



6 October 2008

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Dear Steve

**HRL – ETRS Report MCG03-3021**

As requested, I am forwarding to you an electronic (PDF) version of the above report.

At the time the report was prepared by the HRL Materials Group of ETRS. It should be noted that the name of the group now is:

**Engineering and Materials Group  
HRL Technology Pty Ltd**

Regards

A handwritten signature in blue ink that reads 'Harry Better'.

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Prepared for  
**R&S Grating**

## Load Testing of Covers and Grates

Report No: MCG03-3021

March 2003

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Tested by

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Approved by:

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# Load Testing of Covers and Grates

## 1 INTRODUCTION

R&S Grating Pty Ltd requested that ETRS witness a set of load tests, as part of the quality assurance program undertaken by them. The aim of the testing was to determine the compliance of the grates to the requirements of AS 3996, Appendix C.

The grates tests, as identified below, were manufactured from gray cast iron and mild steel welded bar. The articles were identified as follows:

- Grate 1 – Cast Iron - 600 x 600mm Light Duty Cover Class B
- Grate 2 – Cast Iron - 600 x 600mm Medium Duty Cover Class D
- Grate 3 – Cast Iron - 600 x 600mm Heavy Duty Cover Class E
- Grate 5 – Cast Iron - 750 x 750mm Light Duty Cover Class B
- Grate 6 – Cast Iron - 750 x 750mm Medium Duty Cover Class C
- Grate 8 – Cast Iron - 600 x 600mm Heavy Duty Cover – Concrete Filled Class E
- Grate 9 – Cast Iron - 600 x 900mm Light Duty Cover Class B
- Grate 10 – Cast Iron - 600 x 900mm Medium Duty Cover Class C
- Grate 11 – Cast Iron - 600 x 900mm Medium Duty Cover – Double Section Class C
- Grate 12 – Cast Iron - 600 x 600mm Medium Duty Cover Class C
- Grate 14 – Cast Iron - 600 x 600mm Heavy Duty Cover Class D
- Grate 15 – Cast Iron - 600 x 900mm Heavy Duty Cover – Concrete Filled Class E
- Grate 16 – Mild Steel - 600 x 900x65mm Heavy Duty Cover – Transurban Class E
- Grate 17 – Mild Steel - 600 x 900x12mm Pit Size, Medium Duty Cover Class C
- Grate 18 – Mild Steel - 400 x 1000x65mm Heavy Duty Cover – VicRoads Class D

## 2 METHODOLOGY AND TEST PROCEDURE

### 2.1 Specification

The test was conducted in accordance with AS 3996-1992 *Metal access covers, road grates and frames*. The test focus on section 4.2.6.1, Type load test, under the guideline of Appendix C, *Methods of Load Testing for Covers and Grates*. The load values applied were consistent with the standard specification, Table 3.1 below:

Class of Grate or Cover	Minimum Ultimate Limit State Design Load kN
B	80
C	150
D	210
E	400

The general acceptance criterion for both materials was to sustain the load for 30 seconds. The specific requirement for cast iron samples was no cracking or dropping of the load, while for mild steel was no permanent deformation greater than 0.8% of the clear opening span.

### 2.2 Load Measurements

The loading of the grates was conducted in a loading rig, which was fitted with a calibrated load cell, calibration certificate issued by ACS, certificate number VAC939-B-5 and dated 24 February 2003. Load was displayed digitally by an instrument calibrated simultaneously with the load cell.

### 2.3 Displacement Measurements

The measurements were conducted using an in house calibrated displacement transducer gauge. The calibration was conducted against a calibrated and NATA certified extensometer. The calibration result are attached to this report.

## 3 TEST RESULTS

The test results are individually prepared below.

