustion chamber should not have been cooled or fouled due to a prolonged period of idling preceding the test.

c. The exhaust system shall not have any orifice or leaks wherein the gases emitted by the engine might be diluted.

3. Test Equipment

The light-absorption coefficient of the exhaust gases shall be measured with an opacimeter satisfying the conditions laid down in ECE Regulation No. 24, Revision 2E/ECE/TRANS 505, Rev Add 23 Rev 2, Annex 8: Characteristics of Opacimeter.

4. Test Procedures and Smoke Opacity Measurement

a. Follow the opacimeter manufacturer's instruction for on the proper installation, operation/use and checking the accuracy and calibration before and after each test.

b. Set the vehicle gear-change control in the neutral position and the hand-brake effectively engaged.

c. Start the engine and warm it up to its normal operating temperature.

d. Accelerate the engine two to three times (2-3) prior to smoke sampling in order to remove deposits of soot and other carbon particles in the tail pipe.

e. With the engine idling, depress the accelerator quickly, but not violently, to obtain maximum delivery from the injection pump. Maintain this position until maximum engine speed is reached for about two (2) to four (4) seconds and the governor comes into action. As soon as this speed is reached, release the accelerator until the engine resumes its idling speed. Record the maximum reading of the smokemeter.

f. The operation described in paragraph (4)(e) shall be repeated not less than six (6) times in order to clear the exhaust system and to allow for any necessary adjustment of the apparatus. The maximum opacity values read in each successive acceleration shall be noted until stabilized values are obtained. The values read shall be regarded as stabilized when four (4) consecutive readings are within a band width of 0.25 m^{-1} and do not form a decreasing sequence. The arithmetic mean of the four stabilized values shall be the test result for the concerned vehicle.

g. For motor vehicles designed with several exhaust outlets that are individually connected from paired exhaust ports, the free acceleration test shall be carried out on each outlet. In this case, the values used for calculating the correction to the absorption coefficient shall be arithmetical mean values recorded at each outlet and the test shall be valid only if the extreme values measured do not differ by more than 0.15 m^{-1} . For motor vehicles designed with several exhaust outlets connected from one exhaust pipe coming from the engine's exhaust manifold collector, the free acceleration test shall be carried out only on one exhaust outlet, the other outlets effectively blocked to prevent leaks.

h. Seal the full load screw of the injection pump/delivery system of the motor vehicle after a pass-test to prevent tampering.