STRUCTURES TEST REPORT

ST1229-01-01

SMC MANHOLE COVER LOAD TESTING TO EN124:1994 [2015]

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

TEST SPONSOR

Prelude Holdings Ltd
17 Puriri Road
Beachlands
Auckland 2018
New Zealand

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.

DOCUMENT REVISION STATUS

ISSUE NO.	DATE ISSUED	DESCRIPTION
01	13/03/2026	Initial Issue

branz.nz | 1222 Moonshine Rd, RD1, Porirua 5381, Private Bag 50 908, Porirua 5240, New Zealand | Phone +64 4237 1170 | branz@branz.co.nz

SIGNATORIES

Author

Lucy Brosnan
Structural Testing Engineer
Authorised to author this report

Reviewed by

Dr David Carradine
Structures Team Leader
Authorised to review this report

Authorised by

Dr David Carradine
Structures Team Leader
Authorised to release this report to client

branz.nz | 1222 Moonshine Rd, RD1, Porirua 5381, Private Bag 50 908, Porirua 5240, New Zealand | Phone +64 4237 1170 | branz@branz.co.nz

CONTENTS

DOCUMENT REVISION STATUS 2
SIGNATORIES 3
1. OBJECTIVE 5
2. DESCRIPTION OF SPECIMENS 5
3. DESCRIPTION OF TESTING 5
3.1 Date and location of test 5
3.2 Test set-up 5
3.3 Test procedure 6
4. RESULTS 7
5. CONCLUSION 8
6. REFERENCES 8

branz.nz | 1222 Moonshine Rd, RD1, Porirua 5381, Private Bag 50 908, Porirua 5240, New Zealand | Phone +64 4237 1170 | branz@branz.co.nz

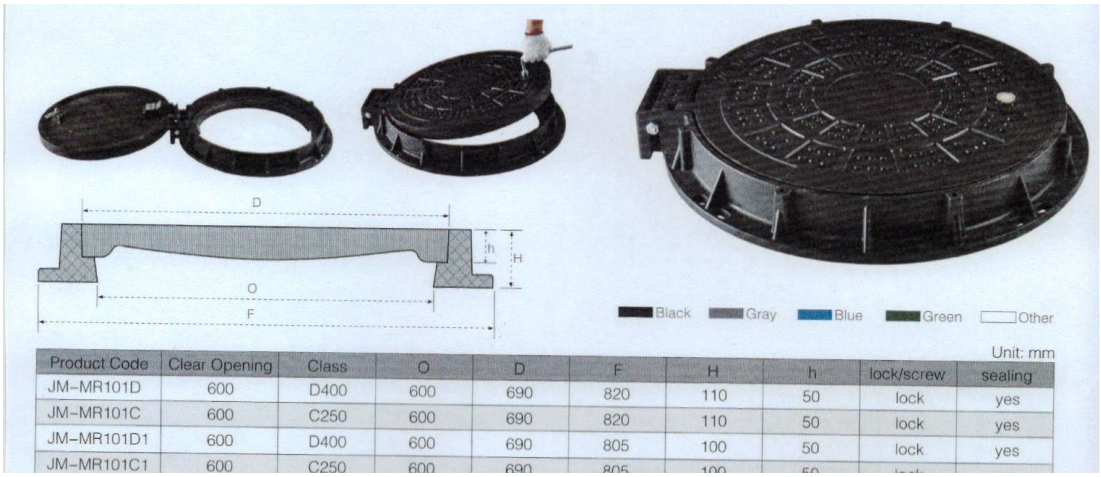
1. OBJECTIVE

This report is a reissue of an older BRANZ TYPE TEST report ST1229-TT [2017] issued on the 2 August 2017.

To undertake a Type Test in accordance with clause 8.2.4 of BS EN 124:1994 [1] *Gully tops and manhole tops for vehicular and pedestrian areas – Design requirements, type testing, marking, quality control* of an SMC Manhole Cover. The load classification being sought was Class D400 in accordance with Table 6 of the Standard.

2. DESCRIPTION OF SPECIMENS

The SMC Manhole Cover assembly is manufactured from sheet moulding compound plastic consisting of special yarns, unsaturated resin, low shrinkage additives, fillers and various additives. The Manhole Cover had the dimensions as shown in Figure 1 and its Product Code was JM-MR101D1. The circular opening (CO) size was 600 mm. The outer diameter of the actual lid was 690 mm and the outer diameter of the support frame was 805 mm. The marking on the top of the cover was "EN124 D400 SMC". It is understood from the client that the cover was shipped to him as a single sample for testing.



Unit: mm

Product Code	Clear Opening	Class	O	D	F	H	h	lock/screw	sealing
JM-MR101D	600	D400	600	690	820	110	50	lock	yes
JM-MR101C	600	C250	600	690	820	110	50	lock	yes
JM-MR101D1	600	D400	600	690	805	100	50	lock	yes
JM-MR101C1	600	C250	600	690	805	100	50	lock	yes

Figure 1. Manhole Cover assembly (Product Code JM-MR101D1) (Information supplied by the client)

3. DESCRIPTION OF TESTING

3.1 Date and location of test

The test was carried out in August 2017, at the premises of J & D McLennan, Lower Hutt, New Zealand.

3.2 Test set-up

The Manhole Cover and surrounding frame were seated on a rigid 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. A 32 mm thick steel plate rested on the shelf. The Manhole Cover assembly rested on the top of the 32 mm thick plate.

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 installed in the reaction frame is presented in Figure 2.

Figure 2. View of the specimen installed in the test frame

Load was applied to the top of the Manhole Cover assembly using a 60 tonne capacity ram and hand pump. The load was applied through a 250 mm diameter x 32 mm thick steel test block onto a 250 mm diameter x 26 mm thick section of oriented strand board (OSB). The load was measured with a calibrated circular hollow loadcell (BRANZ Fire Loadcell) having a range of 500 kN. The loadcell was connected to Strain indicator (BRANZ LB2). The system of loadcell and indicator was calibrated on 28 March 2017 in the BRANZ laboratory and determined to be Class 1 in accordance with International Standard EN ISO 7500-1.2004 *Metallic materials. Calibration and verification of static uniaxial testing machines. Tension/compression testing machines. Calibration and verification of the force-measuring system* [2]. The deflection of the geometric centre of the lid was measured with a 25 mm displacement potentiometer for the serviceability loading tests and for the ultimate load test. The potentiometer outputs were captured by a laptop computer running a FlexDAQ software program 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 8.3 of S EN 124:1994 [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 267 kN. The load was maintained for 5 seconds, and a second displacement reading was taken at this

load before the load was released and a further displacement reading taken. This process was repeated five more times (note that the cycling should have been repeated only 4 times).

The load was finally applied at a rate of between 1 kN/s and 5 kN/s until the load reached 400 kN. 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 0.63 mm.

Table 1 Displacements recorded during the tests

Stage of test	Differential displacement (mm)	Permanent set due to service design load (mm)
Before loading	0.00	
267 kN load (First cycle)	6.53	
Unloaded	0.55	
267 kN load (Second cycle)	6.60	
Unloaded	0.58	
267 kN load (Third cycle)	6.64	
Unloaded	0.60	
267 kN load (Fourth cycle)	6.66	
Unloaded	0.63	
267 kN load (Fifth cycle)	6.65	
Unloaded	**0.63**	**0.63**
267 kN load (Sixth cycle)	6.66	
Unloaded	0.63	
400 kN load	9.37	
Unloaded	0.73	

branz.nz | 1222 Moonshine Rd, RD1, Porirua 5381, Private Bag 50 908, Porirua 5240, New Zealand | Phone +64 4237 1170 | branz@branz.co.nz

5. CONCLUSION

BS EN 124:1994 [1] requires that the permissible permanent set for a lid with CO ≥500 mm is 1/300 times CO = 2.0 mm. The permanent set in the test was 0.63 mm. Under the ultimate limit state load, held for 30 seconds, no cracking or collapse of the lid was observed. The SMC Manhole Cover JM-MR101D1 therefore satisfies the requirements of Table 8 of BS EN 124:1994 [1] for a Class D400 lid when tested in accordance with clause 8.3 of that Standard.

Since these tests have been carried out the standard has been updated to BS EN 124: 2015 [3]. The 2015 revision expands the scope to include specific requirements for composite, concrete, and plastic materials, bringing them fully into the scope of the standard. Accordingly, the standard is split into 6 parts divided by material and application. Part 5 is applicable to composite materials which is relevant to the specimen tested within this report.

BS EN 124- 5: 2015 [3] Table 3 sets out the requirements related to design and performance. The performance requirements in the current standard that relate to the testing carried out within this report are load bearing capacity and permanent set. The requirements reference BS EN 124- 1: 2015 [5] clauses 7.2 and 8.3 for load bearing capacity and clauses 7.3 and 8.2 for permanent set. The client has confirmed since testing there has been no change to the product [4] and testing carried out in this report is compliant with clauses 7.2,7.3,8.2 & 8.3 of reference BS EN 124- 1: 2015 [5]. Therefore, compliant to the specific requirements in BS EN 124- 5: 2015, Table 3, load bearing capacity and permanent set.

Note there are other performance requirements related to design and performance in the current standard BS EN 124- 1: 2015 [5] that are not covered in this report.

6. REFERENCES

[1] BS EN 124:1994 *Gully tops and manhole tops for vehicular and pedestrian areas – Design requirements, type testing, marking, quality control*, British Standards.

[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] BS EN 124- 5: 2015 *Gully tops and manhole tops for vehicular and pedestrian areas - Part 5: Gully tops and manhole tops made of composite material,* British Standards.

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

[5] BS EN 124- 1: 2015 *Gully tops and manhole tops for vehicular and pedestrian areas - Part 1: Definitions, classification, general principles of design, performance requirements and test methods,* British Standards.

branz.nz | 1222 Moonshine Rd, RD1, Porirua 5381, Private Bag 50 908, Porirua 5240, New Zealand | Phone +64 4237 1170 | branz@branz.co.nz