



## PRODUCT TESTING REPORT

**Subject:** CRETEX PRO-RING™ POLYMERIC MAKE-UP RINGS  
**Prepared For:** INDEPENDENT SEWER CONSULTING SERVICES PTY LTD  
**Address:** UNIT 13/1 ADEPT LANE BANKSTOWN NSW 2200  
**Attention:** DENNIS BENTINK  
**PO Number:** P19008  
**Identification:** PRO-RING™ SEGMENTS 36-24G-600 AND 36-24F-600  
**Specification:** AS 3996: 2019 "Access Covers and Grates" AND WSA-PS 345 "Polymeric Make-up Rings for Sewerage Maintenance Holes"  
**Report Number:** 076953-1  
**Test Personnel:** Chris Vines  
**Date:** 1 November 2019

### 1. INTRODUCTION

It was requested that load testing, water tightness testing, gas tightness testing and fatigue load resistance testing be performed on a joined pair of 610 mm clear opening round Cretex Pro-Ring™ make-up rings. The tests were to be performed in order given above then the water and gas tests repeated after fatigue testing was completed.

The testing was performed in accordance with the performance requirements of WSA PS-345 "Polymeric Make-up Rings for Sewerage Maintenance Holes" and AS 3996: 2019 "Access Covers and Grates" Appendices C/E/F and section 4.2.13.



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Prepared by:

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**Figure: 1**  
**Subject: Cretex Pro-Ring™ make-up rings submitted for testing**



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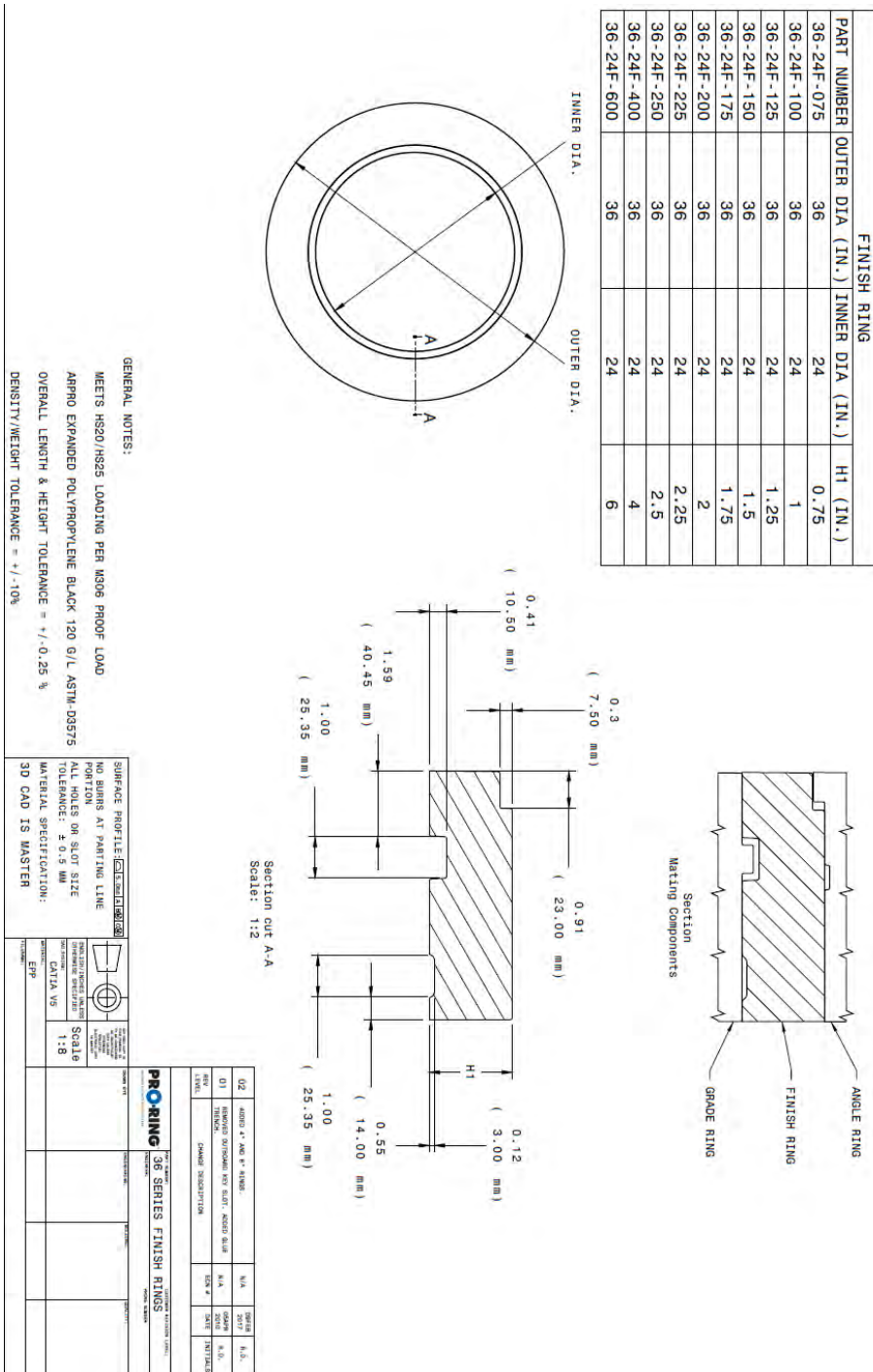


Figure: 2  
 Subject: Cretex Pro-Ring™ make-up ring submitted for testing



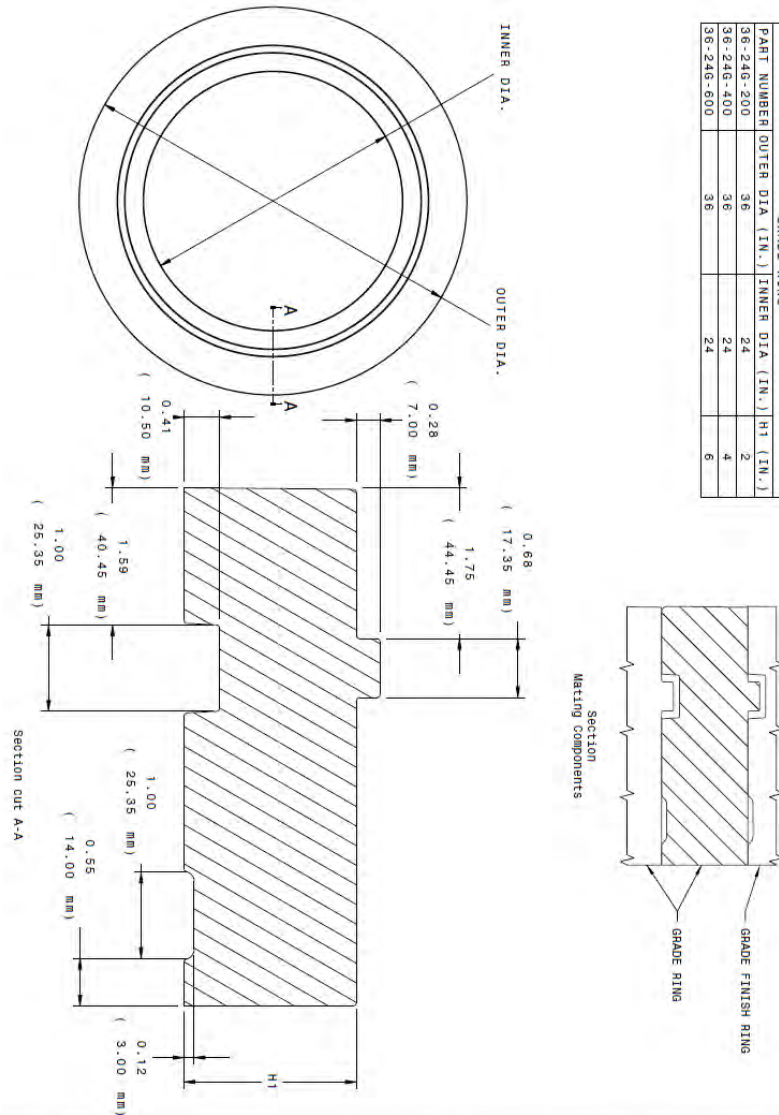
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PART NUMBER	OUTER DIA (IN.)	INNER DIA (IN.)	H1 (IN.)
36-24G-200	36	24	2
36-24G-400	36	24	4
36-24G-600	36	24	6

 <a href="http://www.cretexseals.com">www.cretexseals.com</a>	
36 SERIES GRADE RING	
LOAD RATING <b>HEAVY DUTY</b>	
MATERIAL SPECIFICATION ARPRO EXPANDED POLYPROPYLENE BLACK 5000 SERIES ASTM-D3575	
LAST REVISED RAD	DATE 05APR2010
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**Figure: 3**  
**Subject: Cretex Pro-Ring™ make-up ring submitted for testing**



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## 2. TYPE LOAD TESTING, Clause C4.3

The rings were installed with a standard type D cover and tested in accordance with Appendix C of AS 3996. 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 250 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 Pro-Ring™ was assessed for failures.

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

Test Load:	160 kN (Clause 4.2.2.1(a) for CO > 250 mm, Table 3.1 Serviceability design load for Class D = 1) applied via bearing block to the cover in accordance with Appendix C.
Deflection under load:	13.5 mm (No structural failure observed). Deflection measured in rings only on a 300mm high stack
Acceptance Criteria:	AS 3996: 2019 Class D CO/45 = 610/45 = 13.6 mm (see Table 4.2) Where: CO – circular opening = 610 mm.
Test date:	01/07/2019

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

Test Load:	5 cycles at 160 kN (see above) applied via bearing block to the cover in accordance with Appendix C
Permanent set:	0.15 mm (No structural failure observed) Deflection measured in rings only on a 300mm high stack
Test date:	01/07/2019

### 2.3 Ultimate limit test, Clause C4.7

Test Load:	240 kN (Clause 4.2.2.1(a) for CO > 250 mm, Table 3.1 Ultimate Limit state design load for Class D) 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



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### 3. WATER TIGHTNESS TESTING

The two glued rings were installed in a test fixture which kept water on the inside of the assembly to a known depth and allowed for observation of the outside. The following test parameters were to achieve the result listed below (as per AS 3996-2019 appendix E):

Sealant used:	Chem Link M1 Adhesive (as supplied by client)
Coating system:	N/A
Water depth:	153mm water (A0986)
Test date:	01/7/2019
Test time:	15 minutes
Observations:	No evidence of leakage in the ring to ring seal

### 4. GAS TIGHTNESS TESTING

The two glued rings were installed in a test fixture which kept water on the outside of the assembly to a known depth and allowed for observation of the inside while 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:	Chem link M1 adhesive (as supplied by client)
Coating system:	NA
Test pressure:	0.52 kPa (55mm water in manometer A0986)
Test date:	02/7/2019
Test time:	15 minutes
Observations:	No evidence of leakage in the ring to ring seal

### 5. FATIGUE TESTING

The two glued rings were installed in a test fixture which loaded the top ring surface through a standard 600 mm clear opening sewer lid ring. The following test parameters were to achieve the result listed below (as per AS 3996-2019 clause 4.213 and appendix C):

Sealant used:	Chem link M1 adhesive (as supplied by client)
Coating system:	NA
Test load:	80 kN
Test load rate:	25 kN/s
Test cycles:	300,000
Cycle rate:	7 cycle per minute
Test start:	30/09/2019
Test finish:	18/10/2019



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Initial fatigue testing was performed using as standard D class drain lid with the normal wooden test block (240 mm square). However, the lid cracked after 50k cycles and no replacement was available hence the steel plates were installed to continue testing of the rings by loading directly through the rim rather than via the lid.

## 6. POST FATIGUE TESTING

### 6.1 WATER TIGHTNESS TEST

The two glued rings were installed in a test fixture which kept water on the inside of the assembly to a known depth and allowed for observation of the outside. The following test parameters were to achieve the result listed below (as per AS 3996-2019 appendix E):

Sealant used:	Chem link M1 adhesive (as supplied by client)
Coating system:	N/A
Water depth:	154mm water (A0986)
Test date:	21/10/2019
Test time:	15 minutes
Observations:	No evidence of leakage in the ring to ring seal

### 6.2 GAS TIGHTNESS TEST

The two glued rings were installed in a test fixture which kept water on the outside of the assembly to a known depth and allowed for observation of the inside while covered in a thin film of water above the glue line. The following test parameters were to achieve the result listed below (as per AS 3996-2019 appendix F):

Sealant used:	Chem link M1 adhesive (as supplied by client)
Coating system:	NA
Test pressure:	0.53 kPa (55mm water in manometer A0986)
Test date:	22/10/2019
Test time:	15 minutes
Observations:	No evidence of leakage in the frame to cover seal (<5mm film of water above seal)



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

Test Load:	160 kN (Clause 4.2.2.1(a) for CO > 250 mm, Table 3.1 Serviceability design load for Class D = 1) applied via bearing block to the cover in accordance with Appendix C.
Deflection under load:	13.5 mm (No structural failure observed). Deflection measured in rings only on a 300mm high stack
Acceptance Criteria:	AS 3996: 2019 Class D CO/45 = 610/45 = 13.6 mm (see Table 4.2) Where: CO – circular opening = 610 mm.
Test date:	23/10/2019

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

Test Load:	5 cycles at 160 kN (see above) applied via bearing block to the cover in accordance with Appendix C
Permanent set:	0.24 mm (No structural failure observed) Deflection measured in rings only on a 300mm high stack
Test date:	23/10/2019

### 6.3.3 Ultimate limit test, Clause C4.7

Test Load:	240 kN (Clause 4.2.2.1(a) for CO > 250 mm, Table 3.1 Ultimate Limit state design load for Class D) 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

## 6. RESULTS

The nominal deflections observed in the rings, while under loading as per AS 3996, were within the prescribed limits for a fatigue tested unit as per AS 3996. After the fatigue testing no evidence of water or gas leakage from the ring-ring joint was observed and the deflection characteristics of the assembly were recorded as similar to the initial test results.

The Cretex Pro-Rings tested were found to meet the performance requirements of WSA PS 345 “Polymeric Make-up Rings for Sewerage Maintenance Holes” as defined in AS 3996 Access Covers and Grates” appendices C/E/F and section 4.2.13



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**Figure: 4**  
**Subject: Ring assembly load test**



**Figure: 5**  
**Subject: Water tightness assembly**



**Figure: 6**  
**Subject: Gas tightness test rig with water external (air filled into chamber under wooden seal insert)**



**Figure: 7**  
**Subject: Fatigue rig assembly (after lid cracked)**



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