

15 October 1998

E.S. Plastics
59 Higgins Road
HAMILTON

Dear Mike

re: Water Meter Box Lid Test - Standard Box

The test procedure outlined in the attached report was undertaken at The Waikato Polytechnic in the Mechanical Engineering Laboratory. The results detailed in the conclusion of the report are that the lids met the specification criteria. This report is therefore included for your information.

Yours faithfully



Peter Niven
Dean
Faculty of Applied Technology

Water Meter Box Lid Test

Object:

AMBJ - JUMBO BOXES

- - To test a plastic water meter box lid to the specification of 1000 kg and 2000 kg static load.
- -To test a plastic water meter box and lid to the specification of 1000kg and 2000 kg static load.

Apparatus:

- Instron Tensile/Compression Tester capable of no less than 1500 kg static load.
- ESP – lid test jig which resembles the containment of the lid within the box when installed.
- 100 x 100 x 100mm square steel block with which load from the Instron will be placed.

Method: (Lid only)

- ESP – lid test jig is placed on bottom platen of Instron tester with water meter box lid placed inside test jig.
- Square steel block is then placed upon lid in a central position
- Instron crosshead is moved into contact with the steel block – reference distance is recorded.
- Test begins and continues at 10mm/min until 1000 kg of load is applied – deflection distance is measured. Loading continues until a 2000 kg load is applied and deflection is again measured
- Load is released from lid.
- Lid sample is removed from jig – 1 minute after completion of test, permanent deformation is measured.
- Sample is inspected for stress cracking or complete failures.
- A lid "H" set up as above is loaded at 10 mm/min until a maximum value is reached. A graph of load v's compression is recorded

Method: (Box and Lid complete)

- Same procedure as for lid only except, instead of using jig to hold lid, the lid is assembled onto the box. A tall box and short box assembly are tested.
- The box is unrestrained in the X and Y planes.
- A short and tall box/lid assembly, G & I respectively, are each loaded at 10 mm/min until a maximum value is reached and a graph of load v's compression recorded

Results:

The test was completed on the premises of the Waikato Polytechnic using a calibrated Instron tensile tester.

Results are as follows: (lid only)

Sample A – deflection at 1000 kg – 4.0 mm, permanent set – 1.0mm.
deflection at 2000 kg – 8.0 mm, permanent set – 1.0mm.

Sample B – deflection at 1000 kg – 4.5 mm, permanent set – 1.0mm
deflection at 2000 kg – 8.5 mm, permanent set – 1.0mm.

Sample C – deflection at 1000 kg – 4.0 mm, permanent set – 1.0mm
deflection at 2000 kg – 8.0 mm, permanent set – 1.0mm.

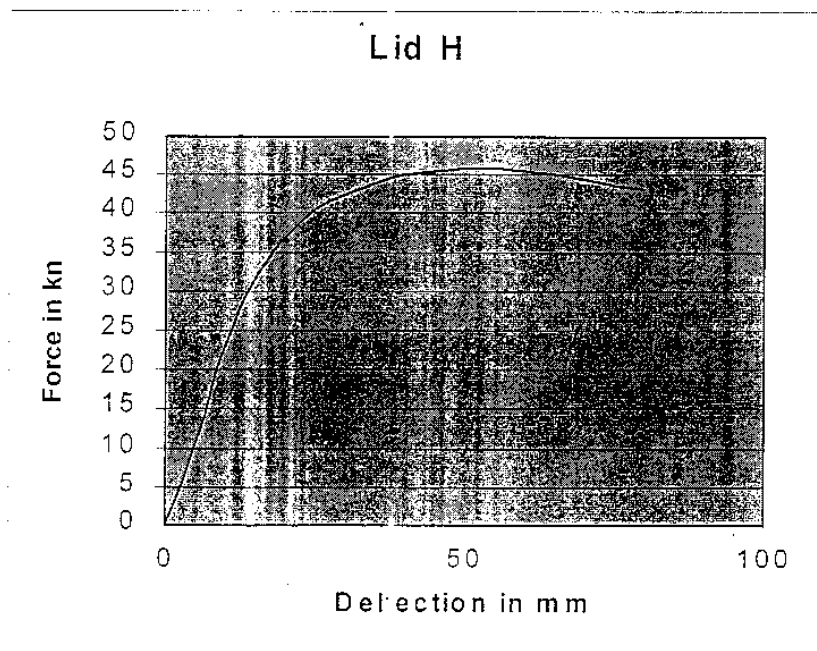
Sample D – deflection at 1000 kg – 4.0 mm, permanent set – 1.0mm
deflection at 2000 kg – 8.0 mm, permanent set – 1.0mm.

Lid and Box Assembly

Sample E (tall box) - deflection at 1000kg – 11.5mm, permanent set – 4.5mm.
deflection at 2000 kg – 27.0 mm, permanent set – 4.5mm.

Sample F (short box) – deflection at 1000kg – 10.5mm, permanent set – 4.5mm.
deflection at 2000 kg – 22.5 mm, permanent set – 4.5mm.

The results of the maximum applied loading tests on the lid and short and tall box/lid assemblies are shown in the load v's compression graphs below.



LARGE METER BOX LOAD TESTING AMB350 300 x 260 x 350

Test requirements were a load of 3000kg be placed on the top of the meter box this weight should not compress the overall height of the box more than 15mm.

**Test one 3500kg force applied to the entire top face of the meter box when mounted on a steel plate with no support from the sides (no packed earth).
Weight held for 5 minutes at full force.**

Results test one: An overall height deflection of 9-10mm
 Deflection inward of box in ribbed areas 20mm overall
 No permanent damage to any part of the assembly
 (All parts returned to original shape after test)

**Test two 3500kg applied to an area of 195mm in diameter on the meter box lid
Placed in a meter box on a steel plate with no support from packed earth.
Test force applied for a period of 5 minutes.**

Results test two: An overall height deflection of 9-13mm
 (range of deflection from corner to centre of top face)
 deflection inward of box in ribbed areas 20mm overall
 No permanent damage to any part of the assembly
 (All part returned to original shape after testing)

Based on the test as outlined to me both testing options passed without problem.

Yours sincerely



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STANDARD Water Meter Box Lid Test

Object:

- - To test a plastic water meter box lid to the specification of 1000kg static load.
- – To test a plastic water meter box and lid to the specification of 1000kg static load.

Apparatus:

- Instron Tensile/Compression Tester capable of no less than 1500 kg static load.
- ESP – lid test jig which resembles the containment of the lid within the box when installed.
- 100 x 100 x 100mm square steel block with which load from the Instron will be placed.

Method: (Lid only)

- ESP – lid test jig is placed on bottom platen of Instron tester with water meter box lid placed inside test jig.
- Square steel block is then placed upon lid in a central position
- Instron crosshead is moved into contact with the steel block – reference distance is recorded.
- Test begins and continues at 10mm/min until 1000 kg of load is applied – deflection distance is measured.
- Load is released from lid.
- Lid sample is removed from jig. 1 minute after completion of test, permanent deformation is measured.
- Sample is inspected for stress cracking or complete failures.

Method: (Box and Lid complete)

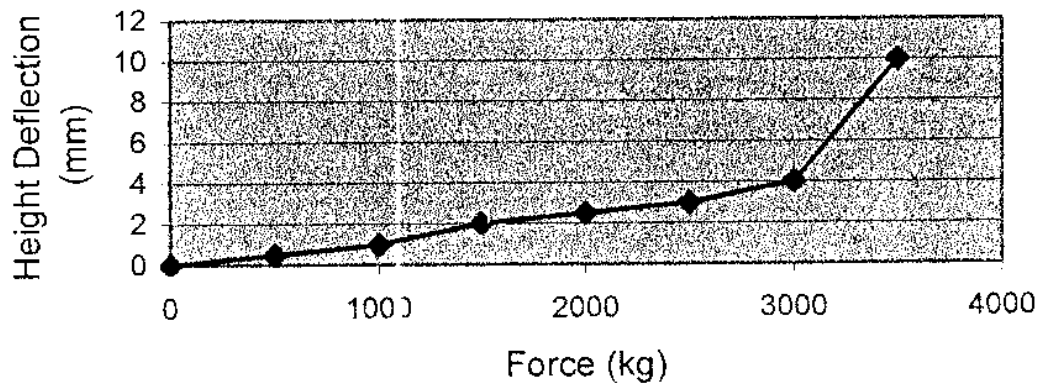
- Same procedure as for lid only except, instead of using jig to hold lid, the lid is assembled onto the box.
- The box is unrestrained in the X and Y planes.

Results:

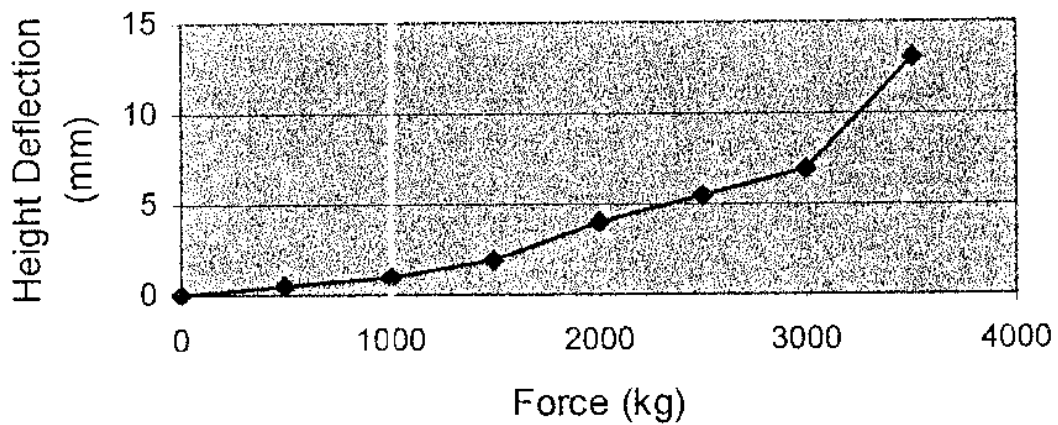
The test was completed on the premises of the Waikato Polytechnic using a calibrated Instron tensile tester.

AM1350 300 x 260 x 350

Large Meter Box Loading Test *Test One*



Large Meter Box Loading Test *Test Two*



Lid samples A,B,C,D and tall & short box/lid samples E and F showed no evidence of failures or areas of high stress concentration after completion of the loading tests.

Conclusion:

Based on the results of the loading tests it is considered the individual lids and the box/lid assemblies performed adequately.

As a consequence the box/lid assemblies, as they will be installed, should function satisfactorily in service.

Bryan Fowles



Technician

Mechanical engineering.

November 2000