COMMONWEALTH OF AUSTRALIA

AUSTRALIAN DESIGN RULE 26
FOR
VEHICLE ENGINE EMISSION CONTROL

As Endorsed by the
Australian Transport Advisory Council

The intention of this Australian Design Rule is to define the limits of engine emissions of carbon monoxide from motor vehicles at engine idle in order to reduce air pollution.

The Australian Transport Advisory Council has recommended to Commonwealth, State and Territory Governments that all motor vehicles specified below shall comply with Australian Design Rule 26 - Vehicle Engine Emission Control.

VEHICLE CATEGORY	RULE	AMENDMENT	
	MANUFACTURED ON OR AFTER		
	26		
Passenger Cars			
Forward Control Passenger Vehicles up to 8 seats	N/A		
9 seats	N/A		
Other Passenger Cars	1 Jan 1972		
Passenger Car Derivatives	N/A		
Multi-Purpose Passenger Cars	N/A		
Omnibuses up to 3.5 tonnes GVM			
up to 12 seats	N/A		
over 12 seats	N/A		
up to 4.5 tonnes GVM	N/A		
over 4.5 tonnes GVM	N/A		
Motorcycles	N/A		
Mopeds	N/A		
Specially Constructed Vehicles	N/A		
Other Vehicles not listed above			
up to 4.5 tonnes GVM	N/A		
over 4.5 tonnes GVM	N/A		

N/A - Not Applicable
GROSS VEHICLE MASS - Abbreviated to 'GVM'

The Australian Transport Advisory Council has also recommended to Commonwealth, State and Territory Governments that motor vehicles which comply with the requirements of ADR 27A, 27B, or 27C - Vehicle Emission Control shall be deemed to comply with the requirements of ADR 26.

The Australian Transport Advisory Council has also recommended to Commonwealth, State and Territory Governments that motor vehicles manufactured after 1 July 1985 which comply with the requirements of ADR 37 shall be deemed to comply with the requirements of ADR 26.

The Australian Transport Advisory Council has also recomended to Commonwealth, State and Territory Governments that the option available in ADR 26 - Vehicle Engine Emission Control, for motor vehicles which use unleaded petrol exclusively, shall only apply to motor vehicles manufactured on or after 1 July 1985.

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AUSTRALIAN DESIGN RULE NO. 26 - VEHICLE ENGINE EMISSION CONTROL

26.1 IMPLEMENTATION

26.1.1 Implementation of this Rule shall be by vehicle type approval in accordance with the specifications contained in this Rule.

26.1.2 Each basic engine shall require certification.

26.2 DEFINITIONS

26.2.1 'Vehicle Type' - means a category of power-driven vehicles which do not differ in respect to the engine characteristics as defined under Clause 26.8 and which carry the manufacturer's same model identification.

26.2.2 'Approval of a vehicle' - means the approval of a vehicle type with regard to the limitation of the emission of carbon monoxide from the engine at idle.

26.2.3 'Vehicle type approval' - means that a vehicle representative of the type to be approved shall be subject to the tests. The specifications of this vehicle and engine and results of the tests shall form the basis of the certification.

26.2.4 'Basic Engine' - means each engine unique in respect to the specification items under Clause 26.8.

26.2.5 'Unleaded Petrol' - means petrol (or motor spirit) containing not more than 0.013 gram of lead per litre, and not more than 0.0013 gram of phosphorus per litre.

26.2.6 'Unleaded Petrol-engined Vehicle' - means a vehicle coming within the definition of this Rule and which has been designed, constructed and is recommended by the vehicle manufacturer to be operated using unleaded petrol exclusively.

26.2.7 'Other vehicle' - means a vehicle coming within the definition * of this Rule other than an unleaded petrol-engined vehicle (refer Definitions Clause 26.2.6).

26.2.8 'Leaded Petrol' - means petrol (or motor spirit) which is produced with the use of any lead additive or which contains more than 0.013 gram of lead per litre or more than 0.0013 gram of phosphorus per litre.

26.2.9 'Lead Additive' - means any substance containing lead or lead compounds.

* Amended July 1983

26.3 REQUIREMENTS

26.3.1 Requirement for carbon monoxide emission test at idle speed. *

26.3.1.1 This test shall be carried out on vehicles referred to in Clause 26.1. The carbon monoxide content by volume of the exhaust gases emitted with the engine idling must not exceed 4.5 percent.

26.3.1.2 Conformity with the last preceding requirement shall be checked by a test carried out by the procedure described in this Rule.

26.3.2 Requirements for fuel label

Every unleaded petrol-engined vehicle (refer Definitions Clause 26.2.6) shall have the words "UNLEADED PETROL ONLY" or "UNLEADED FUEL ONLY" on a durable label or by other durable means permanently affixed to the area immediately adjacent to the petrol filler inlet(s), on the door to the filler inlet compartment, or within 150 mm of the door to the filler inlet compartment, or on or within 150 mm of the filler inlet cap, readily visible to any person intending to refuel the vehicle. The lettering shall be legible and in capital letters no smaller than 6.0 mm high.

Alternative wording or location may be used, if approved.

26.3.3 Requirements for petrol filler inlet (Refer Appendix I) *

The following requirements shall apply to every unleaded petrol-engined vehicle:

(a) Unleaded petrol-engined vehicles (refer Definitions Clause 26.2.6) shall be equipped with a petrol tank filler inlet assembly which prevents the insertion of a nozzle having a spout with an external diameter of 23.6 mm or greater (leaded petrol nozzle) and allows the insertion of a nozzle having a spout with an external diameter of 21.34 mm or less (unleaded petrol nozzle).

For details of nozzles, refer Appendix I.

(b) The design and construction of the filler inlet assembly shall be such that it is not possible for it to be readily altered to allow the insertion of a leaded petrol nozzle having a spout with an external diameter of 23.6 mm or greater, without causing such damage as would require its replacement or major repair to enable it to be restored to the design condition.

* Amended July 1983

(c) The filler inlet assembly shall be designed to pass not more than 700 ml of petrol into the tank when the introduction of petrol into such filler inlet assembly is attempted from a leaded petrol nozzle complying with the characteristics specified in Appendix I.

(d) A test shall be conducted to establish compliance with Clause 26.3.3(c) using a test fixture which positions the filler inlet assembly in the same position as it is installed in the vehicle. For the purpose of this test, * an attempted introduction shall be conducted by inserting a leaded petrol nozzle such that its automatic shutoff vacuum port is at various depths within the filler inlet, except those locations which cause spillage (not including splash back) outside the filler inlet assembly shall not be used. The nozzle may have any orientation within the filler inlet assembly which may reasonably be expected to be encountered in use. The nozzle valve shall be fully and rapidly opened to a 30 ± 4 litres/minute flow setting.

26.4 TEST PROCEDURE

26.4.1 Starting in an ambient temperature of 20°C to 30°C, the vehicle shall be started from cold and warmed by idling at 2 to 2.5 times the specified idle speed for not less than 15 minutes and not more than 30 minutes. The bonnet shall be raised for the duration of the test.

26.4.2 After returning the engine speed to specified idle speed the proportion of carbon monoxide shall be measured by an analyser collecting from a sampling probe placed in the exhaust pipe. This measurement shall be made between one and two minutes of returning the engine to the specified idle speed.

26.4.3 During the test, for manual transmission cars, the gear lever shall be placed in the neutral position and the clutch engaged; for automatic transmission cars the gear level shall be placed in the neutral or drive position as required by the manufacturer's idle setting procedure.

* Amended July 1983

26.5 TEST EQUIPMENT

26.5.1 Analytical equipment shall be of the non-dispersive type with absorption in the infra-red.

26.5.2 If the vehicle being tested is equipped with an exhaust pipe comprising several branches the branches shall be connected as near as possible to the vehicle and the probe inserted in the single outlet.

26.5.3 Accuracy of instruments

Temperatures considered in previous Clauses shall be measured within $\pm$ 2°C.

26.5.4 The analyser shall have a measuring range compatible with the accuracy required to measure the content of carbon monoxide to within $\pm$ 5 percent disregarding the accuracy of the standard (calibration) gases. The overall response time of the analysing circuit shall be less than one minute.

26.5.5 The content of the standard gases shall not differ by more than $\pm$ 2 percent from the reference value of each gas. The diluent shall be nitrogen.

26.6 TEST VEHICLE

26.6.1 The Test Vehicle shall have had at least 2 000 miles run in before test.

26.6.1.1 Fuel used for accumulating distance shall be:

(a) for unleaded petrol-engined vehicles (refer Definitions Clause 26.2.6) either unleaded test fuel whose specifications are given in paragraph 26.7.3 or unleaded petrol (refer Definitions Clause 26.2.5) representative of commercial unleaded petrol;

(b) for other vehicles (refer Definitions Clause 26.2.7) * either leaded reference fuel whose specifications are given in Clause 26.7.2 or leaded petrol (refer Definitions Clause 26.2.8) representative of commercial leaded petrol.

26.6.2 The settings of the engine and of the vehicle's controls shall be those prescribed by the manufacturer.

* Amended July 1983

26.7 TEST FUELS

26.7.1.1 For unleaded petrol-engined vehicles (refer Definitions Clause 26.2.6) unless otherwise approved the fuel shall be the unleaded test fuel whose specifications are given in Clause 26.7.3.

26.7.1.2 For other vehicles (refer Definitions Clause 26.2.7) unless otherwise approved the fuel shall be the leaded reference fuel whose specifications are given in Clause 26.7.2. *

26.7.1.3 If the engine is lubricated by mixture the oil added to the fuel shall comply as to grade and quantity with the vehicle manufacturer's recommendations.

26.7.2 Specifications of Leaded Reference Fuel *

Property	Limits and Units	ASTM Test Method
Octane Number, Research	99 ± 1	D 908 -67
Specific gravity 15/4°C	0.742 ± 0.007	D 1298 -67
Distillation Range (°C)		D 86 -67
Initial boiling point		
10 percent vol.	50 ± 5	
50 percent vol.	100 ± 10	
90 percent vol.	160 ± 10	
Final boiling point	195 ± 10	
- residue (percent vol.)	max. 2	
- loss (percent vol.)	max. 1	
Hydrocarbon analysis		D 1319 -66T
- olefins	18 ± 4 percent by volume	
- aromatics	35 ± 5 percent by volume	
- saturates	balance	
Oxidation stability	min. 480 minutes	D 525 -55
Existent gum	max. 4mg/100ml.	D 381 -64
Antioxidant	min. 50 ppm	
Sulphur content	0.03 ± 0.015 percent by weight	D 1266 -64
Lead content	(0.57 ± 0.03 gram/litre) (2.587 ± 0.136 gram/I.G.)	D 526 -66
Nature of scavenger	Motor mix	
Nature of lead alkyl	Not specified	
Other additives	Nil	
Reid Vapour Pressure	0.6 ± 0.04 bars 8.32 ± 0.59 psi	D 323 -58

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26.7.3 Unleaded Test Fuel Specifications
(unless otherwise approved)

Property	ASTM Test Method	Specification
Octane Number, Research	D2699	91 min, 93 max
Octane Number, Motor	D2700	82 min
Lead (organic), gram/litre	D3237	0.013 max
Sulphur, percent by weight	D1266 or D2785	0.10 max
Phosphorus, gram/litre	D3231	0.0013 max
Distillation Range (°C)	D86	
Initial Boiling Point		24-35 *
10 percent Point		49-57
50 percent Point		93-110
90 percent Point		149-163
End Point		213 max
Hydrocarbon Composition	D1319	
Olefins, percent by volume		10 max
Aromatics, percent by volume		35 max
Saturates		remainder
Reid Vapour Pressure (kPa)	D323 or D2551	55.0 - 63.4 (8.0 - 9.2 psi)

26.7.4 In ASTM Test Methods in Clauses 26.7.2 and 26.7.3 the figure after a test method denotes the year when the Standard was adopted or revised. Should any of the so-designated Standards be amended, the Standards adopted in the years quoted will remain applicable until the Rule is amended.

* Amended July 1983

25.8 VEHICLE SPECIFICATIONS *

The following specifications are designated for the purposes of Clause 25.2.1:

25.8.1 Vehicle Identification

25.8.1.1 Trade name or mark of the vehicle

25.8.1.2 Vehicle type

25.8.1.3 Manufacturer's name and address

25.8.2 Details of Engine

25.8.2.1 Make

25.8.2.2 Type

25.8.2.3 Cycle: four stroke/two stroke/rotary

25.8.2.4 Number of cylinders

25.8.2.5 Bore

25.8.2.6 Stroke

25.8.2.7 Cylinder capacity

25.8.2.8 Number of rotors

25.8.2.9 Number of lobes per rotor

25.8.2.10 Maximum cubic capacity of each combustion chamber (rotary engines)

25.8.2.11 Compression ratio[c]

25.8.2.12 Idle speed

25.8.2.13 Idling mixture adjustment

25.8.3 Fuel Feed

25.8.3.1 By carburettor(s) (number)

25.8.3.2 Make

25.8.3.3 Type

25.8.3.4 Number of barrels

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25.8.3.5	Venturi size
25.8.3.6	Throttle bore size
25.8.3.7	By Injector
25.8.3.8	Pump
25.8.3.9	Make
25.8.3.10	Type
25.8.4	Ignition
25.8.4.1	Distributor(s)
25.8.4.2	Make
25.8.4.3	Type
25.8.4.4	Ignition timing at idle
25.8.5	Catalytic converter characteristics *
25.8.6	Thermal reactor characteristics

* Amended July 1983

APPENDIX I

PETROL NOZZLE CHARACTERISTICS

(This Appendix is to be read in conjunction with
Clause 26.3.3 - Requirements for petrol filler inlet)

Filler pipes and openings of motor vehicle fuel tanks may be as described in Society of Automotive Engineers, Incorporated "Recommended Practice" J1140, entitled "Filler Pipes and Openings of Fuel Tanks", to accommodate petrol dispenser nozzle spouts as described in Society of Automotive Engineers, Incorporated "Recommended Practice" J285a entitled "Gasoline Dispenser Nozzle Spouts".

Leaded Petrol Nozzle - a nozzle used for demonstrating compliance with Clause 26.3.3 having a spout with an external diameter of 23.6 mm or more.

This leaded petrol nozzle shall have an automatic shut off vacuum port, the centre of which shall be located within 22.1 mm of the tip of the terminal end.

This leaded petrol nozzle shall pass less than 120 ml of petrol when fully and rapidly activated with the automatic shutoff vacuum port plugged. *

Unleaded Petrol Nozzle - a nozzle having:

(i) a spout with an external diameter of 21.34 mm or less

(ii) the terminal end of the spout shall have a straight section of at least 63 mm in length

(iii) any retaining spring fitted to the nozzle shall terminate 76 mm from the terminal end.

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