STRUCTURES TEST REPORT

ST1107-01-01

TESTING OF THE IGPU PIT LID TO AS 3996-2006 [2019]

CLIENT
J & D McLennan
P O Box 30087
Lower Hutt
New Zealand

All tests and procedures reported herein, unless indicated, have been performed in accordance with the BRANZ ISO9001 Certification

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LIMITATIONS

The results reported here relate only to the item tested. The sample was tested as supplied.

TERMS AND CONDITIONS

This report is issued in accordance with the Terms and Conditions as detailed and agreed in the BRANZ Services Agreement for this work.

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1. OBJECTIVE

This report is a reissue of an older BRANZ TYPE TEST report ST11017-TT [2016] issued on the 27 June 2016.

To undertake a Type Test in accordance with Appendix C of AS 3996-2006 [1] of an IGPU pit lid. The load classification being sought was Class G in accordance with Table 3.1 of the Standard.

2. DESCRIPTION OF SPECIMENS

The IGPU pit lid assembly was machined steel plate and had the dimensions as shown in Figure 1 to Figure 3. The circular opening (CO) size was 423 mm. The outer dimensions of the actual lid were 592 mm by 492 mm. The lid was one of 10 manufactured on J&D McLennan Job Numbers 16152 & 16154.

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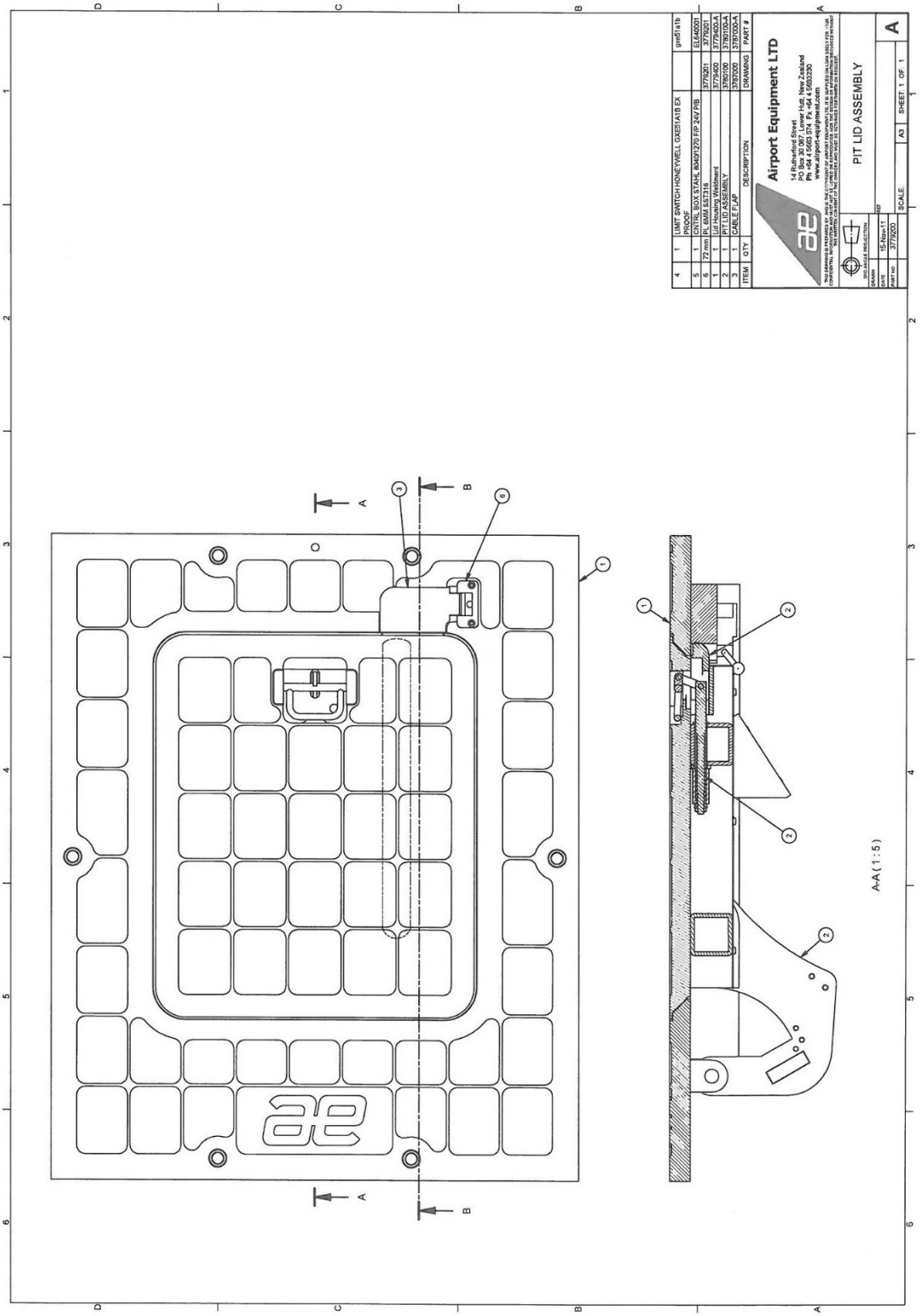

Figure 1. Pit lid assembly (Part number 3779200) (Drawing supplied by the client)

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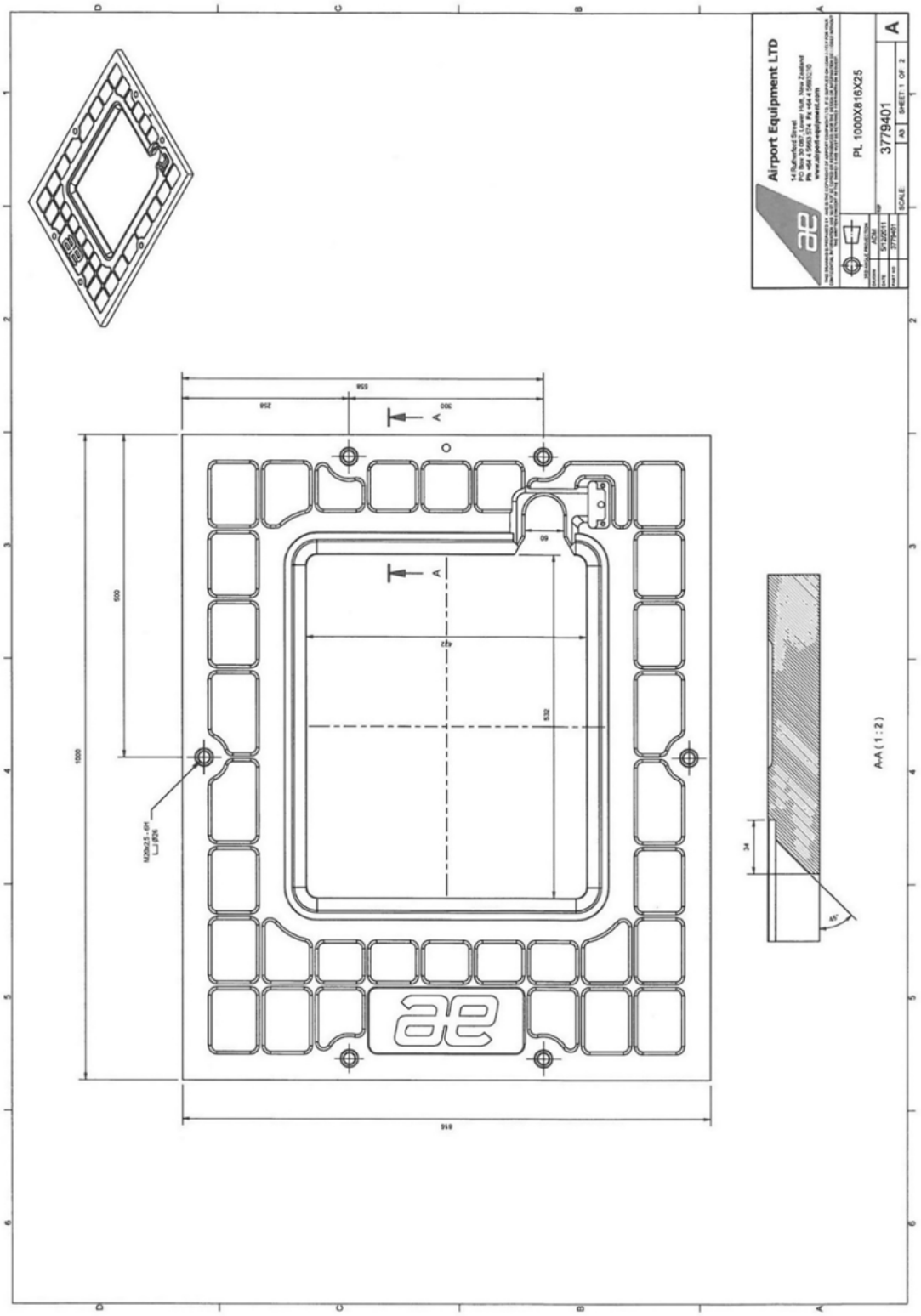

Figure 2. Pit lid assembly (Part number 3779401) (Drawing supplied by the client)

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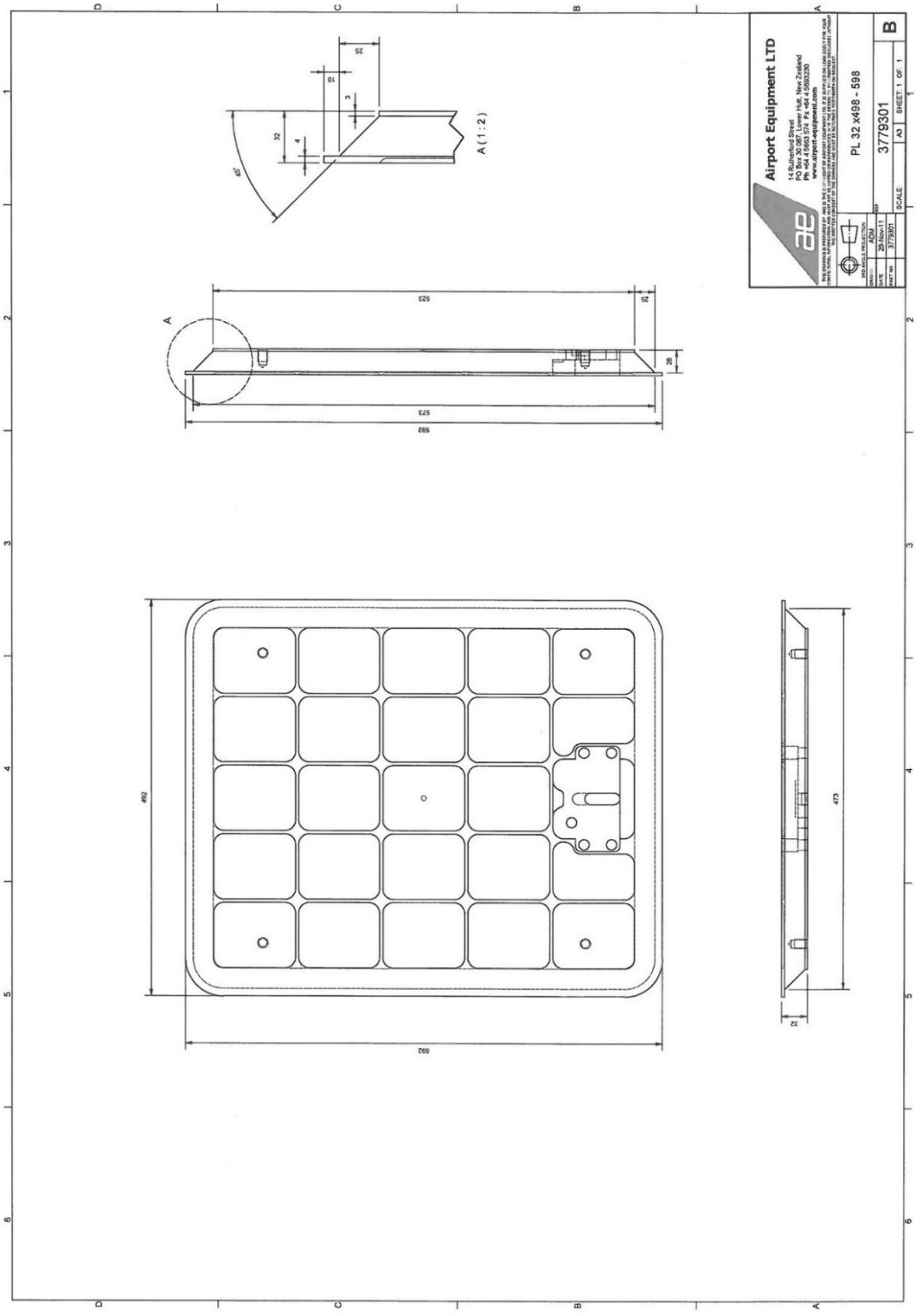

Figure 3. Pit lid (Part number 3779301) (Drawing supplied by the client)

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3. DESCRIPTION OF TESTING

3.1 Date and location of test

The test was carried out in June 2016, at the premises of J & D McLennan, Lower Hutt, New Zealand

3.2 Test set-up

The assembled lid and surround were fitted into a steel frame. The frame was constructed with a rectangular base of 300 mm parallel flange channels (300PFC), with a shelf constructed from 70 mm wide x 25 mm thick mild steel plate to accept the outer edge of the lid assembly. On each of the long edges of the rectangular frame, vertical 300PFCs were welded and to these, a top cross beam of two back-to-back 300PFCs was welded to provide a reaction frame.

A view of the specimen being installed in the frame is presented in Figure 4.

Figure 4. View of the specimen being installed in the test frame

Load was applied to the top of the lid assembly using a 100 tonne capacity ram and hand pump. The load was applied through a rigid steel test block onto a 240 mm x 240 mm x 25 mm thick section of structural plywood. The load was measured with a PT LPCH loadcell (Serial number 1366003) having a range of 100 tonne. The loadcell was connected to a PT 20X-F indicator (Serial number 3322448). The system of loadcell and indicator was calibrated on 14 March 2016 by Australasian Calibrating Services Ltd and determined to be Class 1 in accordance with International Standard EN ISO 7500-1.2004 [2] (calibration certificate appended). The deflection of the geometric centre of the lid was measured with a 10 mm displacement potentiometer for the serviceability loading tests and a 25 mm potentiometer for

the ultimate load test. The potentiometer outputs were captured by a Labview data logging program on a laptop computer and displayed on the computer screen. The potentiometers and logging equipment were calibrated to produce an output accurate to 0.1 mm.

3.3 Test procedure

The assembly was loaded in accordance with clauses C4.3, and C4.5 to C4.7 of AS 3996-2006 [1].

An initial reading from the displacement potentiometer was made before any load was applied. Load was then applied at a rate of between 1 kN/s and 5 kN/s until the load reached 600 kN (61.16 tonne). The load was maintained for 5 seconds, and a second displacement reading was taken at this load. This process was repeated four more times.

The load was finally applied at a rate of between 1 kN/s and 5 kN/s until the load reached 900 kN (91.74 tonne). This load was held for a period of 30 seconds, and the lid assembly was inspected for damage. The load was then released, and a final unloaded displacement reading was made.

4. RESULTS

The displacements recorded during the test are presented in Table 1. The permanent set (differential displacement) after five serviceability cycles was determined to be 0.14 mm.

Table 1. Displacements recorded during the tests

Stage of test	Displacement record (mm)	Differential displacement (mm)
Before loading	0	
600 kN load (First cycle)	6.25	
Unloaded	0.13	
600 kN load (Second cycle)	6.28	
Unloaded	0.14	**0.14**
600 kN load (Third cycle)	6.26	
Unloaded	0.13	
600 kN load (Fourth cycle)	**6.30**	
Unloaded	0.12	
600 kN load (Fifth cycle)	6.13	
Unloaded	0.12	
900 kN load	10.30	
Unloaded	2.16	

5. CONCLUSION

AS 3996-2006 [1] requires that the maximum permanent set for a lid with CO ≤500mm is 1 mm. The maximum recorded permanent set in the test was 0.14 mm. AS 3996-2006 also requires that the maximum deflection does not exceed CO/45 (= 423/45 = 9.4 mm) in the cycles to the serviceability load. The maximum deflection recorded in the serviceability test was 6.30 mm. Under the ultimate limit state load, held for 30 seconds, no cracking or collapse of the lid was observed. The IGPU pit lid therefore satisfies the requirements of Table 4.2 of AS 3996-2006 [1] for a Class G lid when tested in accordance with Appendix C of that Standard.

Since testing the AS 3996:2006 [1] standard has been superseded with AS 3996:2019 [3]. The testing methods used in this report and relevant compliance requirements set out above have not changed between the two versions of AS 3996. The client has confirmed that since testing there has been no change to the product [4] therefore the testing and results are compliant with the current standard AS 3996:2019 [3].

6. REFERENCES

[1] AS 3996:2006 Access covers and grates, Standards Australia, Sydney, Australia.

[2] International Organisation for Standardisation (ISO). 2004. ISO 7500:2004 Metallic Materials – Verification of Static Uniaxial Testing Machines, Part 1: Tension/Compression Testing Machines – Verification and Calibration of the Force-Measuring System. ISO, Geneva, Switzerland.

[3] AS 3996:2019 Access covers and grates, Standards Australia, Sydney, Australia.

[4] Letter dated 9th December 2025 from J&D McLennan Engineering.

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7. APPENDIX

AUSTRALASIAN CALIBRATING

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Issue Date: 14 Mar 2016
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SCN020NZV4.02

VERIFICATION CERTIFICATE
A COMPRESSION TESTING MACHINE

FOR: J&D McLennan Engineers
2-12 Rutherford Street
Lower Hutt
5040

LOCATION: Opus Lower Hutt

DATE OF VERIFICATION: 9 March 2016

EQUIPMENT DETAILS:	Machine	Load Cell	Indicator
Maker:	JD McLennan	PT	PT
Serial Number:	JDM1	1366003	3322448
Plant Number:	Nil	Nil	Nil
Type:	Compression	LPCH 1000000kg	PT20X-F
Range:	100000 kgf x 5 kgf		

Aux Equipment: Nil
Force Application: Hydraulic Ram
Force Indication: Digital Indicator

TEST DETAILS:
- International Standard EN ISO 7500-1:2004.
  Metallic Materials - Verification of static uniaxial testing machines.
  Part 1: Tension/compression testing machines. Verification of the force measuring system.
- The testing machine was verified in compression over a series of three tests with the maximum load device not in operation..
- The method of verification adopted was in accordance with clause 6.4.5 (Fi).
- The ambient temperature at the time of verification was 20°C ± 1 °C.
- Approved Devices were used.
  Reference Number. NZ1000-A.
- Uncertainty Confidence Level = 95% k = 2

PRELIMINARY INSPECTION:
The Equipment was adjusted prior to taking final readings.

.../PERFORMANCE TABLE

Signed .....C. Marlow.....
C. Marlow Approved Signatory

AUSTRALASIAN CALIBRATING SERVICES LTD

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ACCREDITATION Nº: 435

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PERFORMANCE TABLE:

In the following table a plus error shows that the indicated force is greater than the force applied to the test specimen.

Scale Range	Indicated Force	Class	Error %	Repeat %	Uncertainty %	Before Adjustment	Mean Applied Force
Compression	5,000	1	+0.1	0.6	0.51	5,004	4,994
100000 kgf x 5 kgf	10,000	1	+0.0	0.3	0.44	10,032	9,999
	20,000	1	+0.0	0.0	0.39	20,129	19,990
	40,000	1	-0.3	0.0	0.38	40,405	40,103
	60,000	1	-0.4	0.0	0.38	60,711	60,241
	80,000	1	-0.4	0.0	0.38	81,020	80,342
	100,000	1	-0.5	0.0	0.38	101,305	100,455

ZERO READING: The zero was adjusted and recorded prior to each series of measurements. At the conclusion of each series the zero reading was again recorded. The maximum error of zero force did not exceed 0.1% of full scale for each range.

CONCLUSION: The testing machine class based on performance and readability of the scale is included in the above table. The error and repeatability did not exceed the specification requirements within the intervals tabulated.

RECOMMENDED DATE OF NEXT TEST: 09 March 2017

Signed .....C. Marlow.....
C. Marlow Approved Signatory

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