

Partial Amendment of the Announcement that Prescribes Details of Safety Regulations for Road Vehicles

November 2007

Ministry Land, Infrastructure and Transport

1. Background of the Amendment

Acknowledging that air pollution by automotive exhaust emissions such as suspended particulate matter and nitrogen dioxide still lingers in the big city areas but intending to roughly achieve and maintain the Environmental Standard's air quality level in the fiscal year 2010 and onward, the Central Environment Council in April 2005 produced a recommendation report entitled "Future Policy for Motor vehicle Exhaust Emission Reduction (8th Recommendation)", underlining a need to further strengthen the exhaust emission standard.

In response to the recommendation, the Ministry Land, Infrastructure and Transport has decided to step up controls on nitrogen oxides ("NOx") and particulate matter ("PM") emitted by diesel vehicles and on PM emitted by a certain group of gasoline vehicles.

2. Summary of the Amendment

Note: "Light duty vehicles" hereafter mean trucks and buses not exceeding 1,700 kg in gross vehicle weight; "medium duty vehicles" denote those exceeding 1,700 kg but not 3,500 kg; "heavy duty vehicle" are trucks and buses exceeding 3,500 kg.

(1) Scheduled changes according to the Type of Automotive Fuel [2009 Regulation for Diesel Vehicles]

- * A 2009 diesel vehicle regulation will be introduced to lower the NOx and PM emission limits for new vehicles. (See ATTACHMENT 1.)
- * The required exhaust emission test methods will be JC08H mode + JC08C mode for passenger vehicles and light/medium duty vehicles; JE05 mode for heavy duty vehicles.
- * In the 2009 diesel vehicle regulation, the PM emission limit for in-use vehicles will be lowered from 0.8m-1 to 0.5m- 1. At the same time the diesel 4-mode black smoke regulation for new vehicles will be abolished.
- * The 2009 diesel vehicle regulation will be entered into force on 1 October 2009 for domestic vehicles (1 September 2010 for imported vehicles). However, the enforcement date will be 1 October 2010 for the domestic medium duty vehicles exceeding 1,700 kg but not 2,500 kg and for the domestic heavy duty vehicles exceeding 3,500 kg but not

12,000 kg (1 September 2011 for imported vehicles).

[2009 Regulation for Gasoline/LPG Vehicles]

- * The 2009 gasoline/LPG vehicles regulation will introduce a PM emission limit for new vehicles with direct-injection gasoline engines to which NOx absorber catalysts (hereafter referred to as "NOx catalyst DI gasoline vehicles"). (See ATTACHMENT 1.)
- * Among NOx catalyst DI gasoline vehicles, the required exhaust emission test methods are JC08H mode + JC08C mode for passenger vehicles and light/medium duty vehicles; JE05 mode for heavy duty vehicles.
- * This PM emission limit for NOx catalyst DI gasoline vehicles will become effective from 1 October 2009 for domestic vehicles (1 September 2010 for imported vehicles).

[Other Vehicles (Powered by Fuels other than Gasoline, LPG or Diesel)]

- * Exhaust emission limits for other vehicles, which have been set in relation to the limits for gasoline, LPG or diesel vehicles, will be amended concurrently with the introduction of the 2009 diesel vehicle regulation.
- * The required exhaust emission test methods are 10.15 mode + JC08C mode for passenger vehicles and light/medium duty vehicles until 31 March 2011 (until 28 February 2013 for imported vehicles); JC08H mode + JC08C mode thereafter. The required test method for heavy duty vehicles is the JE05 mode.
- * This regulation for other vehicles will be entered into force on 1 October 2009 for domestic vehicles (1 September 2010 for imported vehicles). However, the enforcement date will be 1 October 2010 for the domestic heavy duty vehicles exceeding 3,500 kg but not 12,000 kg (1 September 2011 for imported vehicles).

(2) Exhaust Emission Measurement Method

- * In keeping with the scheduled introduction of stricter PM emission limits, the PM emission measuring method will be replaced by a new method enabling more stable measurement of PM emission. Additionally, the measurement methods for CO and other exhaust gases will be technically modified.

2. Comparison Table for Gasoline/LPG Vehicles

	CO		NMHC		NOx		PM	
	Current	Amended	Current	Amended	Current	Amended	Current	Amended
Passenger vehicles	1.15 (1.92)	←	0.05 (0.08)	←	0.05 (0.08)	←	–	0.005 (0.007)
Light duty vehicles	1.15 (1.92)	←	0.05 (0.08)	←	0.05 (0.08)	←	–	0.005 (0.007)
Medium duty vehicles	2.55 (4.08)	←	0.05 (0.08)	←	0.07 (0.10)	←	–	0.007 (0.009)
Heavy duty vehicles	16.0 (21.3)	←	0.23 (0.31)	←	0.7 (0.9)	←	–	0.010 (0.013)

PM for gasoline vehicles are applied only to direct injection vehicles fitted with NOx absorber catalyst.

Note:

- 1) "Light duty vehicles" are trucks and buses GVW not exceeding 1,700 kg ; "medium duty vehicles" are trucks and buses GVW exceeding 1,700 kg but not exceeding 3,500 kg; "heavy duty vehicles" are trucks and buses GVW exceeding 3,500 kg.
- 2) The numerals without parentheses in the table indicate average values; the parenthesized numerals indicate upper limit values.
- 3) The unit of values is in g/km for passenger vehicles and light/medium duty vehicles; in g/kWh for heavy duty vehicles.
- 4) With regard to the CO emission limit value for light duty vehicles, the limit value for Mini-sized trucks is 4.02(6.67).

3. Comparison Table for Other Vehicles

	CO		NMHC		NOx		PM	
	Current	Amended	Current	Amended	Current	Amended	Current	Amended
Passenger vehicles	1.15 (1.92)	←	0.05 (0.08)	←	0.14 ^{*A}	0.08	0.013 ^{*A}	0.005
					(0.19)	(0.11)	(0.017)	(0.007)
					0.15 ^{*B}	0.08	0.014 ^{*B}	0.005
Light duty vehicles	1.15 (1.92)	←	0.05 (0.08)	←	0.14	0.08	0.013	0.005
					(0.19)	(0.11)	(0.017)	(0.007)
Medium duty vehicles	2.55 (4.08)	←	0.05 (0.08)	←	0.25 (0.33)	0.15 (0.20)	0.015 (0.020)	0.007 (0.009)
Heavy duty vehicles	16.0 (21.3)	←	0.23 (0.31)	←	2.0 (2.7)	0.7 (0.9)	0.027 (0.036)	0.010 (0.013)

Note:

- 1) "Light duty vehicles" are trucks and buses GVW not exceeding 1,700 kg ; "medium duty vehicles" are GVW exceeding 1,700 kg but not exceeding 3,500 kg; "heavy duty vehicles" are trucks and buses GVW exceeding 3,500 kg.
- 2) The numerals without parentheses in the table indicate average values; the parenthesized numerals indicate upper limit values.
- 3) The unit of values is in g/km for passenger vehicles and light/medium duty vehicles; in g/kWh for heavy duty vehicles.
- 4) "*A" indicates that the limit is applicable to vehicles not exceeding 1,265 kg in vehicle weight.
- 5) "*B" indicates that the limit is applicable to vehicles exceeding 1,265 kg in vehicle weight.
- 6) As an exception to the CO emission limit value for light duty vehicles, the limit for Mini-sized trucks is 4.02(6.67).

Amendment of the Exhaust Emission Measurement Methods

The exhaust emission measurement method for light/medium duty vehicles and that for heavy duty vehicles will be amended as follows.

1. Measurement Method and Calculation of PM Emission

- * In addition to the single-stage dilution tunnel method, the double-stage dilution tunnel method will be specified for light/medium duty vehicles.
- * The temperature and humidity conditions for the measurement room will be changed as below.
(Temperature: $298 \pm 5\text{K} \rightarrow 295 \pm 3\text{K}$, Humidity: 30 to 70% $\rightarrow 45 \pm 8\%$)
- * It will be allowed to attach to the dilution air entrance of the main dilution tunnel an anti-dust filter and/or the charcoal filter each having a filtering capability comparable with or greater than the HEPA filter.
- * The gas and air temperatures required for the main dilution tunnel will be changed as below for light/medium duty vehicles.
(Diluted exhaust emission temperature: not higher than 325K \rightarrow not higher than 464K for light/medium duty vehicles, Dilution air temperature: $298 \pm 5\text{K} \rightarrow$ not lower than 288K)
- * The minimum duration of pre-trap soak time for the PM trapping filter will be changed as below.
(At least 8 hours \rightarrow at least 24 hours)
- * It will become necessary to equip the weighing balance with an electrostatic elimination device.
- * It will also become necessary to insulate or heat the measuring equipment or other related equipment to regulate the temperature of diluted exhaust emissions immediately before reaching the PM trapping filter within the range of $320 \pm 5\text{K}$.
- * Replacement period of reference filters is provided.
- * To calculate the amount of PM emission, the filter's weight will be corrected by buoyancy factor.

<PM calculation equations>

The mass of PM and PMb will be derived by the following equations:

$$W_p = W_{pa} - W_{pb}$$

W_p : buoyancy-corrected mass of the PM trapped from diluted exhaust emissions
 μg

W_{pb} : buoyancy-corrected weight of the filter as measured shortly after pre-trap

soaking μg

W_{pa}: buoyancy-corrected weight of the filter as measured shortly after post-trap soaking μg

$$W_{\text{corr}} = W_{\text{uncorr}} \left(\frac{1 - \frac{\rho_{\text{air}}}{\rho_{\text{wei}}}}{1 - \frac{\rho_{\text{air}}}{\rho_{\text{med}}}} \right)$$

W_{corr} : buoyancy-corrected weight of the filter for trapping PM or PMb μg

W_{uncorr} : weight of the filter for trapping PM or PMb before correction by buoyancy μg

ρ_{air} : air density in the weighing room g/l

ρ_{wei} : density of calibration weights for the balance g/l

ρ_{med} : density of the trapping filter g/l

$$\rho_{\text{air}} = \frac{P_{\text{abs}} \times M_{\text{mix}}}{R \times T_{\text{amb}}}$$

P_{abs} : absolute pressure in the weighing room kPa

M_{mix} : molar mass of air in the weighing room in standard humidity condition (saturation humidity at a temperature of 282.65K)

R : molecular gas constant

T_{amb} : absolute temperature in the weighing room K

* Performance requirements for subsonic Venturi flowmeters will be established, and their use will be allowed.

* In the case of double-stage dilution, a trapping filter made of fluorine carbide coated glass fibers will be used; when tunnel blank correction is not conducted, an HEPA filter and an active carbon filter will be attached to the anti-dust filter at the secondary air dilution entrance.

2. Measurement Method of CO and Other Exhaust Emissions

* To enable the use of subsonic Venturi (SSV type) CVS equipment, its precision and calibration requirements will be established in accordance with the WHDC Global Technical Regulation.