

# Mechanical Testing

- 
- Anchorages
  - Bending
  - Calibration
  - Compression
  - Concrete
  - Covers and Grates
  - Fasteners
  - Fatigue
  - Formwork
  - Jacks and Stands
  - Lifting Devices
  - Proof Load
  - Reinforcing Products
  - Scaffolding
  - Structures
  - Tensile

IN CONFIDENCE TO THE CLIENT

REPORT NO: MT-18/064-C

## LOAD TESTING OF A 16" PARALLEL RADIUS POOL GRATE FOR CLASS A

CLIENT: **DALDORADO**  
 ATTENTION: ROBERT LAWSON  
 5/99 HUMPHRIES ROAD  
 FRANKSTON SOUTH VIC 3199

DATE OF TEST: JANUARY 22<sup>ND</sup> 2018

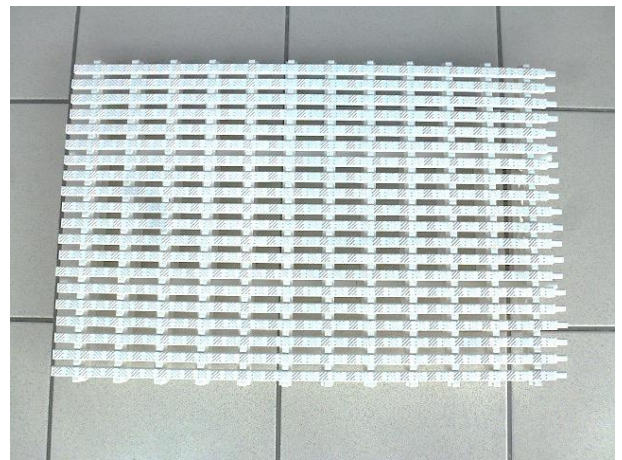
DATE OF REPORT: JANUARY 30<sup>TH</sup> 2018

### TEST SYNOPSIS:

Interlocking modular PVC pool grate members were delivered to the MTS laboratory for load testing (see Fig. 1). At the request of the client, DALDORADO, the grate was to be assembled and Type Tested for **Class A** in accordance with AS 3996 — 2006 ACCESS COVERS AND GRATES; CLAUSE 4.2.1.2 and APPENDIX C. Following testing to AS 3996, the grate was to be loaded until failure in order to determine the ultimate strength capacity of the specimen.

Upon arrival at the laboratory the following details and nominal dimensions were recorded:

<b>Specimen I.D.:</b>	'Parallel Radius' Grate
<b>Grate Width:</b>	406.4 mm (16")
<b>Module Length:</b>	609.6 mm (24")
<b>Longitudinal Members:</b>	609.6 × 12 × 8 mm
<b>Transverse Members:</b>	406.4 × 38 × 15 mm
<b>Grid Apertures:</b>	8 × 36 mm
<b>Module Connectors:</b>	Two (2), Ø15mm spigot/socket pairs per member at 166 mm centres
<b>Circular Opening (CO):</b>	343 mm



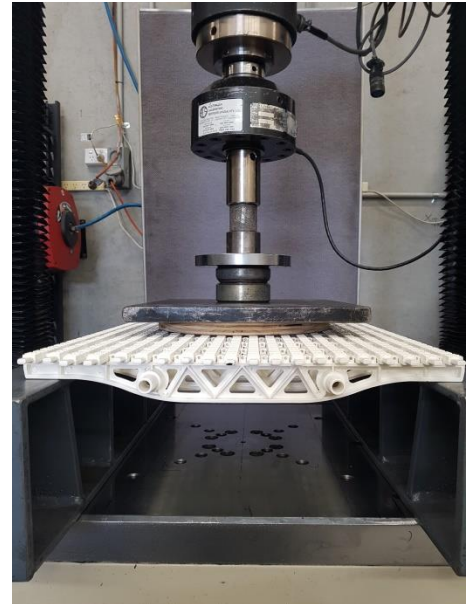
**FIG. 1**  
**'PARALLEL RADIUS' POOL GRATE**  
**SECTION AS ASSEMBLED**

### TEST PROCEDURE:

The access cover grate was aligned centrally under the actuator of a calibrated universal testing machine (UTM). The grate was rigidly supported on two (2) parallel edges with a free span of 343 mm to replicate the bearing conditions typically seen in service (see Fig. 2). A series of displacement transducers was used to measure the net deflection at the centre of the cover throughout testing. All compressive test loads were applied vertically to the centre of the cover grate via a 250 mm diameter circular loading platen. Test load and deflection were recorded autographically during testing using a computerised data acquisition system.

### ***Serviceability Design Load***

Serviceability Design Load (SDL) testing was conducted in accordance with AS 3996 CLAUSE C4.5 and C4.6. Prior to testing, the displacement transducers were balanced to establish a deflection datum. Test load was applied at a rate of 1 kN/s until the SDL of **6.7 kN** was achieved, as specified by TABLE 3.1 of AS 3996 for Class A covers. After maintaining the SDL for five (5) seconds, the change in deflection at the centre of the test cover was recorded and the test force removed. Following removal of the SDL, any permanent deformation of the grate was logged. This process was repeated a total of five (5) times as per the requirements of AS 3996 – 2006 CLAUSE C4.3.



**FIG. 2**  
**GRATE TEST SET-UP**

### ***Ultimate Limit State***

The Ultimate Limit State (ULS) test immediately followed completion of the SDL test and was conducted in accordance with AS 3996 – 2006 CLAUSE C4.7. The ULS load of **10 kN**, as specified by TABLE 3.1 of AS 3996 – 2006 for Class A covers, was applied at a constant rate of 1 kN/s to the centre of the grate and held for a period of 30 seconds. The test load was then removed and the grate was inspected for visible signs of cracking, collapse or other similar forms of structural failure.

### ***Ultimate Strength Capacity***

Upon complete of the AS 3996 load tests, the access grate was reinstalled centrally in a UTM. Compressive test force was then gradually applied to the specimen until a peak load was achieved and a mode of failure was evident.

## **TEST OBSERVATIONS:**

### ***Serviceability Design Load***

During the initial SDL application of 6.7 kN, the loaded net deflection was recorded to be **9.4 mm** at the centre of the cover which exceeds the maximum allowable deflection of 7.6 mm, as required by TABLE 4.2 of AS 3996 – 2006 for a Class A access cover grate with a circular opening of 343 mm.

Upon conclusion of the SDL test, the net permanent set at the centre of the grate was recorded to be **0.4 mm** which is less than the maximum allowable permanent set of 3.4 mm, as required by TABLE 4.2 of AS 3996 – 2006 for a Class A access grate with a circular opening of 343 mm.

### ***Ultimate Limit State***

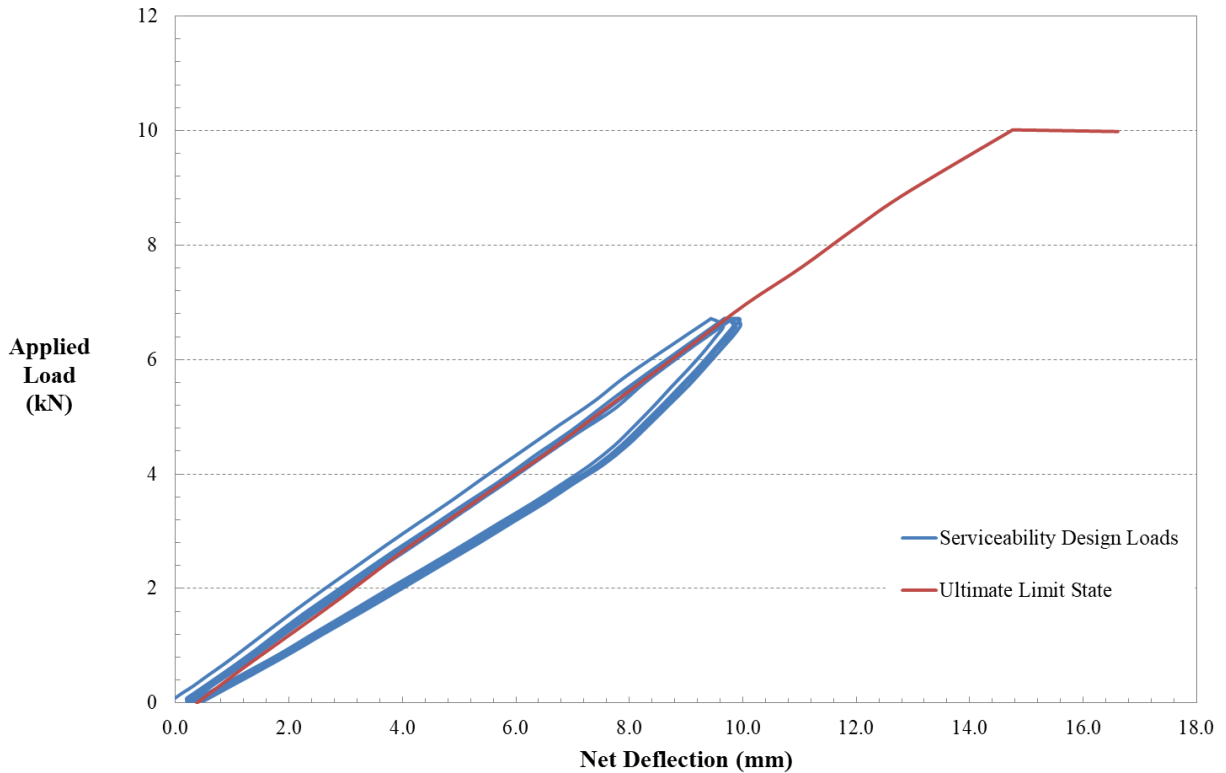
The tested pool grate was observed to sustain the ULS load of 10 kN for 30 seconds without visible signs of cracking, collapse or other structural failure.

### ***Ultimate Strength Capacity***

The grate achieved a peak load of 11.6 kN and underwent gradual ductile failure of the structural members.

**TEST DATA:**

Test curves for the Serviceability Design Load and Ultimate Limit State are provided in Figure 3.



**FIG. 3  
TEST CURVES**

**SUMMARY**

The DALDORADO 16” × 24” ‘Parallel Radius’ grate, as tested and reported herein, is **non-compliant** to the Type Test requirements as specified in AS 3996 – 2006 CLAUSE 4.2.1.2 for a Class A cover with a circular opening of 343 mm due to exceeding the maximum deflection requirement under the Serviceability Design Loads.

**NOTES:**

1. Melbourne Testing Services (MTS) Pty Ltd shall not be liable for loss, cost, damages or expenses incurred by the client or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Melbourne Testing Services Pty Ltd be liable for consequential damages including, but not limited to, lost profit, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested.
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 of the cover/grate as reported herein is strictly conditional on the cover/grate being fully rigidly supported. MTS shall therefore take no responsibility for the performance of cover/grate supported in conditions other than those as outlined herein.
6. MTS shall take no responsibility for the assembly procedures or installation used for the test items as described herein.
7. This report is specific to the load and deflection requirements for type testing in accordance with AS 3996 – 2006 Clause 4.2.1.2 and Appendix C. This report in no way addresses the compliance of the test item to any other requirement specified in AS 3996 or any other Australian or international standards that may apply

**GAVIN VAN DEVENTER**  
AUTHORISED SIGNATORY

**BRENDAN LEIS**  
TEST ENGINEER



Accredited for compliance with ISO/IEC 17025.  
The results of the tests included in this document are traceable to Australian/National Standards.  
This document shall not be reproduced except in full.  
Laboratory Accreditation No: 1047.