

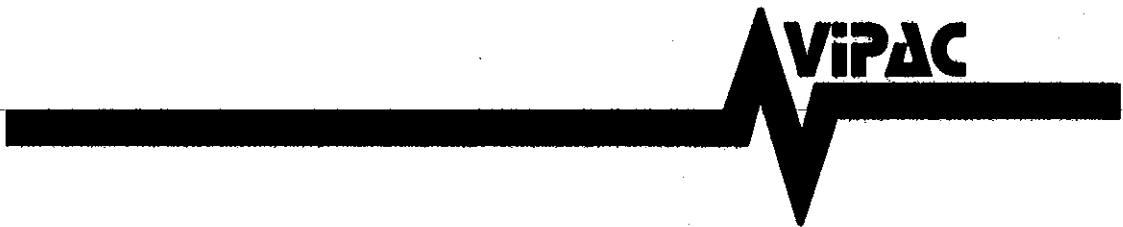
Lovato Autogas Pty Ltd.

Australian Design Rule 79/01

Mazda BT50 (WE8T)

Report No: 30V-09-0215-TRP- 442832-0

Vipac Engineers & Scientists Ltd
Melbourne, Australia
Approved Research Organisation (ARO.0125)
DOT. 4009.





DOCUMENT CONTROL

REPORT No.: 30V-09-0215-TRP- 442832-0

AUSTRALIAN DESIGN RULE 79/01

FILE:

30V-09-0215-TRP-442832-0

PREPARED FOR:

Lovato Autogas Pty Ltd.
PO Box 115,
Hindmarsh,
South Australia 5007.

REPORT CODE:

V 06

PREPARED BY:

Vipac Engineers & Scientists Ltd.
279, Normanby Road,
Port Melbourne,
Victoria 3207.

Contact: Gary Blucher / Graham Vardy.

Tel : (08) 8340 2366.

Fax : (08) 8340 3266.

Tel : +61 3 9647 9700.

Fax : +61 3 9646 4370.

AUTHOR:

ROBYN DAVIES
Automotive Engineer

Date: 20th August 2009.

E-mail: robynd@vipac.com.au

REVIEWED BY:

MAURIZIO DEMONTIS
Team Leader-Automotive

Date: 20th August 2009.

E-mail: mauriziod@vipac.com.au

REVISION HISTORY:

Revision No.	Date Issued	Reason/Comments
0	20/08/2009	Initial Issue

DISTRIBUTION:

Copy No. <u>1</u>	Revision No.	Location
1	0	Client
2	0	Vipac Melbourne
3	0	Vipac Melbourne Library

KEYWORDS:

AUSTRALIAN DESIGN RULE 79/01



1. INTRODUCTION

The following report details the results achieved when a Mazda BT50, VIN Number MM0UNY0E300638334, was tested in accordance with Australian design Rule 79/01, as detailed in the Australian Design Rule, by Vipac Engineers and Scientists Vehicle Emissions Test facility at Port Melbourne during the period 19th – 20th August 2009.

The testing was conducted in order to verify the conformance of an aftermarket Liquefied Petroleum Gas Vapour Injection Kit (LPG over Diesel), Part Number "DGA (Diesel Gas Australia) Mazda BT50 WE8T System" manufactured & installed by the client.

The kit as installed contained the following major components:

- DGA Electronic Control Unit With Appropriate WE8T Tuning File.
- LPG regulator, filter and delivery system.
- Manchester/Elko LPG tank & standard delivery system



2. PROCEDURES

The testing was carried out in accordance with the procedures listed in Australian Design Rule 79/01, Emission Control For Light Vehicles. The vehicle was tested using an equivalent inertia figure of 2040Kg, with a road load power absorption figure at 80km/h of 11.18kW utilising the factors outlined within the table of paragraph 3.2.1 Annex 4 – Appendix 2 with respect to an N1 (III) vehicle type.

Pre-conditioning was undertaken as per clause 5.3.1 of ADR79/01 with the vehicle being driven over three “Extra Urban” drive cycles prior to being soaked overnight under ambient conditions of between 20°C - 30°C. Oil and coolant temperatures were checked prior to the commencement of the single Type 1 test in order to verify that these parameters were each within 2°C of the current ambient air temperature.

The fuels used for the exhaust emission test were commercially available Ultra Low Sulphur Diesel fuel and commercially available Liquefied Petroleum Gas.



3. TEST VEHICLE SPECIFICATIONS

MANUFACTURER	Mazda.
MODEL	BT50.
ODOMETER	71881Km.
BUILD DATE	2007.
VIN NUMBER	MM0UNY0E300638334.
ENGINE NUMBER	WE8T 115867.
ENGINE MODEL & TYPE	Mazda WE8T, 2.953Litre, 4 -Cyl I/L, Direct Injection Compression Ignition Turbocharged & Intercooled.
TRANSMISSION	5spd Manual.
TYRE SIZES	235/75 R-15 (Front & Rear).
TYRE PRESSURE	240kPa (driven wheels under test).
KERB MASS	1967Kg.
REFERENCE MASS	2067Kg.
EQUIVALENT INERTIA	2040Kg.
ROAD LOAD @ 80 kph	11.18kW.



4. TEST RESULTS

AUSTRALIAN DESIGN RULE ADR 79/01 (AVERAGE TAILPIPE EMISSIONS)		
	SPECIFIED grams/km	MEASURED grams/km
Carbon Monoxide (CO)	0.74	0.264
Total Hydrocarbons (THC)	-N/A-	0.058
Oxides Of Nitrogen (NOx)	0.39	0.316
Total Hydrocarbons (THC) & Oxides Of Nitrogen (NOx) (Combined)	0.46	0.374
Particulate Matter (PM10)	0.06	0.059

**TABLE 4.1: ADR 79/00 Average Tailpipe Emission Test Results 20/08/09
Mazda BT50 Vin No: MM0UNY0E300638334**

5. CONCLUSION

The Exhaust Emission test results of the vehicle when tested in accordance with the Type 1 Test (Average Tailpipe Emissions) procedures incorporated within directive ADR79/01 were within the limits specified for Carbon Monoxide (CO), Oxides Of Nitrogen (NOx), Total Hydrocarbons (THC) & Oxides Of Nitrogen (NOx) (combined) and Particulate Matter (PM10) for an N1 vehicle of reference mass >1760Kg. The published results do not include the relevant Deterioration Factors utilised in lieu of the Type V Test (Durability Of Anti-Pollution Devices).

The vehicle as presented complies with the limits and criteria for an N1 (III) class vehicle (Type I Test) as specified within ADR79/01.

Prepared By:

Robyn.A.Davies. IEng MSOE MIRTE LCGI

Automotive Engineer – Emissions/Vehicle Certification



6. INSTRUMENTATION & CALIBRATION

Carbon Monoxide (CO) Analyser

Make & Model:- Signal Instruments 7100FM

Principal Of Operation:- Infrared

Method Of Calibration:- Signal Instruments 821 Standard Gas Divider (10 Points)

Last Calibrated July 2009

Total Hydrocarbon (THC) Analyser

Make & Model:- Signal Instruments 3000HM

Principal Of Operation:- Flame Ionisation (FID)

Method Of Calibration:- Signal Instruments 821 Standard Gas Divider (10 Points)

Last Calibrated July 2009

Oxides Of Nitrogen (NOx) Analyser

Make & Model:- Signal Instruments 4000VM

Principal Of Operation:- Chemiluminescence

Method Of Calibration:- Signal Instruments 821 Standard Gas Divider (10 Points)

Last Calibrated July 2009

Carbon Dioxide (CO₂) Analyser

Make & Model:- Signal Instruments 7200FM

Principal Of Operation:- Infrared

Method Of Calibration:- Signal Instruments 821 Standard Gas Divider (10 Points)

Last Calibrated July 2009

Particulate Matter Capture

Make & Model:- Vipac Primary Dilution Tunnel Incorporating
Nova Microtrol 4 Secondary Dilution Tunnel (Mini-Dilution Tunnel)

Principal Of Operation:- Primary & Secondary Dilution Of Sample

Last Calibrated: Flow Calibration Prior To Testing

Particulate Matter Mass Determination

Mettler Toledo Microbalance model XU6

Resolution:- 0.0001mg

Last Calibrated:- February 2009



Constant Volume Sampling System

Make & Model:- Beckman Industries (Critical Flow Venturi)

Method Of Calibration:- Laminar Flow Element

Accuracy:- Standard Deviation Of Calibration Coefficient <0.3%

Last Calibrated August 2008

Total System Verification

Make & Model:- Beckman Industries

Method Of Calibration:- Propane Injection (Using CFO)

System Efficiency:- >95%

Last Calibrated August 2008

Inertia Simulation Dynamometer

Make & Model:- Cirrus Technologies

Calibrated prior to testing:- August 19th 2009

Method Of Calibration/Check:- Vehicle Coast-down @ 2040Kg Inertia (RLP 11.18kW)