

Exhaust

11-1 Exhaust system and silencer

11-2 Exhaust emissions

11-3 Metered emissions test specifications

Summary of legislation

Applicable legislation

- Land Transport Rule: Vehicle Equipment 2004

Mandatory equipment

1. A vehicle must comply with the requirements relating to mandatory equipment set out in the relevant section of the *VIRM: In-service certification*, section 11-1.

Compliance with approved standards

2. A class LC, LD, LE, MA, MB, MC, MD1, MD2, MD3, MD4, ME, NA, NB or NC vehicle manufactured on or after 1 January 1985 and certified for entry on or after 1 June 2008 must comply with:
 - a) an approved standard and not exceed the relevant noise limit, as specified in **Table 11-1-2**, or
 - b) the LVVTA objective noise test.

Condition and performance

3. The exhaust system and silencer must comply with the requirements relating to condition and performance set out in the relevant section of the *VIRM: In-service certification*, section 11-1.

Modification

4. A vehicle must comply with the requirements relating to modifications set out in the relevant section of the *VIRM: In-service certification*, section 11-1.

Reasons for rejection

Mandatory equipment

1. A vehicle does not comply with the requirements relating to mandatory equipment set out in the relevant section of the *VIRM: In-service certification*, section 11-1.

Compliance with approved standards

2. A class LC, LD, LE, MA, MB, MC, MD1, MD2, MD3, MD4, ME, NA, NB or NC vehicle, other than one listed in **Table 11-1-1**, manufactured on or after 1 January 1985 and certified for entry on or after 1 June 2008:
 - a) did not comply, or cannot be demonstrated to have complied, with at least one of the approved standards listed in **Table 11-1-2** at the time the vehicle was manufactured, or
 - b) exceeded the noise limits in **Table 11-1-2** when it was tested in accordance with the standards in **Table 11-1-2** at the time the vehicle was manufactured, or
 - c) does not have evidence that the vehicle has passed an LVVTA objective noise test, for instance:
 - i. the owner cannot produce a valid 'Objective exhaust noise emission test certificate' (**Figure 11-1-1**), or
 - ii. the exhaust system tailpipe is not fitted with a valid LVVTA noise test label (**Figure 11-1-2**).

Condition and performance

3. A vehicle does not comply with the requirements relating to condition and performance set out in the relevant section of the *VIRM: In-service certification*, section 11-1.


Exhaust 11-1 Exhaust system and silencer (cont.)

Table 11-1-1. Vehicles deemed to comply with approved noise standards and drive-by noise limits

Evidence of compliance with an approved noise standard and noise limit is not required for the following vehicles:
<ul style="list-style-type: none"> any vehicle that may be entry certified because it already meets all other approved vehicle standards applicable to the vehicle any vehicle manufactured for a market that requires compliance with FMVSS, ECE, EEC, ADR or Japanese standards

Table 11-1-2. List of approved noise standards and drive-by noise limits

A vehicle manufactured on or after 1985 for which evidence of compliance with an approved standard and noise level is required must comply with the following:		
Approved noise standard	Vehicle class	Maximum noise level (dBA)
ISO 362	LC, LD, LE (engine capacity of 125 cc or less)	82
BS 3425	LC, LD, LE (engine capacity more than 125 cc)	86
SAE J1470	MA, MB, MC, MD1, MD2, NA	81
ADR 28/01	MD3, MD4, ME, NB, NC (power output 150 kW or less)	86
TRIAS 20	MD3, MD4, ME, NB, NC (power output more than 150 kW)	88

LOW VOLUME VEHICLE TECHNICAL ASSOCIATION Inc 

Objective Exhaust Noise Emission Test Certificate

Vehicle and owner details: *(white copy for vehicle owner)*

Owner: (Name) (Contact Ph #) ()

Vehicle: (Make) (Model) (Sub-model)

(Year) (Colour) (VIN)

Engine: (Make) (Code if known) (Modified?)

(Cylinder configuration & #) (Came shaft & valve arrangement)

Exhaust system description & details:

(a) Exhaust manifold(s): (make/type)

(b) Front pipe(s): (OD/material/length)

(c) Muffler(s)/resonator(s) #1: (make/material/length/OD)

(d) Intermediate pipe(s): (OD/material/length)

(e) Muffler(s)/resonator(s) #2: (make/material/length/OD)

(f) Tail pipe(s): (OD/material/length)

(g) Other exhaust system details: (catalytic converter(s)/balance pipe/additional mufflers/other)

Low Volume Vehicle Certifier's declaration:

LVV Certifier: (Name) (ID) (Contact Ph #) ()

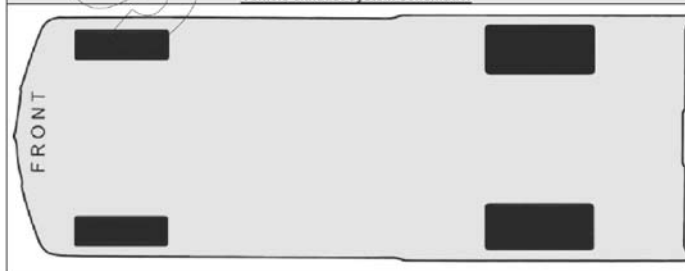
PASS: Approval label: (number) (Location of label)

I, the above-named Low Volume Vehicle Certifier appointed by the Low Volume Vehicle Technical Association (Inc) for the purpose of Objective Exhaust Noise Emission Testing, declare that I carried out an objective exhaust noise emission test on the above-described vehicle in accordance with the procedures specified by Low Volume Vehicle Standard 90-20, and confirm that at the time of testing the vehicle complied with all requirements of, and emitted exhaust noise emissions not exceeding that specified by, Low Volume Vehicle Standard 90-20. (Signed) (Date)

LVV certifier's authentication (only if pass is recorded):
[Authenticity sticker with hologram security feature]

FAIL: Recommendations to vehicle owner on bringing the exhaust system into compliance (expert advice is offered without any guarantees of a pass as a result of the advice given or implied).

Vehicle exhaust system schematic:



FRONT

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Figure 11-1-1. Objective exhaust noise emission test certificate



Figure 11-1-2. Objective noise test label

Summary of legislation

Applicable legislation

- Land Transport Rule: Vehicle Exhaust Emissions 2007

Compliance with approved standards

- A used vehicle of class MA, MB, MC, MD1, MD2, MD3, MD4, ME, NA, NB or NC, manufactured on or after 1 January 1990 and:
 - certified for entry into New Zealand before 3 January 2008 must comply with one or more of the approved exhaust emission standards in **Table 11-2-1**
 - powered by petrol, CNG or LPG and border checked for entry into New Zealand on or after 3 January 2008 must comply with one or more of the approved exhaust emission standards in **Table 11-2-2 (Note 1)**
 - powered by diesel and border checked for entry into New Zealand on or after 3 January 2008 must comply with one or more of the approved exhaust emission standards in **Table 11-2-3 (Note 1)**.
- New petrol, CNG or LPG powered vehicles of class MA, MB, MC, MD1, MD2, MD3, MD4, ME, NA, NB or NC, manufactured on or after 1 January 1990 must comply with one or more of the approved exhaust emission standards in **Table 11-2-4**.
- New diesel-powered vehicles of class MA, MB, MC, MD1, MD2, MD3, MD4, ME, NA, NB or NC, manufactured on or after 1 January 1990 must comply with one or more of the approved exhaust emission standards in **Table 11-2-5**.

Performance

- Class MA, MB, MC, MD1, MD2, MD3, MD4, ME, NA, NB or NC vehicles manufactured on or after 1 January 1990 and first certified for entry into New Zealand on or after 1 May 2008 must pass a prescribed metered test (see section 11-3, Metered test specifications).
- The exhaust system must comply with requirements relating to performance set out in the *VIRM: In-service certification*, section 11-2.

Reasons for rejection

Compliance with approved standards

- A vehicle that is required to comply with an approved exhaust emission standard did not comply or cannot be demonstrated to have complied with at least one of the standards listed in **Tables 11-2-1 to 11-2-5** at the time the vehicle was manufactured.

Performance and modification

- A class MA, MB, MC, MD1, MD2, MD3, MD4, ME, NA, NB or NC vehicle does not pass the prescribed metered emissions test (see section 11-3, Metered emissions test specifications).
- The exhaust system does not comply with requirements relating to performance set out in the *VIRM: In-service certification*, section 11-2.

Note 1 A transitional provision of the Rule allows vehicles border checked for entry into New Zealand before 1 February 2008 to meet earlier requirements, as set out in **Table 11-2-1**.

Note 2 Technical bulletin 25 describes methods of proving compliance with approved emissions standards, and explains how to record the information in LANDATA.

Note 3 The Land Transport Rule: Vehicle Exhaust Emissions does not apply to ancillary engines that do not power the vehicle's wheels.

Note 4 The following vehicles are not required to meet an emissions standard:

- Tractors
- Class MA or MC motorsport vehicle
- Class MA, MB or MC immigrants' vehicles
- Class MA or MC special interest vehicles
- Mobile cranes
- Low volume production vehicles that comply with the emissions requirements of the *Low Volume Vehicle Code*.

Table 11-2-1. Approved exhaust emission standards for used vehicles certified for use on New Zealand roads before 3 January 2008

Petrol-powered vehicles				
UN-ECE Regulation No.	EEC/EC Directive	ADR	Japan	Others
15 83	70/220	36 37 79/00 80/00	Japan Safety Regulations for Road Vehicles, Article 31	Federal Regulation 40 CFR Part 86 Title 13 of the California Code of Regulations Mean Value Standards for Motor Vehicle Exhaust Emissions, No. 129
Diesel-powered vehicles				
UN-ECE Regulation No.	EEC/EC Directive	ADR	Others	
24 and one of: 15 83 49	72/306 and one of: 70/220 88/77	ADR 30 and one of: 70/00 79/00 80/00	Federal Regulation 40 CFR Part 86 Title 13 of the California Code of Regulations The Mean Value Standards for Motor Vehicle Exhaust Emissions, No. 129 Japan Safety Regulations for Road Vehicles, Article 31	
Low volume vehicles				
As defined in the <i>Low Volume Vehicle Code</i>				

Table 11-2-2. Approved exhaust emission standards for used petrol-, CNG- and LPG-powered vehicles certified for use on New Zealand roads on or after 3 January 2008

Certified for entry into service	Approved vehicle emissions standards	
	Light vehicles	Heavy vehicles
On or after 3 January 2008 and before 1 January 2009 (Note 1)	ADR 79/00, or Euro 2, or Japan 98, (Note 2) or US 2001	ADR 80/02, or Japan 00/02, or US 98P
On or after 1 January 2009 and before 1 January 2012 (Note 1)	ADR 79/01, or Euro 3, or Japan 00/02, or US 2001	ADR 80/02, or Japan 00/02, or US 98P
On or after 1 January 2012 and before 1 January 2013 (Note 1)	ADR 79/02, or Euro 4, or Japan 05, or US 2004	ADR 80/02, or Euro 4, or Japan 05, or US 2004

Note 1 A transitional provision of Land Transport Rule: Vehicle Exhaust Emissions allows vehicles border checked for entry into New Zealand before 1 February 2008 to meet earlier requirements (as set out in **Table 11-2-1**).

Note 2 Under a transitional provision of Land Transport Rule: Vehicle Exhaust Emissions, a vehicle that complied with the Japan 98 Idling Standard when it was manufactured or modified and has a Japanese emissions code of GF, HK, GG, or HL is deemed to have complied with Japan 98.



Table 11-2-3. Approved exhaust emission standards for used diesel-powered vehicles certified for use on New Zealand roads on or after 3 January 2008

Certified for entry into service	Approved vehicle emissions standards	
	Light vehicles	Heavy vehicles
On or after 3 January 2008 and before 1 January 2009 (Note 1)	ADR 30/01 and ADR 79/01, or Euro 4, or Japan 02/04, or US 2004	ADR 30/01 and ADR 80/00, or Euro 3, or Japan 02/04, or US 2004
On or after 1 January 2009 and before 1 January 2010 (Note 1)	ADR 30/01 and ADR 79/01, or Euro 4, or Japan 02/04, or US 2004	ADR 30/01 and ADR 80/02, or Euro 4, Japan 02/04, or US 2004
On or after 1 January 2010 and before 1 January 2013 (Note 1)	ADR 30/01 and ADR 79/01, or Euro 4, or Japan 05, or US 2004	ADR 30/01 and ADR 80/02, or Euro 4, or Japan 05, or US 2004

Note 1 A transitional provision of Land Transport Rule: Vehicle Exhaust Emissions allows vehicles border checked for entry into New Zealand before 1 February 2008 to meet earlier requirements (as set out in **Table 11-2-1**).

Table 11-2-4. Approved exhaust emission standards for new petrol-, CNG- and LPG-powered vehicles

Date of manufacture	Approved vehicle emissions standard			
	Light		Heavy	
	New model	Existing model	New model	Existing model
Before 3 January 2008	ADR 79/01, or Euro 3, or Japan 00/02, or US 2001	ADR 79/01, or Euro 3, or Japan 00/02, or US 2001	ADR 80/01, or Japan 00/02, or US 98P	ADR 80/01, or Japan 00/02, or US 98P
On or after 3 January 2008 and before 1 January 2009	Before 1 July 2008 ADR 79/01, On or after 1 July 2008 ADR 79/02, or Euro 4, or Japan 05, or US 2004	ADR 79/01, or Euro 3, or Japan 00/02, or US 2001	ADR 80/02, or Euro 4, or Japan 05, or US 2004	ADR 80/02, Euro 4, or Japan 00/02, or US 98P
On or after 1 January 2009 and before 1 January 2010	ADR 79/02, or Euro 4, or Japan 05, or US 2004	ADR 79/01, or Euro 4, or Japan 05, or US 2004	ADR 80/02, or Euro 4, or Japan 05, or US 2004	ADR 80/02, or Euro 4, or Japan 05, or US 2004
On or after 1 January 2010 and before 1 January 2011	ADR 79/02, or Euro 4, or Japan 05, or US 2004	Before 1 July 2010 ADR 79/01, On or after 1 July 2010 ADR79/02, or Euro 4, or Japan 05, or US 2004	ADR 80/03, or Euro 4, or Japan 05, or US 2004	ADR 80/02, or Euro 4, or Japan 05, or US 2004

Table 11-2-5. Approved exhaust emission standards for new diesel-powered vehicles

Date of manufacture	Approved vehicle emissions standard			
	Light		Heavy	
	New model	Existing model	New model	Existing model
Before 3 January 2008	ADR 79/01 and ADR 30/01, or Euro 4, or Japan 02/04, or US 2004	ADR 79/01 and ADR 30/01, or Euro 4, or Japan 02/04, or US 2004	ADR 80/00 and ADR 30/01, or Euro 3, or Japan 02/04, or US 2004	ADR 80/00 and ADR 30/01, or Euro 3, or Japan 02/04, or US 98D
On or after 3 January 2008 and before 1 January 2009	ADR 79/01 and ADR 30/01, or Euro 4, or Japan 05, or US 2004	ADR 79/01 and ADR 30/01, or Euro 4, or Japan 02/04, or US 2004	ADR 80/02 and ADR 30/01, or Euro 4, or Japan 05, or US 2004	ADR 80/00 and ADR 30/01, or Euro 3, or Japan 02/04, or US 2004
On or after 1 January 2009 and before 1 January 2010	ADR 79/01 and ADR 30/01, or Euro 4, or Japan 05, or US 2004	ADR 79/01 and ADR 30/01, or Euro 4, or Japan 05, or US 2004	ADR 80/02 and ADR 30/01, or Euro 4, or Japan 05, or US 2007	ADR 80/02 and ADR 30/01, or Euro 4, or Japan 02/04, or US 2004
On or after 1 January 2010 and before 1 January 2011	ADR 79/01 and ADR 30/01, or Euro 4, or Japan 05, or US 2004	ADR 79/01 and ADR 30/01, or Euro 4, or Japan 05, or US 2004	ADR 80/03 and ADR 30/01, or Euro 4, or Japan 05, or US 2007	ADR 80/02 and ADR 30/01, or Euro 4, or Japan 05, or US 2004

Notes to Table 11-2-4 and Table 11-2-5

1. New-model vehicle means a new motor vehicle that has a date of manufacture occurring in the same calendar year as that in which the particular model of the vehicle was first manufactured.
2. Existing-model vehicle means a new vehicle that is not a new-model vehicle.
3. To help confirm emissions standards compliance, see Technical bulletin 25 – Exhaust emissions standards compliance.
4. To help confirm emissions standards compliance for new heavy vehicles imported by the manufacturer's New Zealand representative, refer to Reference material 43.

Applicable legislation

Land Transport Rule: Vehicle Exhaust Emissions 2007, section 3.

Application

Group M or N vehicles manufactured on or after 1 January 1990 and certified for entry on or after 1 May 2008 must pass a prescribed metered exhaust emissions test, according to the following procedures and requirements.

Note 1 This requirement does not apply to tractors, class MA or MC motorsport vehicles, or a vehicle certified to the low-volume vehicle standard exhaust gas emissions 90-10(00).

Note 2 This requirement does not apply to vehicles being re-registered or new vehicles.

Procedure for measuring exhaust emissions of petrol, LPG or CNG vehicles

1. The test equipment must be warmed up and calibrated before use, in accordance with the equipment manufacturer's instructions.
2. Ensure the vehicle has reached normal operating temperature, as recommended by the vehicle manufacturer.
3. Insert the sampling probe (ie the exhaust gas sampling part of the measuring equipment) far enough into the exhaust pipe to prevent the admission of open air. This is to ensure that only exhaust gas is sampled.
4. For the duration of the test:
 - a) the vehicle's engine must be idling, and
 - b) the accelerator pedal must be released, and
 - c) the handbrake must be applied, and
 - d) the vehicle's transmission must be
 - i. in neutral, or
 - ii. if the vehicle is an automatic, in park.

Pass requirements

A petrol, LPG or CNG vehicle must not exceed the applicable maximum carbon monoxide and hydrocarbon emissions limits set out in **Table 11-3-1**.

Vehicle	Carbon monoxide	Hydrocarbons (parts per million)
A motor vehicle powered by a four-stroke or rotary engine	1%	300
A motor vehicle powered by a two-stroke engine	4.5%	7800

Re-testing

If a vehicle fails the test, it may be necessary to ensure the vehicle has reached normal operating temperature, as recommended by the manufacturer.

Procedure for measuring exhaust emissions of diesel vehicles (using an opacimeter)

Pre-testing

1. The vehicle must be brought to the normal operating temperature as recommended by the manufacturer.
2. The equipment must be readied before use, in accordance with the equipment manufacturer's instructions.

During testing

For the duration of the test:

- a) the vehicle must be stationary, and
- b) the handbrake must be applied, and
- c) the vehicle's transmission must be:
 - i. in neutral, or
 - ii. if the vehicle is an automatic, in park.

Operation of the vehicle while testing

During the test procedure, the vehicle operation cycle must follow these phases (refer to **Figure 11-3-1**):

1. Purge
 - a) Residual smoke must be purged from the vehicle's exhaust system before the vehicle's diesel smoke is sampled.
2. Inserting probe
 - a) The probe (the exhaust gas sampling part of the measuring equipment) must be inserted sufficiently into the exhaust pipe to prevent outside air from entering the probe and ensure that only exhaust gas is sampled.
3. Idling before testing
 - a) The engine must be run at idle for five or six seconds before the first test cycle.
4. Test cycle
 - a) The accelerator pedal must be fully and rapidly depressed, held in this state for two seconds, then released for three seconds (refer to **Figure 11-3-2**).
 - b) Despite the above, if the opacimeter has a function allowing the measurement of the engine revolutions per minute (RPM), the accelerator pedal should only be depressed until the highest engine RPM is indicated by the opacimeter (rather than for the fixed period of two seconds).
 - c) The exhaust emissions must be sampled throughout this (five-second) period.
5. Idling between test cycles
 - a) The engine must be run at idle for 4-10 seconds between each test cycle that is performed.

Measured values

1. One, two or three test cycles must be performed as necessary.
 - a) If the result of measurement 1 is:
 - i. less than or equal to an optical absorption coefficient (OAC) of 0.64m^{-1} , the vehicle passes the test,
 - ii. more than an OAC of 0.64m^{-1} , the test cycle must be repeated.
 - b) If the result of measurement 2 is:
 - i. less than or equal to an OAC of 0.64m^{-1} , the vehicle passes the test,
 - ii. more than 0.64m^{-1} , the test cycle must be repeated.
 - c) If the average of the three measurements is:
 - i. less than or equal to an OAC of 0.80m^{-1} , the vehicle passes the test,
 - ii. more than an OAC of 0.80m^{-1} , the vehicle fails the test.
2. To avoid doubt, if the vehicle does not meet the prescribed standard after three test cycles, the vehicle fails the test.

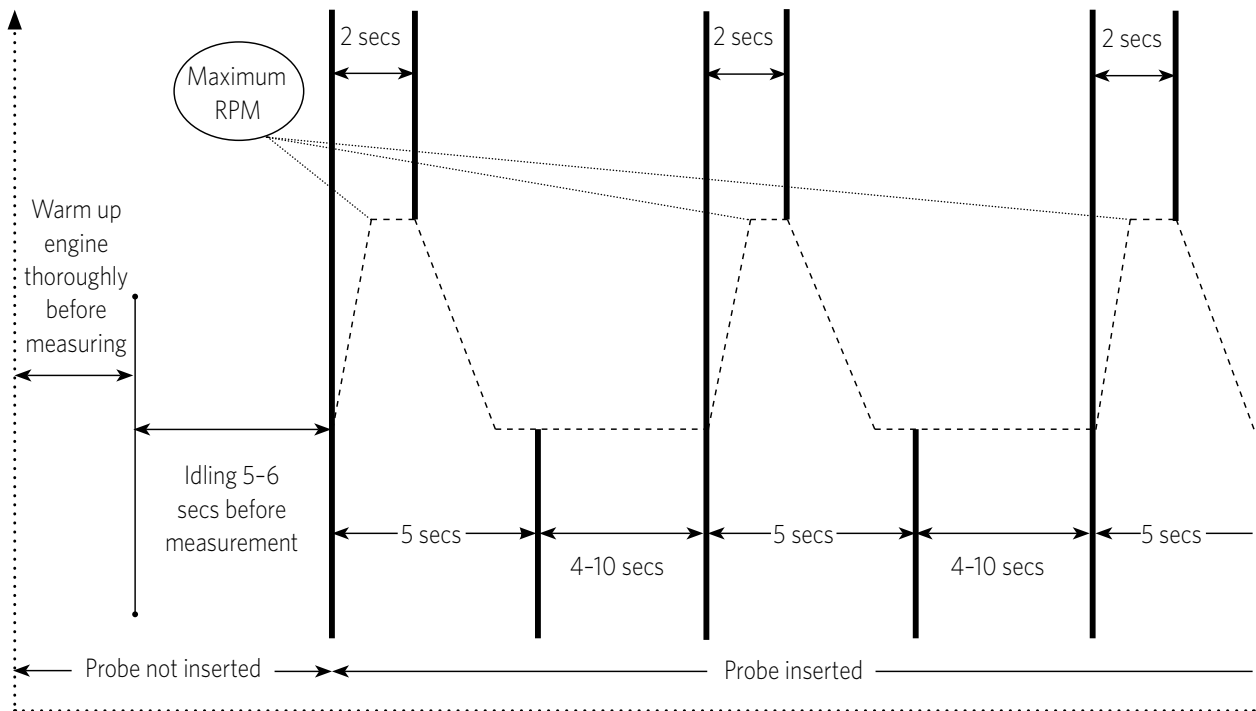


Figure 11-3-1. Diesel exhaust emission test vehicle operation cycle using an opacimeter

Procedure for measuring exhaust emissions of diesel vehicles (using filter paper test equipment)

Pre-testing

1. The test equipment must be warmed up and calibrated before use, in accordance with the equipment manufacturer's instructions.
2. Insert the sampling probe (ie the exhaust gas sampling part of the measuring equipment) far enough into the exhaust pipe to prevent the admission of open air. This is to ensure that only exhaust gas is sampled.

Operation of the vehicle during testing

For the duration of the test:

- a) the vehicle must be stationary, and
- b) the handbrake must be applied, and
- c) the vehicle's transmission must be:
 - i. in neutral, or
 - ii. if the vehicle is an automatic, in park.

During the test procedure, the vehicle operation cycle must follow these phases (refer to **Figure 11-3-2** over the page):

1. Racing purge
 - a) When the engine is idling, rapidly depress the accelerator to the full governed RPM.
 - b) Immediately after the engine reaches its maximum governed RPM, release the accelerator to return the engine to idling.
 - c) Repeat this two more times.
2. Idling phase
 - a) Run the engine at idle for five or six seconds.
3. Measuring phase
 - a) Fully depress the accelerator and hold for two seconds.
 - b) Release the accelerator for 13 seconds and sample the diesel smoke during this period.
 - c) Repeat this two more times.

Diesel sampling requirements

1. A sample of 0.33 litres must be absorbed through a filter paper by means of a pump-type exhaust smoke sampling device.
2. Class 5A filter paper (or equivalent) must be used.
3. The extent the filter paper is polluted by the smoke contained in the vehicle's exhaust emissions must be measured by a prescribed exhaust smoke analyser measurement device.
4. The final result must be calculated as an average of the three measured values obtained during the test procedure.

Pass requirements

A diesel vehicle must not exceed 25% opacity.

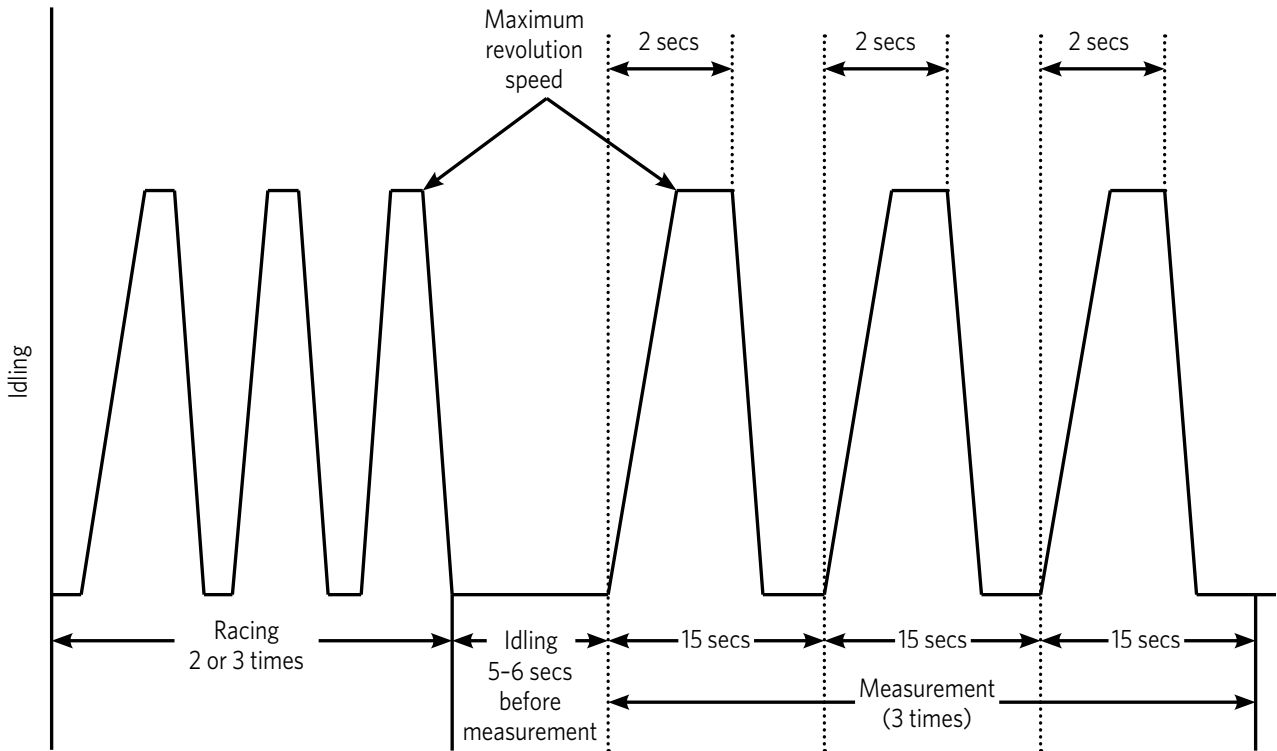


Figure 11-3-2 Diesel exhaust emission test vehicle operation cycle

