

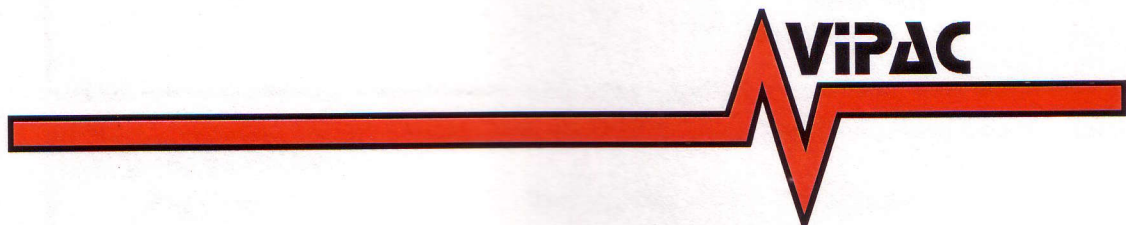
Metropolitan Fire & Emergency Services Board.

Australian Design Rule 30/01 Smoke Emission Control For Diesel Vehicles

Detroit Diesel 6V53T

Report No. 350422_TAP_003656_00

Vipac Engineers & Scientists Ltd
Melbourne, Australia
June 2004





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AUSTRALIAN DESIGN RULE 30/01

SMOKE EMISSION CONTROL FOR DIESEL VEHICLES

FILE:

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1. INTRODUCTION

The following report details the results achieved when a 1990 MFB International Fire Tender, VIN No:- 6F2-252200-LTW10622 with a Detroit Diesel 6V53T engine installed, was tested in accordance with ADR 30/01 procedures detailed in the Australian Design Rule, by Vipac Engineers and Scientists Vehicle Emissions Test facility, Altona T4009.

2. PROCEDURES

The testing was carried out in accordance with the procedures listed in Part III of Australian Design Rule 30/01 (Smoke Emission Control For Diesel Vehicles). Part III of the standard is dedicated to the testing of the Emission Of Visible Pollutants From A Motor Vehicle Whose Engine Has Not Been Separately Approved.

ADR30/01 superseded the previous ADR 30/00 from January 2002 and now includes a Free-Acceleration test as well as the Full Load Steady-State test that was undertaken for previous compliance to ADR 30/00.

The steady state testing was undertaken utilising a Robert Bosch Smokemeter, incorporating a sampling pump EFAW65A and evaluating instrument EFAW68A. Free-Acceleration Tests were undertaken utilising a Robert Bosch RTT 100 Opacimeter, optimising absorption photometry as the measuring principle.



3. TEST VEHICLE SPECIFICATIONS

INTERNATIONAL FIRE TENDER:- VIN NO:- 6F2-252200-LTW10622

MANUFACTURER	International Trucks Australia.
MAKE	International.
MODEL	ACCOF 2250.
ODOMETER	164158Km.
BUILD DATE	1990.
ENGINE NO	N/A.
VIN NUMBER	6F2-252200-LTW10622.
ENGINE TYPE	Detroit Diesel 6V53T, 2-Cycle, IDI/Compression Ignition.
ENGINE CONFIGURATION	6 Cyl V-Formation, With Turbocharger & Intercooler.
ENGINE CAPACITY	5.212 Litres.
MAXIMUM POWER	285hp @ 2600rpm.
MAXIMUM TORQUE	650ft/lb @ 1600rpm.



4. TEST RESULTS

AUSTRALIAN DESIGN RULE ADR30/01 TEST AT STEADY SPEED & FULL LOAD				
<i>Engine Speed rpm</i>	<i>'F' Factor Derived From Atmospheric Conditions</i>	<i>Nominal Gas Flow 'G' Litres/Second</i>	<i>Bosch Smoke Units (BSU) Limit Value (Light Absorption Coefficient l/m³)</i>	<i>Bosch Smoke Units (BSU) Measured Value (Light Absorption Coefficient l/m³)</i>
2600	0.9810	226	3.0 (1.030 l/m ³)	5.9 (4.2 l/m ³)
2314	0.9815	201	3.1 (1.065 l/m ³)	5.6 (3.8 l/m ³)
2028	0.9810	176	3.2 (1.125 l/m ³)	6.6 (6.0 l/m ³)
1742	0.9810	151	3.4 (1.205 l/m ³)	8.6 (<8.0 l/m ³)
1600	0.9815	139	3.5 (1.270 l/m ³)	9.4 (<8.0 l/m ³)
1170	0.9810	102	3.8 (1.465 l/m ³)	9.6 (<8.0 l/m ³)

TABLE 4.1:- ADR 30/01 DIESEL ENGINE EXHAUST SMOKE EMISSIONS
TEST RESULTS AT STEADY SPEED & FULL LOAD
INTERNATIONAL ACCOF 2250 – ENG TYPE 6V53T

AUSTRALIAN DESIGN RULE ADR30/01 TEST UNDER FREE-ACCELERATION			
<i>Maximum Engine Speed rpm</i>	<i>Light Absorption Coefficient (LAC) Limit Value m⁻¹</i>	<i>Light Absorption Coefficient (LAC) Measured Value l/m⁻¹</i>	<i>% Opacity BOSCH</i>
3000	<i>Not Applicable In The Context Of Testing This Vehicle To ADR30/01 The Limit Value Is Dependent On The Highest Result Obtained During The Steady State Testing Which Was Off- Scale</i>	9.5	95.3
3000		9.5	95.1
3000		9.5	95.5
3000		9.5	95.8
<i>Resultant Arithmetical Mean</i>		9.5	95.4

TABLE 4.2:- ADR 30/01 DIESEL ENGINE EXHAUST SMOKE EMISSIONS
TEST RESULTS UNDER FREE ACCELERATION
INTERNATIONAL ACCOF 2250 – ENG TYPE 6V53T



5. CONCLUSION

The Diesel Engine Exhaust Smoke Emissions of the vehicle when tested in accordance with the procedures incorporated within directive ADR 30/01 were outside of the limits specified when tested under Steady State, full-load conditions at the required engine speeds of 2600rpm, 2314rpm, 2028rpm, 1742rpm, 1600rpm and 1170rpm.

With regards to the Free-Acceleration test, the limit for the Free Acceleration test is derived from taking the highest recorded figure obtained during the Steady State Testing and subtracting 0.5 l/m^{-1} from this figure. However, the highest recorded figure (Light Absorption Coefficient LAC l/m^{-1}) derived from the Steady State testing was greater than the uppermost levels quoted within ADR 30/01. With the vehicle having failed the Steady State testing, it would therefore be inappropriate to quote a limit with which the vehicle should comply under the Free-Acceleration condition.

The vehicle detailed within this report failed to comply with the limits and criteria specified in Australian Design Rule ADR 30/01.

Prepared By:

A handwritten signature in black ink, appearing to read 'Robyn A. Davies'.

Robyn.A.Davies. IEng MSOE MIRTE LCGI

Melbourne Fire Brigade - Car 364 - Detroit 6V53T
Steady State Testing - ADR30/01 - conducted by Vipac Melbourne, June 2004 and July 2005
 (individual reports available on request)

