TECHNOLOGY CENTRE

Technical Report

Title: Product weathertightness testing of a sample of Gebrik Walling

Report No: N950-11-16439

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Title: Product weathertightness testing of a sample of Gebrik Walling.

Client: Isosystems, Malmedyer Weg, 62, B-4770 AMEL/SCHOPPEN

Issue date: 10 November 2011

TC job number: TMV054-13PK5

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Distribution: 1copy to Isosystems
(confidential) 1 copy to project file
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UKAS TESTING 0057

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1 INTRODUCTION

This report describes tests carried out at the Technology Centre at the request of Isosystems Limited.

The test sample consisted of a sample of Gebrik Walling.

The tests were carried out during September 2011 and were to determine the weathertightness of the test sample. The test methods were in accordance with the CWCT Standard Test Methods for building envelopes, 2005, for:

Air permeability.

Watertightness – static pressure, dynamic pressure and hose.

Wind resistance – serviceability & safety.

Impact resistance to BS8200.

The testing was carried out in accordance with Technology Centre Method Statement C3988/MS rev 0.

This test report relates only to the actual sample as tested and described herein.

The results are valid only for sample(s) tested and the conditions under which the tests were conducted.

Technology Centre is accredited to ISO/IEC 17025:2008 by the United Kingdom Accreditation Service as UKAS Testing Laboratory No.0057.

Technology Centre is certified by BSI for:

- ISO 9001:2008 Quality Management System,
- ISO 14001:2004 Environmental Management System,
- BS OHSAS 18001:2007 Occupational Health and Safety Management System.

The tests were witnessed wholly or in part by:

Paul Richards - Aquarian Cladding
John Hoban - Mount Anvil

Observed, in part:

David White - NHBC

2 DESCRIPTION OF TEST SAMPLE

2.1 GENERAL ARRANGEMENT

The sample was as shown in the photo below and the drawings included as an appendix to this report.

PHOTO 9270013

TEST SAMPLE

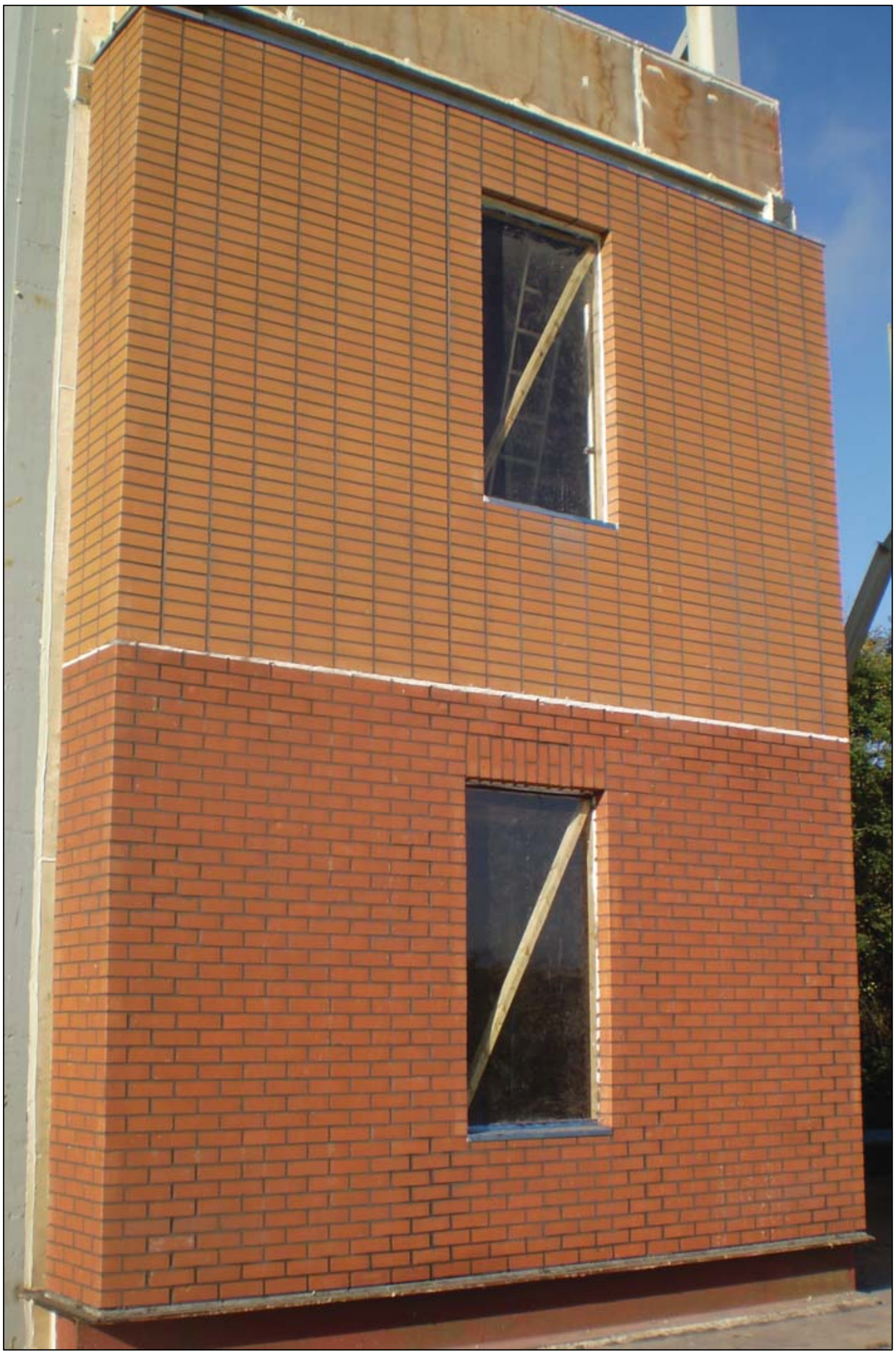


PHOTO 9300038

GEBBRIK PANEL

PHOTO 921001

TEST SAMPLE DURING CONSTRUCTION

PHOTO 923006

TEST SAMPLE DURING CONSTRUCTION

PHOTO 9230008

TEST SAMPLE DURING CONSTRUCTION

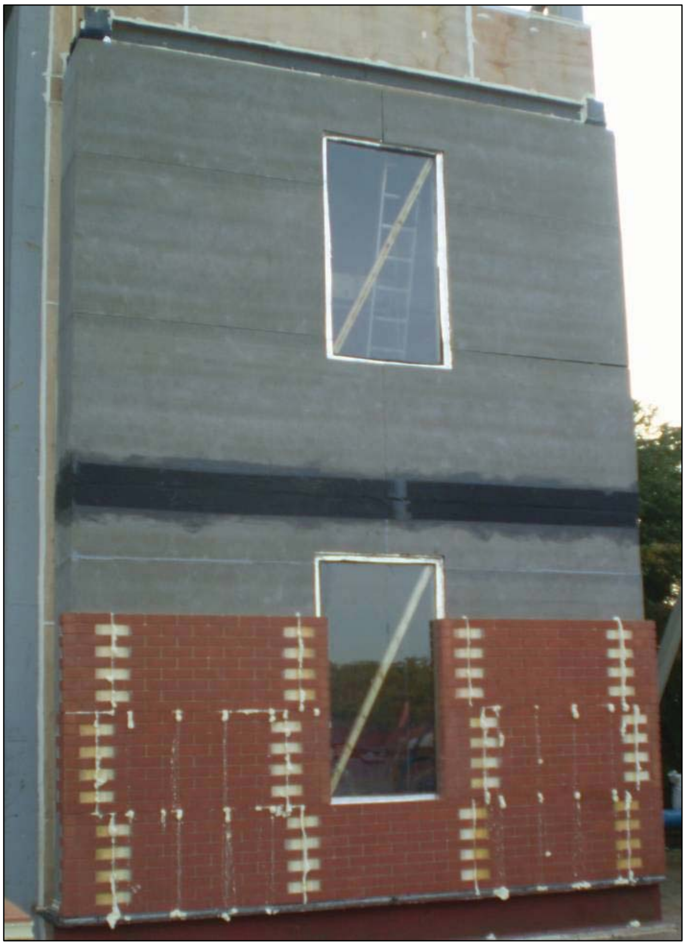


PHOTO 9290021

INTERNAL VIEW BENEATH LOWER WINDOW OPENING

2.2 CONTROLLED DISMANTLING

During the dismantling of the sample no water penetration or discrepancies from the drawings were found in the Gebrik system. At the base of the sample a small quantity of foam sealant had been applied in a couple of locations where water had been observed.

PHOTO 9300028

CORNER DETAIL

PHOTO 9300031

UPPER GEBRIK PANELS REMOVED

PHOTO 9300043

UPPER PANELS WITH MEMBRABE OVER JOINTS

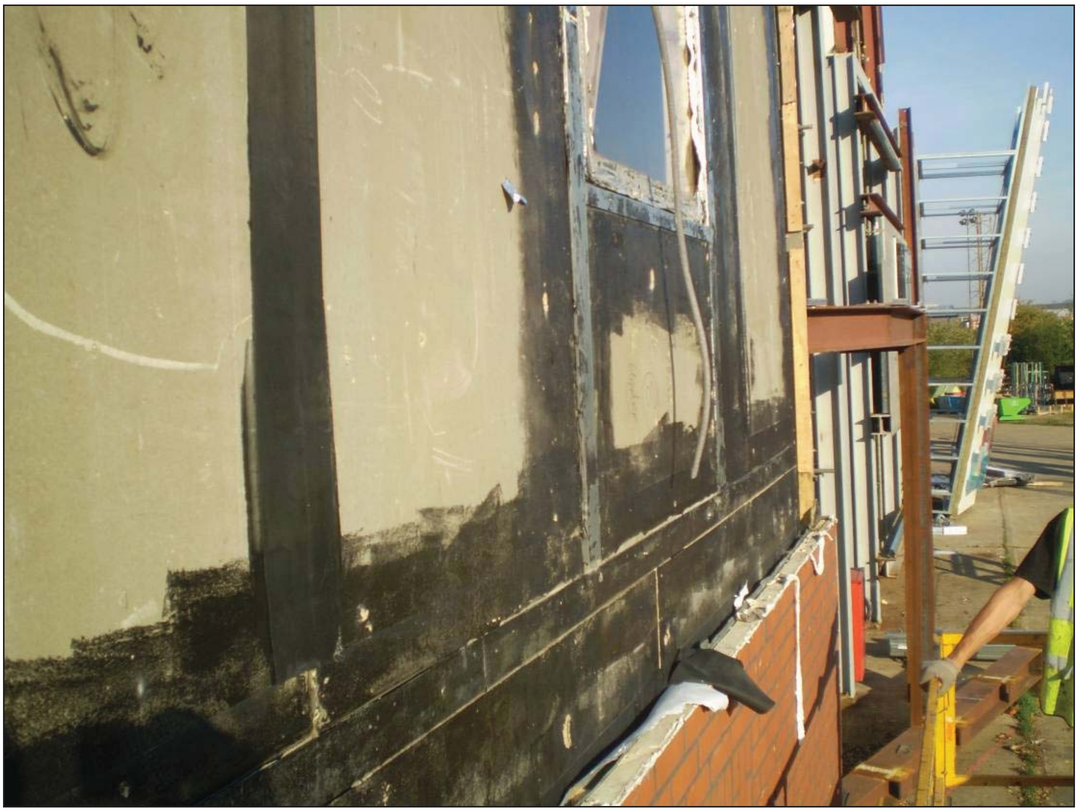


PHOTO 930051

AREA BETWEEN UPPER AND LOWER SECTIONS

PHOTO 9300054

CORNER VIEW AT BASE OF SAMPLE

PHOTO 9300056

BOTTOM CORNER DTAIN AT PERIMETER OF WINDOW OPENING

PHOTO 9300065

METSEC FRAME AT LOWER LEVEL OF SAMPLE

PHOTO 1000001

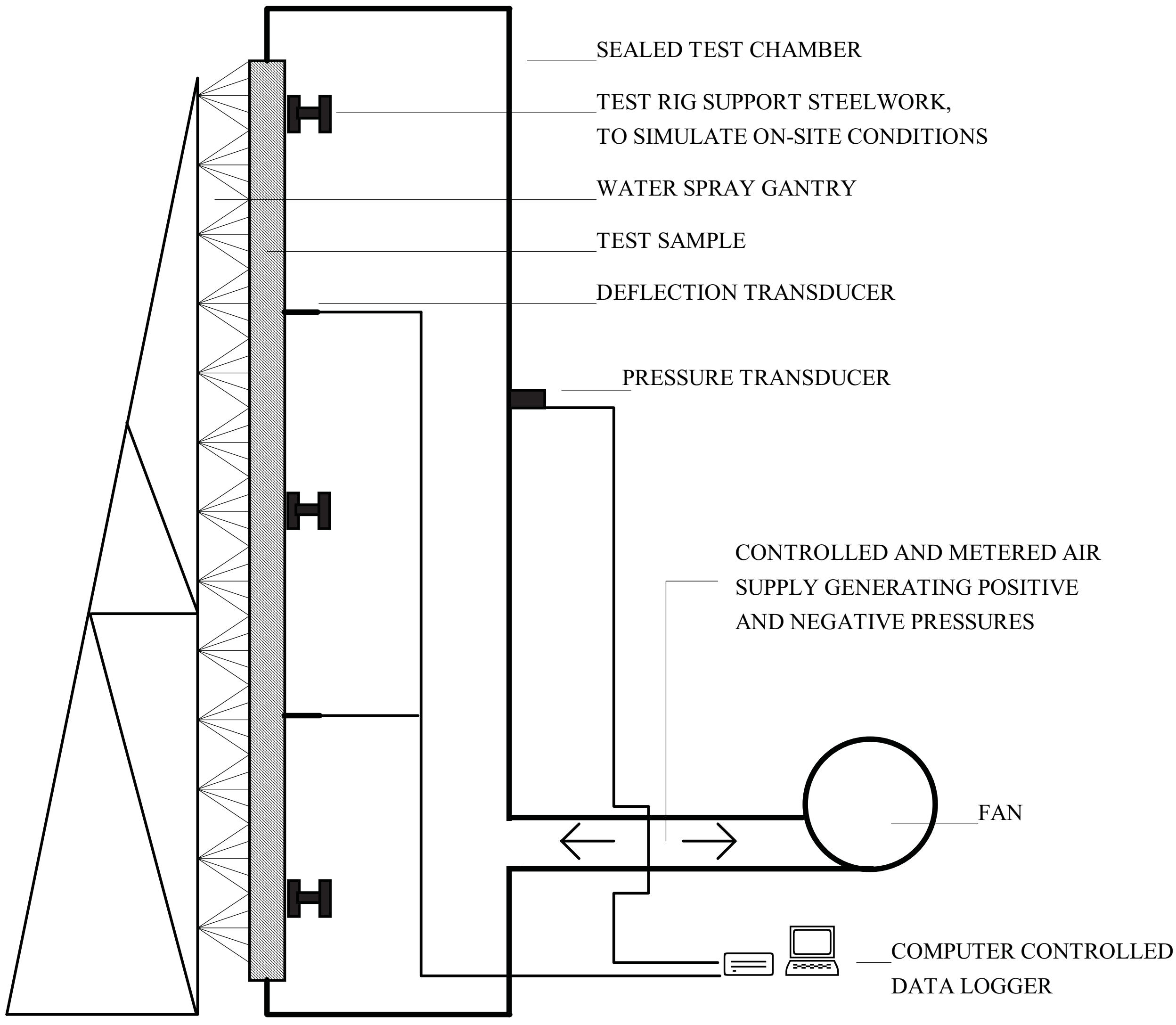
SIDE OF UPPER COMPOSITE PANEL REMOVED FROM TEST RIG

3 TEST RIG GENERAL ARRANGEMENT

The test sample was mounted on a rigid test rig with support steelwork designed to simulate the on-site/project conditions. The test rig comprised a well sealed chamber, fabricated from steel and plywood. A door was provided to allow access to the chamber. See Figure 1.

FIGURE 1

TYPICAL TEST RIG SCHEMATIC ARRANGEMENT



SECTION THROUGH TEST RIG

4 TEST SEQUENCE

The test sequence was as follows:

(1) Air permeability

(2) Watertightness – static

(3) Wind resistance – serviceability

(4) Air permeability

(5) Watertightness – static

(6) Watertightness – dynamic

(7) Watertightness – hose

(8) Wind resistance – safety

(9) Impact resistance

(10) Wind resistance – serviceability to outer wall

(11) Wind resistance – safety to outer wall

5 CLASSIFICATION OF TEST RESULTS

TABLE 1

Test	Standard	Classification / Declared value
Air permeability	CWCT	A4
Watertightness	CWCT	R7
Wind resistance	CWCT	±2400 pascals serviceability ±3600 pascals safety
Impact resistance	BS8200	Soft and hard body Class B

6 AIR PERMEABILITY TESTING

6.1 INSTRUMENTATION

6.1.1 Pressure

One static pressure tapping was provided to measure the chamber pressure and was located so that the readings were unaffected by the velocity of the air supply into or out of the chamber.

A pressure transducer, capable of measuring rapid changes in pressure to within 2% was used to measure the differential pressure across the sample.

6.1.2 Air Flow

A laminar flow element mounted in the air system ductwork was used with a pressure transducer to measure the air flow into the chamber. This device was capable of measuring airflow through the sample to within 2%.

6.1.3 Temperature

Platinum resistance thermometers (PRT) were used to measure air temperatures to within 1°C.

6.1.4 General

Electronic instrument measurements were scanned by a computer controlled data logger, which also processed and stored the results.

All measuring instruments and relevant test equipment were calibrated and traceable to national standards.

6.2 FAN

The air supply system comprised a variable speed centrifugal fan and associated ducting and control valves to create positive and negative static pressure differentials. The fan provided essentially constant air flow at the fixed pressure for the period required by the tests and was capable of pressurising at a rate of approximately 600 pascals in one second.

6.3 PROCEDURE (CWCT)

Three positive pressure pulses of 1200 pascals were applied to prepare the test sample.

The average air permeability was determined by measuring the rate of air flow through the chamber whilst subjecting the sample to positive pressure differentials of 50, 100, 150, 200, 300, 450 and 600 pascals. Each pressure increment was held for at least 10 seconds.

Extraneous leakage through the test chamber and the joints between the chamber and the test sample was determined by sealing the sample with polythene sheet and adhesive tape and measuring the air flow at the pressures given above.

The test was then repeated with the sample unsealed; the difference between the readings being the rate of air flow through the sample.

The test was then repeated using negative pressure differentials.

6.4 PASS/FAIL CRITERIA

The permissible air flow rate, Q_o, at peak test pressure, p_o, could not exceed: 1.5 m^3 per hour per m^2.

At intermediate pressures, p_n, flow rates, Q_n, were calculated using $Q_n = Q_o(p_n/p_o)^{2/3}$
The area of the sample was 32.2 m^2.

6.5 RESULTS

TABLE 2

Pressure differential (pascals)	Measured air flow through sample (m^3/hour/m^2)			
	Test 1 Date: 27 September 2011		Test 4 Date: 28 September 2011	
	Infiltration	Exfiltration	Infiltration	Exfiltration
50	0.01	0.01	0.00	0.00
100	0.04	0.00	0.00	0.00
150	0.04	0.01	0.00	0.01
200	0.03	0.04	0.00	0.05
300	0.08	0.04	0.00	0.09
450	0.07	0.05	0.00	0.08
600	0.09	0.05	0.00	0.16
Temperatures	Ambient = 17°C Chamber = 17°C		Ambient = 21°C Chamber = 22°C	

The results are shown graphically in Figures 2 and 3.

FIGURE 2

Air infiltration test results

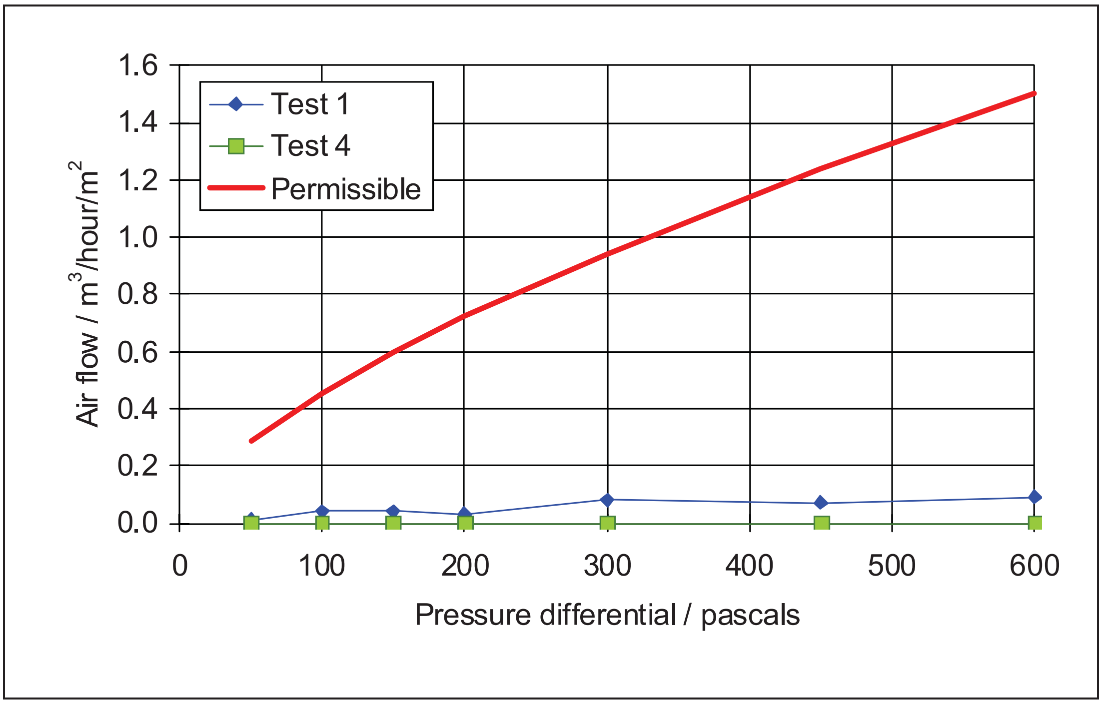
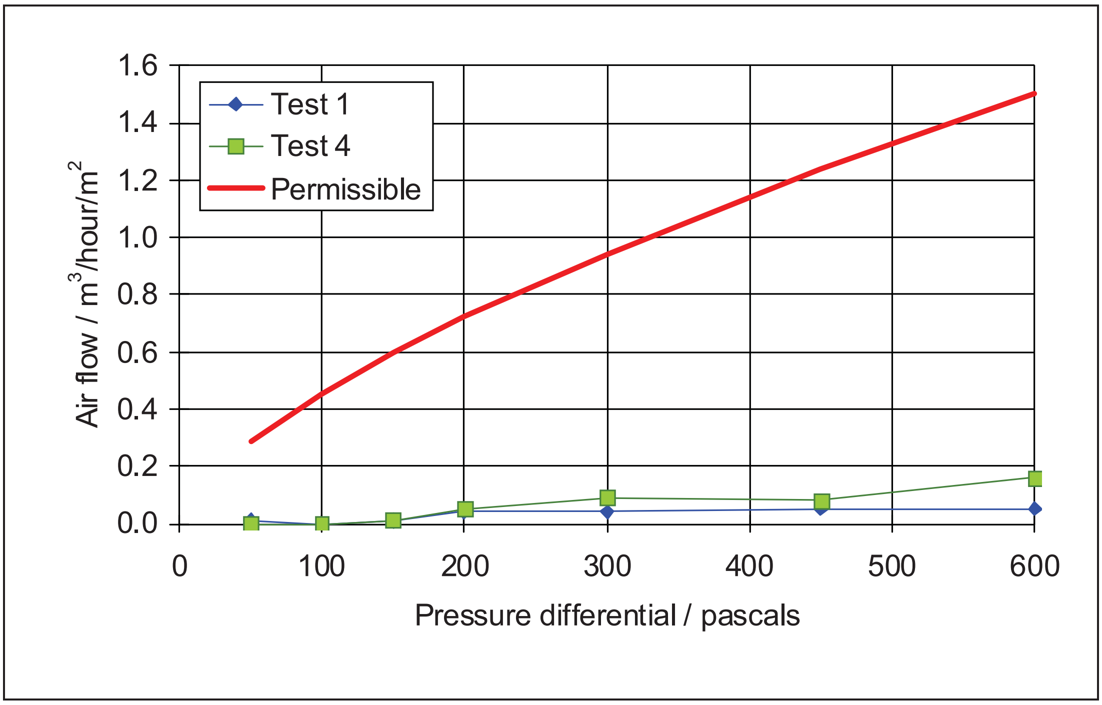


FIGURE 3

Air exfiltration test results



7 WATERTIGHTNESS TESTING

7.1 INSTRUMENTATION

7.1.1 Pressure

One static pressure tapping was provided to measure the chamber pressure and was located so that the readings were unaffected by the velocity of the air supply into or out of the chamber.

A pressure transducer, capable of measuring rapid changes in pressure to within 2% was used to measure the differential pressure across the sample.

7.1.2 Water Flow

An in-line water flow meter was used to measure water supplied to the spray gantry to within 5%.

7.1.3 Temperature

Platinum resistance thermometers (PRT) were used to measure air and water temperatures to within 1°C.

7.1.4 General

Electronic instrument measurements were scanned by a computer controlled data logger, which also processed and stored the results.

All measuring instruments and relevant test equipment were calibrated and traceable to national standards.

7.2 FAN

7.2.1 Static Pressure Testing

The air supply system comprised a variable speed centrifugal fan and associated ducting and control valves to create positive and negative static pressure differentials. The fan provided essentially constant air flow at the fixed pressure for the period required by the tests and was capable of pressurising at a rate of approximately 600 pascals in one second.

7.2.2 Dynamic Pressure Testing

A wind generator was mounted adjacent to the external face of the sample and used to create positive pressure differentials during dynamic testing. The wind generator comprised a piston type aero-engine fitted with 4 m diameter contra-rotating propellers.

7.3 WATER SPRAY

7.3.1 Spray Gantry

The water spray system comprised nozzles spaced on a uniform grid not more than 700 mm apart and mounted approximately 400 mm from the face of the sample. The nozzles provided a full-cone pattern with a spray angle between 90° and 120°. The spray system delivered water uniformly against the exterior surface of the sample.

7.3.2 Hose test

The water was applied using a brass nozzle that produced a full-cone of water droplets with a nominal spray angle of 30°. The nozzle was used with a ¾" hose and provided with a control valve and a pressure gauge between the valve and nozzle.

7.4 PROCEDURE

7.4.1 Watertightness – static (CWCT)

Three positive pressure pulses of 1200 pascals were applied to prepare the test sample.

Water was sprayed onto the sample using the method described above at a rate of at least 3.4 litres/m^2/minute for 15 minutes at zero pressure differential. With the water spray continuing the pressure differential across the sample was then increased in increments of: 50, 100, 150, 200, 300, 450 and 600 pascals, each held for 5 minutes.

Throughout the test the interior face of the sample was examined for water penetration.

7.4.2 Watertightness – dynamic (CWCT)

Water was sprayed onto the sample using the method described above at a flow rate of at least 3.4 litres/m^2/minute.

The aero-engine was used to subject the sample to wind of sufficient velocity to produce the equivalent static pressure differential of 600 pascals. These conditions were maintained for 15 minutes. Throughout the test the inside of the sample was examined for water penetration.

7.4.3 Watertightness – hose (CWCT)

Working from the exterior, the selected area was wetted progressing from the lowest horizontal joint, then the intersecting vertical joints, then the next horizontal joint above, etc. The water was directed at the joint and perpendicular to the face of the sample. The nozzle was moved slowly back and forth above the joint at a distance of 0.3 metres from it for a period of 5 minutes for each 1.5 metres of joint. Shorter or slightly longer joints were tested pro rata. The water flow to the nozzle was adjusted to produce 22, ±2 litres per minute when the water pressure at the nozzle inlet was 220, ±20 kPa.

Throughout the test the interior face of the sample was examined for water penetration. The joints tested are shown in Figure 4.

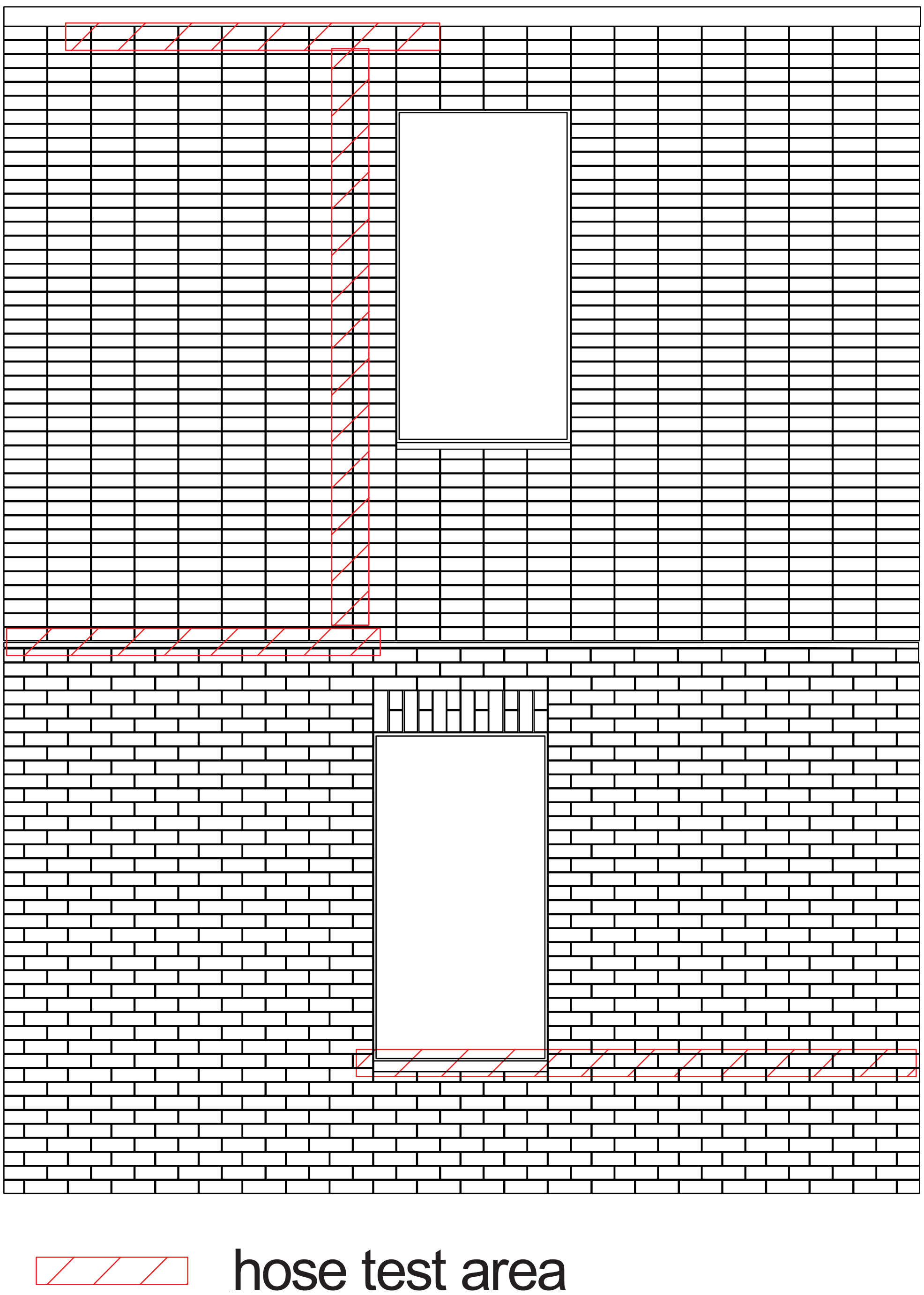
7.5 PASS/FAIL CRITERIA

There shall be no water penetration to the internal face of the sample throughout testing. At the completion of the test there shall be no standing water in locations intended to remain dry.

FIGURE 4

HOSE TEST AREAS

External View



7.6 RESULTS

<u>Test 2 (Static pressure)</u> Date: 28 September 2011

No water penetration was observed through the Gebrik system throughout the test.

After 1 minute at a pressure differential of 450 pascals, water was observed at the base of from a redundant fixing hole in the base of the Metsec frame at location 1 in Figure 5.

After 4 minutes at a pressure differential of 600 pascals water was also observed ponding from a joint in the bottom the Metsec frame at location 2 in Figure 5.

Chamber temperature= 17°C
Ambient temperature = 15°C
Water temperature = 17°C

Note: These leaks were not through the Gebrik system but the base perimeter seal to the test chamber. The base support steelwork projected passed the front face of the Gebrik allowing water to pool along the base and was not as shown in the drawings attached to the appendix.

Remedial work

The following remedial work was carried out by Aquarian Cladding Limited:

The hole was sealed over in location 1 and the joint in the Metsec frame sealed over in location 2. Additional foam sealant was applied at the base of the sample at these locations only.

Test 5 (Static pressure) Date: 28 September 2011

No water penetration was observed through the Gebrik system throughout the test.

After 1 minute at a pressure differential of 600 pascals water was observed ponding in the base of the return at location 1 in Figure 5.

Chamber temperature= 22°C
Ambient temperature = 21°C
Water temperature = 18°C

Note: This leak was not through the Gebrik system but the base perimeter seal to the test chamber.

Test 6 (Dynamic pressure) Date: 28 September 2011

No water penetration was observed throughout the test.

Chamber temperature= 24°C
Ambient temperature = 22°C
Water temperature = 18°C

Test 7 (Hose) Date: 28 September 2011

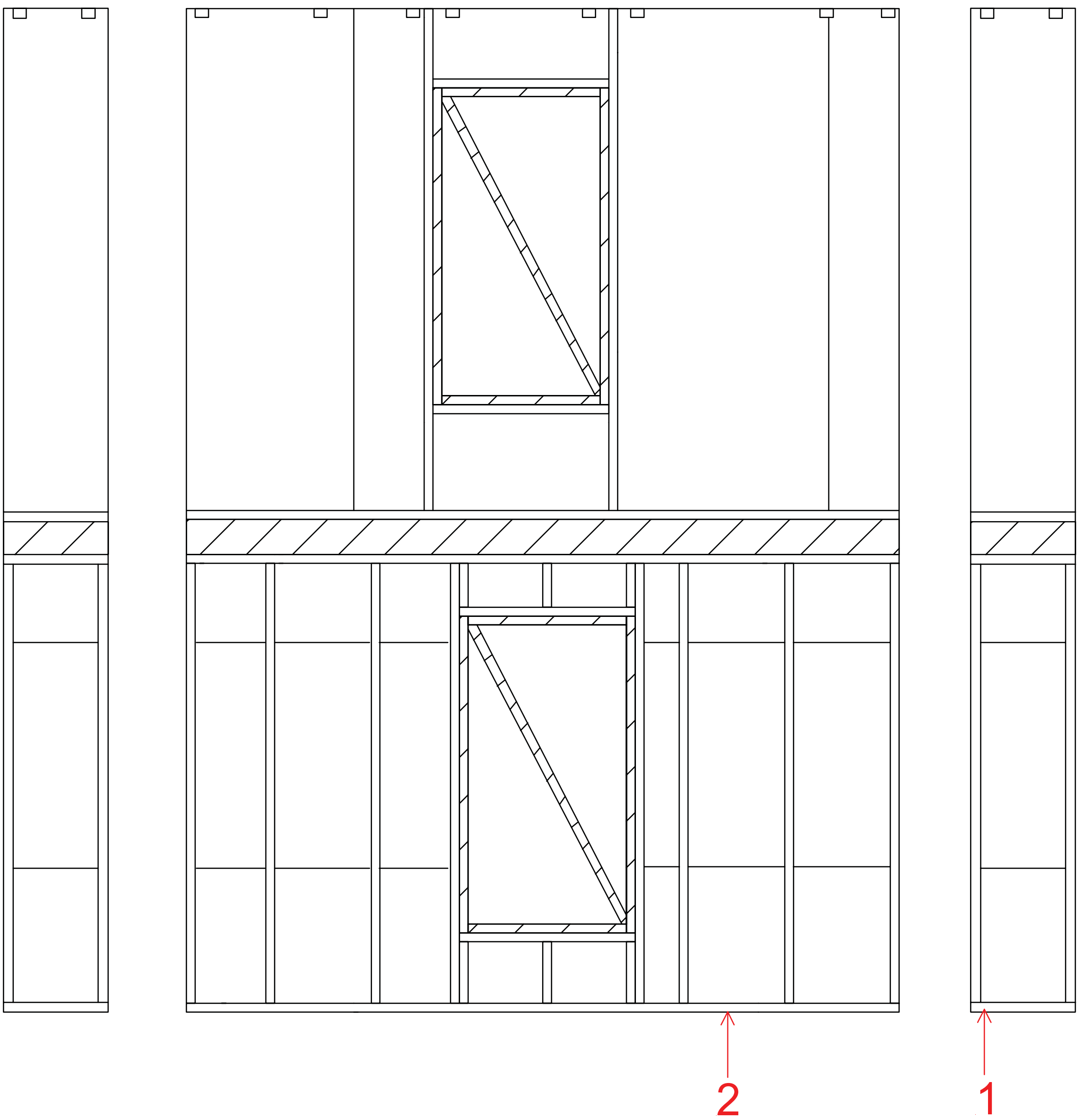
No water penetration was observed throughout the test.

Chamber temperature= 24°C
Ambient temperature =22°C
Water temperature = 18°C

FIGURE 5

WATER LEAKAGE LOCATIONS

Internal view



8 WIND RESISTANCE TESTING

8.1 INSTRUMENTATION

8.1.1 Pressure

One static pressure tapping was provided to measure the chamber pressure and was located so that the readings were unaffected by the velocity of the air supply into or out of the chamber.

A pressure transducer, capable of measuring rapid changes in pressure to within 2% was used to measure the differential pressure across the sample.

8.1.2 Deflection

Displacement transducers were used to measure the deflection of principle framing members to an accuracy of 0.1 mm. The gauges were set normal to the sample framework at mid-span and as near to the supports of the members as possible and installed in such a way that the measurements were not influenced by the application of pressure or other loading to the sample. The gauges were located at the positions shown in Figure 6.

8.1.3 Temperature

Platinum resistance thermometers (PRT) were used to measure air temperatures to within 1°C.

8.1.4 General

Electronic instrument measurements were scanned by a computer controlled data logger, which also processed and stored the results.

All measuring instruments and relevant test equipment were calibrated and traceable to national standards.

8.2 FAN

The air supply system comprised a variable speed centrifugal fan and associated ducting and control valves to create positive and negative static pressure differentials. The fan provided essentially constant air flow at the fixed pressure for the period required by the tests and was capable of pressurising at a rate of approximately 600 pascals in one second.

8.3 PROCEDURE

8.3.1 Wind Resistance – serviceability (CWCT)

Three positive pressure differential pulses of 1200 pascals were applied to prepare the sample. The displacement transducers were then zeroed.

The sample was subjected to one positive pressure differential pulse from 0 to 2400 pascals to 0. The pressure was increased in four equal increments each maintained for 15 ±5 seconds. Displacement readings were taken at each increment. Residual deformations were measured on the pressure returning to zero.

Any damage or functional defects were recorded.

The test was then repeated using a negative pressure of -2400 pascals.

After the impact tests, holes were made in the lower cement board and Tyvec membrane to allow pressure to be applied to the cavity.

The above tests were then repeated.

8.3.2 Wind Resistance – safety (CWCT)

Three positive pressure differential pulses of 1200 pascals were applied to prepare the sample. The displacement transducers were then zeroed.

The sample was subjected to one positive pressure differential pulse from 0 to 3600 pascals to 0. The pressure was increased as rapidly as possible but not in less than 1 second and maintained for 15 ±5 seconds. Displacement readings were taken at peak pressure. Residual deformations were measured on the pressure returning to zero.

Any damage or functional defects were recorded.

The test was then repeated using a negative pressure of –3600 pascals.

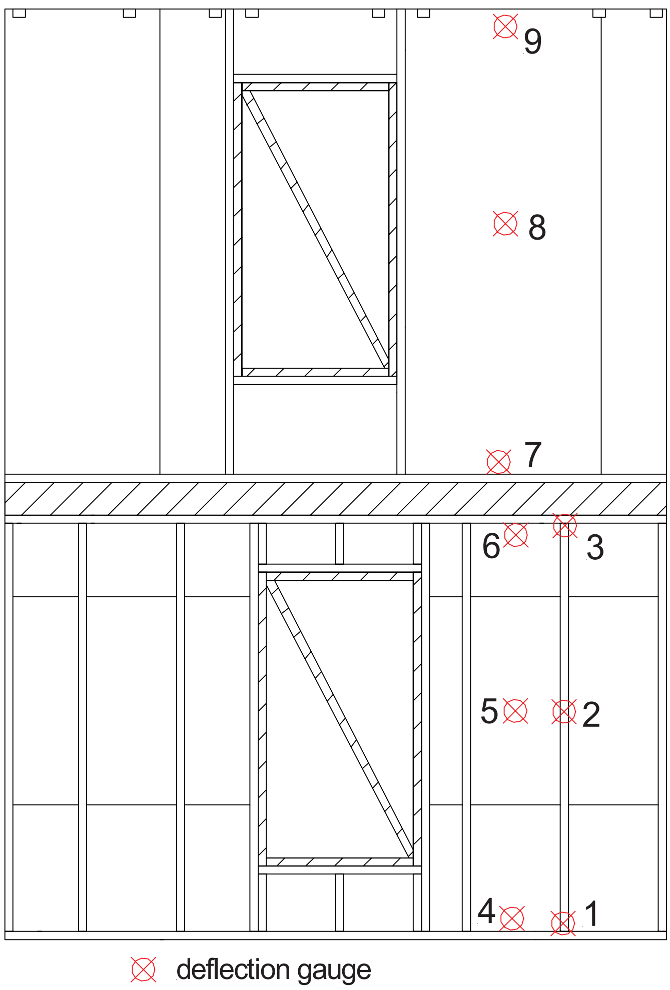
After the impact tests, holes were made in the lower cement board and Tyvec membrane to allow pressure to be applied to the cavity.

The above tests were then repeated.

FIGURE 6

DEFLECTION GAUGE LOCATIONS

Internal View



8.4 PASS/FAIL CRITERIA

8.4.1 Calculation of permissible deflection

Gauge number	Member	Span (L) (mm)	Permissible deflection (mm)	Permissible residual deformation
2 5 8	Metsec frame Lower backing wall Upper backing wall	2960 2960 3000	L/200 = 14.8 L/200 = 14.8* L/200 = 15.0*	1 mm 1 mm 1 mm

*Not located on framing member so deflection permissible a guide only.

8.5 RESULTS

Test 3 (serviceability) Date: 28 September 2011

The deflections measured during the wind resistance test, at the positions shown in Figure 6, are shown in Tables 3 and 4.

Summary Table:

Gauge number	Member	Pressure differential (Pa)	Measured deflection (mm)	Residual deformation (mm)
2	Metsec frame	2392 -2403	10.6	0.2
5	Lower backing wall	2392 -2403	10.1	0.2
8	Upper backing wall	2392 -2403	11.3	0.4

No damage to the test sample was observed.

Ambient temperature = 21°C
Chamber temperature = 22°C

Test 8 (safety) Date: 28 September 2011

The deflections measured during the structural safety test, at the positions shown in Figure 6, are shown in Table 5.

No damage to the sample was observed.

Ambient temperature = 24°C
Chamber temperature = 25°C

Test 10 (serviceability on outer Gebrik wall) Date: 29 September 2011

Note: For this test and the safety test, the deflection gauges at locations 4, 5 & 6 shown in Figure 6 were positioned through holes made through the backing wall onto the back of the Gebrik support panels.

The deflections measured during the wind resistance test, at the positions 4, 5 & 6 shown in Figure 6, are shown in Tables 6 and 7.

Summary Table:

Gauge number	Member	Pressure differential (Pa)	Measured deflection (mm)	Residual deformation (mm)
5	Lower Gebrik wall	2392 -2389	4.0 -16.2	0.4 0.0

No damage to the test sample was observed.

Ambient temperature = 14°C
Chamber temperature = 14°C

Test 11 (safety on outer Gebrik wall) Date: 29 September 2011

The deflections measured during the structural safety test, at the positions 4, 5 & 6 shown in Figure 6, are shown in Table 8.

No damage to the sample was observed.

Ambient temperature = 14°C
Chamber temperature = 15°C

TABLE 3

WIND RESISTANCE – POSITIVE **SERVICEABILITY** TEST RESULTS

Position	Pressure (pascals) / Deflection (mm)				
	591	**1198**	**1786**	**2392**	**Residual**
1	0.1	0.2	0.4	0.6	0.1
2	2.6	5.2	8.4	11.8	0.3
3	0.3	0.7	1.2	1.9	0.1
4	0.6	1.3	2.0	2.6	0.1
5	3.2	6.5	10.3	14.4	0.4
6	1.5	2.8	4.3	6.1	0.3
7	0.4	0.8	1.3	2.0	0.1
8	2.7	5.6	9.3	13.7	0.5
9	0.4	0.8	1.6	2.8	0.1
2 *	2.4	4.8	7.5	10.6	0.2
5 *	2.1	4.5	7.1	10.1	0.2
8 *	2.3	4.8	7.8	11.3	0.4

* Mid-span reading adjusted between end support readings

TABLE 4

WIND RESISTANCE – NEGATIVE **SERVICEABILITY** TEST RESULTS

Position	Pressure (pascals) / Deflection (mm)				
	-619	**-1208**	**-1811**	**-2403**	**Residual**
1	-0.1	-0.3	-0.5	-0.6	-0.1
2	-3.1	-6.2	-10.3	-14.2	-0.7
3	-0.3	-0.7	-1.3	-1.9	-0.2
4	-0.8	-1.9	-3.2	-4.2	-0.3
5	-4.0	-8.1	-13.7	-19.1	-1.0
6	-1.8	-3.6	-6.2	-9.1	-0.9
7	-0.5	-1.0	-1.7	-2.4	-0.2
8	-3.4	-6.7	-11.4	-15.7	-0.8
9	-0.5	-0.9	-1.5	-2.0	-0.2
2 *	-2.9	-5.7	-9.4	-12.9	-0.6
5 *	-2.7	-5.4	-9.0	-12.4	-0.4
8 *	-2.9	-5.8	-9.8	-13.5	-0.6

* Mid-span reading adjusted between end support readings

TABLE 5

WIND RESISTANCE - **SAFETY** TEST RESULTS

Position	Pressure (pascals) / Deflection (mm)			
	3602	**Residual**	**-3599**	**Residual**
1	1.3	0.1	-1.3	-0.1
2	18.1	0.7	-30.8	-0.6
3	3.2	0.4	-3.3	-0.5
4	3.6	0.3	-9.7	-1.3
5	21.5	1.0	-40.5	-2.2
6	9.7	0.9	-15.8	-1.8
7	3.2	0.3	-3.9	-0.4
8	21.9	1.0	-26.3	-1.4
9	4.9	0.2	-3.3	-0.3
2 *	15.9	0.4	-28.5	-0.3
5 *	14.8	0.4	-27.7	-0.7
8 *	17.8	0.8	-22.7	-1.0

* Mid-span reading adjusted between end support readings

TABLE 6

WIND RESISTANCE – POSITIVE **SERVICEABILITY** TEST RESULTS ON OUTER GEBRIK WALL

Position	Pressure (pascals) / Deflection (mm)				
	598	**1202**	**1796**	**2392**	**Residual**
4	13.0	15.5	17.1	18.5	0.4
5	4.3	8.6	12.8	17.2	0.9
6	2.1	4.0	5.9	7.9	0.6
5 *	-3.3	-1.2	1.3	4.0	0.4

* Mid-span reading adjusted between end support readings

TABLE 7

WIND RESISTANCE – NEGATIVE **SERVICEABILITY** TEST RESULTS ON OUTER GEBRIK WALL

Position	Pressure (pascals) / Deflection (mm)				
	-603	**-1200**	**-1814**	**-2389**	**Residual**
4	-1.6	-4.4	-7.0	-9.0	-1.1
5	-6.2	-14.1	-21.5	-28.1	-1.3
6	-3.1	-6.2	-9.7	-14.6	-1.6
5 *	-3.9	-8.8	-13.2	-16.2	0.0

* Mid-span reading adjusted between end support readings

TABLE 8

WIND RESISTANCE - **SAFETY** TEST RESULTS ON OUTER GEBRIK WALL

Position	Pressure (pascals) / Deflection (mm)			
	3611	**Residual**	**-3596**	**Residual**
4	20.9	0.5	-11.7	-1.0
5	22.2	0.7	-36.7	-1.4
6	10.9	1.1	-19.1	-1.4
5 *	6.3	-0.1	-21.3	-0.2

* Mid-span reading adjusted between end support readings

9 IMPACT TESTING

9.1 IMPACTOR

9.1.1 Soft body

The soft body impactor comprised a canvas spherical/conical bag 400 mm in diameter filled with 3 mm diameter glass spheres with a total mass of approximately 50 kg suspended from a cord at least 3 m long.

9.1.2 Hard body

The hard body impactor was a solid steel ball of 62.5 mm diameter and approximate mass of 1.0 kg.

9.2 PROCEDURE (BS 8200)

9.2.1 Soft body

The impactor almost touched the face of the sample when at rest. It was swung in a pendular movement to hit the sample normal to its face. The test was performed at the locations shown in Figure 7. The impact energies were 120, 350 and 500 Nm.

9.2.2 Hard body

The impactor almost touched the face of the sample when at rest. It was swung in a pendular movement to hit the sample normal to its face. The test was performed at the locations shown in Figure 7. The impact energy was 10 Nm. As an additional test, above the required standard, impacts were carried out at two locations with energies of 22 Nm.

9.3 PASS/FAIL CRITERIA

9.3.1 At impact energies for retention of performance

There shall be no failure, significant damage to surface finish or significant indentation.

9.3.2 At impact energies for safety

The structural safety of the building shall not be put at risk, no parts shall be made liable to fall or to cause serious injury to people inside or outside the building. The soft body impactor shall not pass through the wall. Damage to the finish and permanent deformation on the far side of the wall may occur.

9.4 RESULTS

Test 9 Date: 28 September 2011

During the soft body impact testing, with a serviceability energy of 120 Nm, no damage to the sample was observed.

During the soft body testing, with a safety energy of 350 Nm, in one location beneath the window opening the mortar covering the Gebrik fixing screw was dislodged (note: The mortar had been applied 48 hours prior to testing and was not fully cured).

During the soft body testing, at a safety energy of 500 Nm, the mortar covering the Gebrik fixing screws were dislodged in several locations (note: The mortar had been applied 48 hours prior to testing and was not fully cured). There were also minor cracks in the mortar joints next to the impacts.

During the hard body impacts, including two at 22 Nm energies, no damage to the sample was observed.

Ambient temperature = 24°C

FIGURE 7

IMPACT TEST LOCATIONS

External View

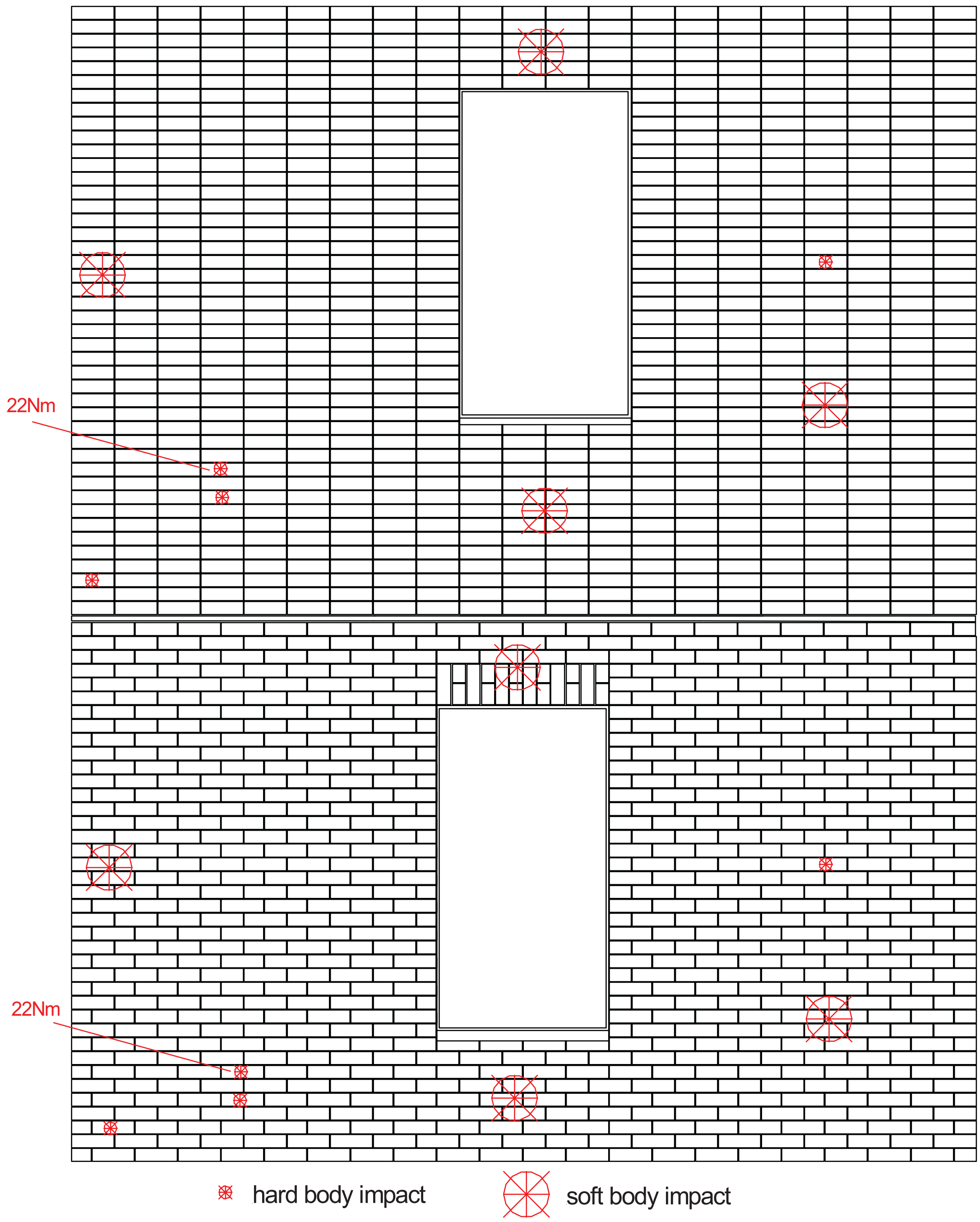


PHOTO 930032

GEBRIK FIXING SCREW REVEALED AFTER 500 NM IMPACT

10 APPENDIX - DRAWINGS

The following 21 unnumbered pages are copies of Telling Design Limited drawings numbered:

TP001 rev A,

TP002 rev B,

TP003 rev A,

TP004 rev A,

TP005 rev A,

TP006 rev B,

TP007 rev -,

D001 rev B,

D002 rev B,

D003 rev B,

D004 rev B,

D005 rev B,

D006 rev B,

D007 rev C,

D008 rev B,

D009 rev C,

D010 rev B,

D011 rev B,

D012 rev B,

D013 rev B,

D014 rev B.

END OF REPORT

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