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## Mechanical Testing

- Tensile
- Compression
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- Load
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- Fasteners
- Tensioning & Staying Systems
- Structural Bearings



IN CONFIDENCE TO THE CLIENT

REPORT NO: MT-12/337-A

## TYPE LOAD TESTING OF AN R & S FRP ECOLIGHT COVER

CLIENT: **ROAD SAFETY GRATING (R & S GRATING)**  
ATT: JAY RULE  
13 HEALEY ROAD  
DANDENONG SOUTH VIC 3175

DATE OF TESTING: JUNE 25<sup>TH</sup> 2012

DATE OF REPORT: JUNE 27<sup>TH</sup> 2012

### TEST SYNOPSIS:

A *Class B*, composite, rectangular cover, measuring 765mm x 1085mm x 47mm, was delivered to the MTS laboratory for Type Load testing and destructive testing (see Fig.1). The client provided the following identification details:

- *R & S FRP Ecolight Cover*

As requested by the client, the cover was to be Type Load tested in accordance with AS 3996—2006 “ACCESS COVERS AND GRATES” CLAUSE 4.2.1.2 (APPENDIX C).

### TEST PROCEDURE:

The cover, in its frame, was placed under the actuator of a calibrated testing machine and supported on a rigid steel frame in a manner to mimic the bearing conditions that would normally be provided by the supporting perimeter of a frame (see Fig.2).

A compressive test load was applied vertically to the centre of the cover via a loading platen with a minimum of 25mm clearance to the unobstructed opening. As requested by the client, the rate of loading was 2kN/s. A displacement transducer was positioned underneath on the centre of the cover which was in-turn connected to an electronic data acquisition system used to autographically record deflection throughout testing.

Details of the testing apparatus are as follows:

- 500kN Universal Testing Machine, Model: Flex Test SE, Serial No: 1416398, fully computerized, equipped with Multipurpose Elite Suite Testing Software
- Test block 240mm x 240mm square (with 25mm plywood at the bottom)
- Displacement Transducers, Model 20FLP100A, No: MT-1432, 1433, 1435
- DAQ, Data Taker Model: DT85 No: MT-8615



**FIG. 1**  
**COVER TEST ITEM**

## Type Load Testing

All loading applications were performed automatically where load, time and rate of loading were programmed using specially designed Multipurpose Elite Suite Testing Software.

In accordance with AS 3996—2006, a test load equivalent to the serviceability design load of **53kN** was applied to the centre of the cover and maintained for a period of 6 seconds (minimum requirement - 5 seconds). This load application procedure was repeated five (5) times with the elastic deflection recorded after each load increment. Upon completion of testing and release of the test load, the permanent set deflection was recorded.

In accordance with AS 3996—2006, a test load equivalent to the ultimate limit state design load of **80kN** was then gradually applied to the centre of the cover and maintained for a period of 31 seconds (minimum requirement - 30 seconds) after which the cover was assessed for failure.

### 1. Elastic Deflection due to the Serviceability Design Load Test

**Test Load:** **53kN** (Clause 4.2.1.1(a) for  $CO \geq 250\text{mm}$ , Table 3.1 Serviceability Design Load for Class B) applied via bearing block to the centre of the cover in accordance with Appendix C of AS 3996—2006.

**Deflection:** 11.41mm (No structural failure observed).

**Acceptance Criteria:**  $CO/45 = 635/45 = 14.11\text{mm}$  (see Table 4.2)

Where: CO – Circular opening = 635mm

### 2. Permanent Set due to the Serviceability Design Load Test

**Test Load:** 5 cycles at **53kN** applied via bearing block to the centre of the cover in accordance with Appendix C of AS 3996—2006.

**Permanent set:** 0.66mm (No structural failure observed).

**Acceptance Criteria:**  $CO/100 = 635/100 = 6.35\text{mm}$  (see Table 4.2)

(Class B, Conditions – All sizes, where: CO – Circular opening = 635mm).

### 3. Ultimate Limit Test

**Test Load:** **80kN** (Clause 4.2.1.1(a) for  $CO \geq 250\text{mm}$ , Table 3.1 Ultimate Limit State Design Load for Class B) applied via bearing block to the centre of the cover for 31 seconds in accordance with Appendix C of AS 3996—2006.

**Result:** No structural failure observed.

**Acceptance Criteria:** No visible cracking, collapse or other similar forms of structural failure are permissible.

## DESTRUCTIVE LOAD TESTING

At the request of the client, and beyond the requirements of AS3996-2006, the cover was then tested to destruction. The load was applied at the identical rate as in the Ultimate Load Test until the cover failed structurally. A peak load of 139.65kN was achieved prior to structural failure.

Inspection of the cover upon release of the test load revealed delimitation of the top layers.

The load was re-applied until the cover was unable to carry the applied load, exhibiting unacceptable deflection and separation and buckling of the top of the cover.

The maximum load sustained was 182.71kN.

## APPENDIX

Test curves for “Test Load vs. Cover Deflection” and “Test Load vs. Test Time” are provided in Appendix A.

## SUMMARY

The Class B, R & S FRP Ecolight Cover with a circular opening (CO) of 635mm met the Type Test Requirements as specified in AS3996—2006 Clause 4.2.1.2 for Class B road covers with circular openings of 635mm. The maximum load sustained by the cover in the Destructive Load Test was 182.71kN.



**Fig. 2**  
**COVER LOAD TEST SEP UP**

NOTES:

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2. It remains the responsibility of the client to ensure that the samples tested are representative of the entire product batch.
3. MTS shall take no responsibility for the procurement and authenticity of the test product as described herein.
4. This report is specific to the test items in their state at the time of testing. It should not be taken as a statement that all products in all states of repair, would also perform in the same manner.
5. Testing and compliance of the cover as reported herein is strictly conditional on the cover being fully rigidly supported. MTS shall therefore take no responsibility for the performance of cover supported in conditions other than those as outlined herein.
6. MTS shall take no responsibility for the assembly procedures or installation methods used for the test items as described herein.
7. This report only indicates the results for the cover in its state at the time of testing. It should not be taken as a statement that all similar covers in all states of repair, would also be found to have similar results.

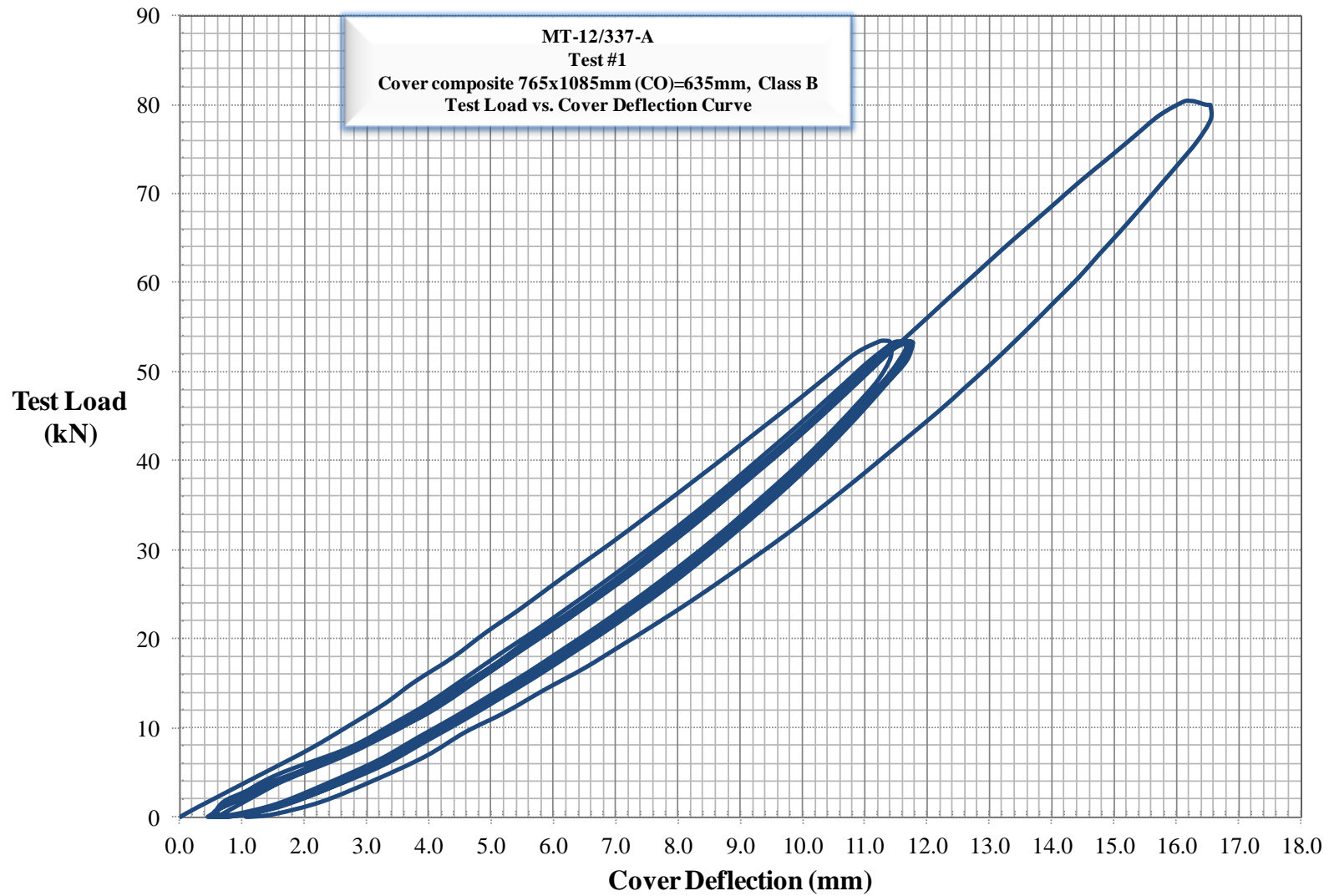
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**APPENDIX A1**



**APPENDIX A2**

