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PRODUCT TESTING REPORT

Subject	COVER TYPE TESTING
Prepared For:	DUCAST AUSTRALIA
Address:	2 STACEY STREET BANKSTOWN NSW 2200
Attention:	JOHN GILBERT
PO Number:	TBC
Identification:	DUCTILE IRON COVER AND FRAME 600mm CLEAR OPENING CLASS D/E DA4
Specification:	AS 3996: 2019 "Access Covers and Grates"
Report Number:	080376-2 Rev 1
Test Personnel:	Chris Vines
Date:	3 September 2019

1. INTRODUCTION

It was requested that type load testing, water tightness testing, gas tightness testing, uplift testing (traffic and flood) and slip resistance testing be performed on a 590 mm clear opening round cover in its frame. The subject was described as a Class D/E sealed ductile iron cover with 590 mm opening dimensions (refer to Figure 1).

The testing was performed in accordance with AS 3996: 2019 "Access Covers and Grates" Appendices C/E/F and J.

Rev 1 issued to update drawing and correct typographic error

Prepared by:

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Figure: 1
Subject: Cover submitted for testing (note the securing bolts for uplift resistance)

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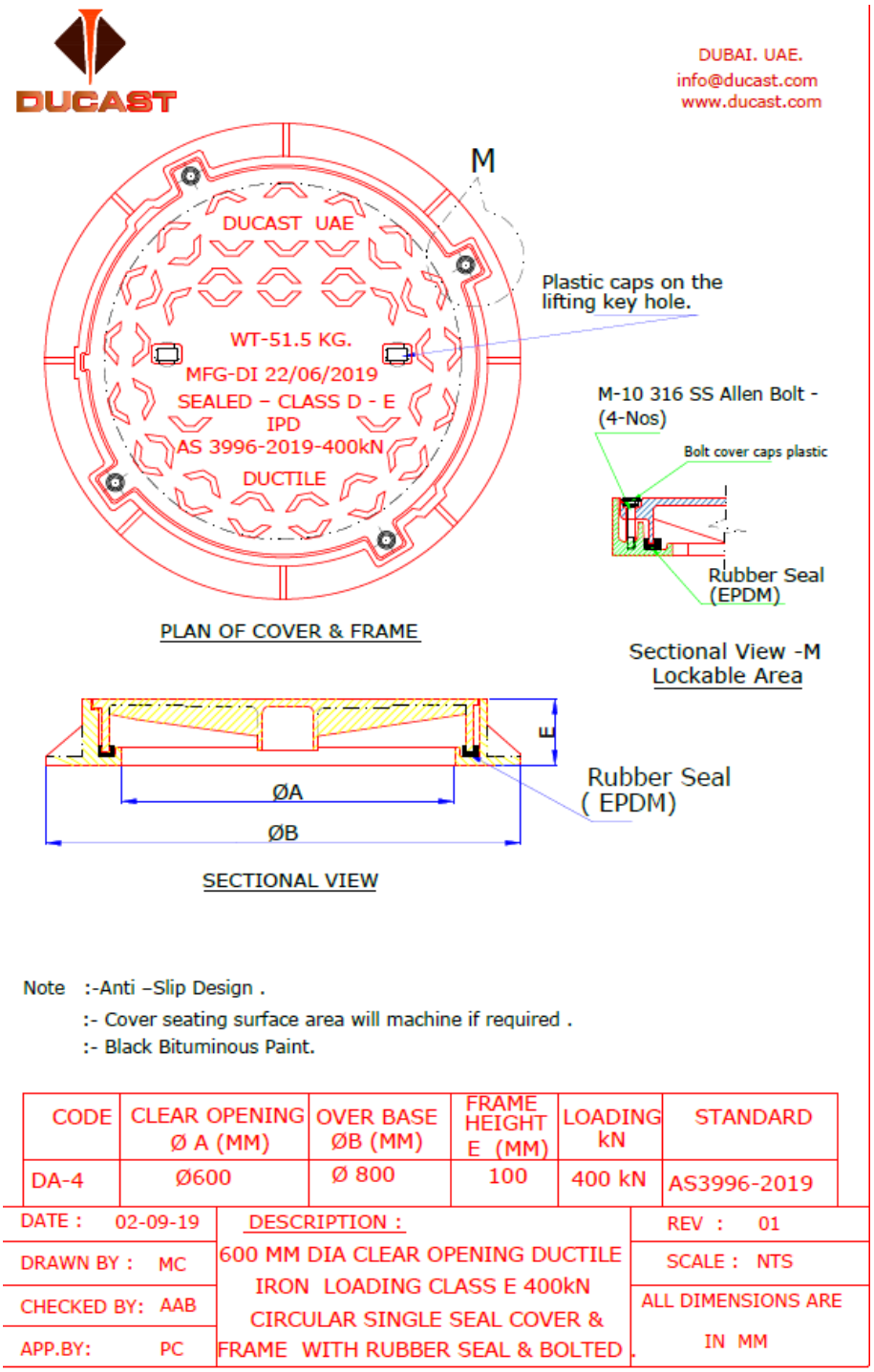

CODE	CLEAR OPENING Ø A (MM)	OVER BASE ØB (MM)	FRAME HEIGHT E (MM)	LOADING kN	STANDARD
DA-4	Ø600	Ø 800	100	400 kN	AS3996-2019

DATE : 02-09-19	DESCRIPTION :	REV : 01
DRAWN BY : MC	600 MM DIA CLEAR OPENING DUCTILE IRON LOADING CLASS E 400kN CIRCULAR SINGLE SEAL COVER & FRAME WITH RUBBER SEAL & BOLTED .	SCALE : NTS
CHECKED BY: AAB		ALL DIMENSIONS ARE IN MM
APP.BY: PC		

Figure: 2

Subject: Typical cover as supplied

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2. WATER TIGHTNESS TESTING

The as submitted cover and its frame were installed in a test fixture which kept water on the topside of the assembly to a known depth and allowed for observation of the underside. The following test parameters were to achieve the result listed below (as per AS 3996-2019 appendix E):

Sealant used:	Unit tested as supplied by client
Coating system:	Unit tested as supplied by client
Water depth:	155mm water (A0986)
Test date:	20/8/2019
Test time:	15 minutes
Observations:	No evidence of leakage in the frame to cover seal

3. GAS TIGHTNESS TESTING

The as submitted cover and its frame were installed in a test fixture which kept air pressure on the underside of the assembly and the top region was covered in a thin film of water. The following test parameters were to achieve the result listed below (as per AS 3996-2019 appendix F):

Sealant used:	Unit tested as supplied by client
Coating system:	Unit tested as supplied by client
Test pressure:	0.50 kPa (55mm water in manometer A0986)
Test date:	22/8/2019
Test time:	15 minutes
Observations:	No evidence of leakage in the frame to cover seal (<5mm film of water on lid)

4. UPLIFT LOAD TESTING

The as submitted cover and its frame were installed upside down in a test fixture to perform the uplift tests (flood only). The following test parameters were to achieve the result listed below (as per AS 3996-2019 appendix J):

Sealant used:	Unit tested as supplied by client
Test block:	Test block 240 mm x 240 mm square (25 mm plywood)
Test load:	12.5 kN (flood)
Test date:	29/08/2019
Test deflection:	0.11 mm (flood)
Maximum permitted:	12.5mm
Observations:	Deflection was less than the maximum permitted.

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5. TYPE LOAD TESTING, Clause C4.3

The cover was tested in accordance with Appendix C of AS3996. The subject was placed in the loading rig and positioned such that it was supported by the frame in horizontal plane with a minimum 25 mm clearance to the unobstructed opening and the load applied vertically to the geometric centre of the cover. The details of the testing apparatus are as follows:

- Compression test unit (A1769)
- Test block 240 mm x 240 mm square Dia. (25 mm plywood)
- Dial Gauge (A0230)

The test load equal to the serviceability design load was gradually applied and elastic deflection was recorded, after which load was released and reapplied for a total of 5 cycles with a minimum of 5s hold at each peak load. After the final load application the permanent set was recorded.

The test load equal to the ultimate limit state design load was then gradually applied and maintained for a minimum of 30 seconds after which the cover was assessed for failures.

5.1 Elastic deflection due to the serviceability design load test, Clause C4.5

Test Load:	267 kN (Clause 4.2.2.1(a) for CO > 250 mm, Table 3.1 Serviceability design load for Class E = 1) applied via bearing block to the cover in accordance with Appendix C.
Deflection under load:	4.69 mm (No structural failure observed).
Acceptance Criteria:	AS 3996: 2019 Class E CO/10 = 590/100 = 5.9 mm (see Table 4.2) Where: CO – circular opening = 590 mm.
Test date:	29/08/2019

5.2 Permanent set due to the serviceability design load test, Clause C4.6

Test Load:	5 cycles at 267 kN (see above) applied via bearing block to the cover in accordance with Appendix C
Permanent set:	0.16 mm (No structural failure observed)
Acceptance Criteria:	AS 3996: 2019 Class E CO/100 = 590/500 = 1.18 mm Where: CO – circular opening = 590 mm.
Test date:	29/08/2019

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5.3 Ultimate limit test, Clause C4.7

Test Load:	400 kN (Clause 4.2.2.1(a) for CO > 250 mm, Table 3.1 Ultimate Limit state design load for Class E) applied via bearing block to the cover for a minimum of 30 seconds in accordance with Appendix C
Observations:	No structural failures observed in the test unit
Acceptance Criteria:	No visible cracking, collapse or other similar forms of structural failure occurred.
Test date:	29/08/2019

6. RESULTS

The cover and frame, DA-4, Class D/E with clear opening of 590 mm **complied** with the type test requirements of AS 3996: 2019 Clauses 4.2.2, 4.2.4, 4.2.5, 4.2.6, and 4.2.8.

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Figure: 3
Subject: Cover underside

Figure: 4
Subject: Test set up for water/gas tightness

Figure: 5
Subject: Cover load test

Figure: 6
Subject: Cover uplift test