

2395 SPEAKMAN DRIVE, MISSISSAUGA, ONTARIO CANADA L5K 1B3 • TEL: (905) 822-4111 • FAX: (905) 823-1446

**Performance Evaluation of the GSW Building Products
60" x 39" x 1/4" (1,524 mm x 990 mm x 6 mm) Glass Panel in a 72" (1,829 mm)
Wide x 42" (1,067 mm) High Guardrail System to NBCC/OBC**

A Report to:

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5 Pages, 3 Appendices

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1.0 SAMPLE IDENTIFICATION

The Building Performance Centre at Bodycote Materials Testing Canada Inc. was contracted by GSW Building Products to evaluate the load and safety factor requirements of the 60" (1,524 mm) wide x 39" (990 mm) high x 1/4" (6 mm) thick glass panel in their 72" (1,829 mm) wide x 42" (1,067 mm) high Glass In-fill Guardrail System. Factored Load tests were conducted as outlined in the 1995 National Building Code of Canada Section 4.1.10.1, and the 1997 Ontario Building Code Section 4.1.10.1 using a safety factor of 1.5.

Three (3) pre-assembled 72" (1,829 mm) wide x 42" (1,067 mm) high Glass In-fill Guardrail Systems were delivered to the laboratory at Bodycote Materials Testing Inc. by GSW Building Products. Upon arrival at Bodycote the samples were given the following Bodycote Sample No.'s:

Bodycote Sample No.'s	Size of Test Specimen
05-06-M0208-1	60" (1,524 mm) wide x 39" (990 mm) high x 1/4" (6 mm) thick
05-06-M0208-2	60" (1,524 mm) wide x 39" (990 mm) high x 1/4" (6 mm) thick
05-06-M0208-3	60" (1,524 mm) wide x 39" (990 mm) high x 1/4" (6 mm) thick

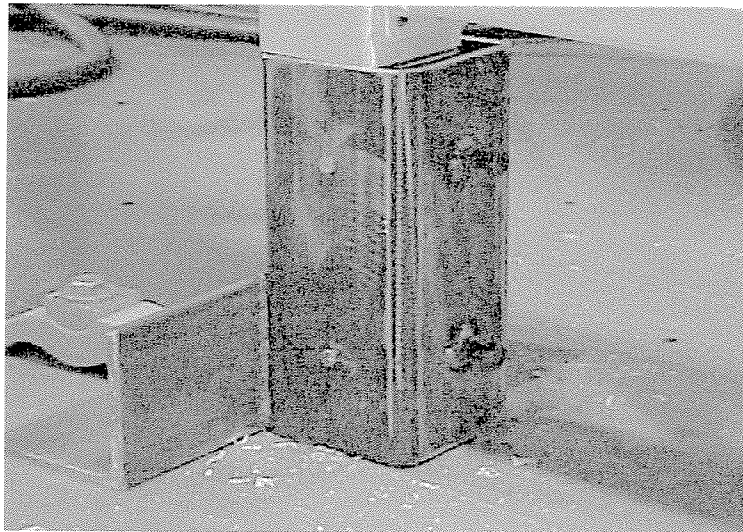


Figure 1 – Anchorage Fixture Detail

2.0 SPECIFICATIONS OF ORDER

The Building Performance Centre at Bodycote was contracted by GSW Building Products to evaluate their 60" (1,524 mm) wide x 39" (990 mm) high x 1/4" (6 mm) thick glass panel in the 72" (1,829 mm) wide x 42" (1,067 mm) high Glass In-fill Guardrail System with respect to the performance requirements outlined in the 1995 National Building Code of Canada (NBCC) and the 1997 Ontario Building Code (OBC); Article 4.1.10.1 using a safety factor of 1.5.

3.0 TEST PROGRAM

The 72" (1,829 mm) wide x 42" (1,067 mm) high Glass In-fill Guardrail System was assembled by GSW personnel and installed on the structural test rig. Two 4" (102 mm) x 4" (102 mm) wooden posts were fitted into the post sleeve and then fitted into a metal fixture. The metal fixture was securely fastened to the test bed and the rail system was aligned and squared with respect to the other members of the test-frame as shown in Figure 1 on Page 2.

The Building Performance Centre at Bodycote Materials Testing Canada Inc. evaluated three (3) specimens of the GSW Building Products 72" (1,829 mm) wide x 42" (1,067 mm) high Glass In-fill Guardrail Systems with 60" (1,524 mm) x 39" (990 mm) x ¼" (6 mm) thick glass panels according to the following building code requirements:

- 1995 National Building Code of Canada (NBCC), Section 4.1.10.1(c); 4.1.10.1.2; 4.1.10.1.4
- 1997 Ontario Building Code (OBC), Section 4.1.10.1 (c); 4.1.10.1.2; 4.1.10.1.4

Please note that in all cases, minimum design load requirements were applied, held for a minimum of 2 minutes and then loading continued to the factored load. At the factored load (specified in the clauses below) the load was again held for a minimum of 2 minutes. The rate of loading was approximately 1.0 kN (200 lbf) per minute.

1995 National Building Code of Canada (NBCC)/1997 Ontario Building Code (OBC) Test Requirements

Section 4.1.10.1.1 (c): The guardrail system shall be designed to resist a horizontal load of 0.75 kN/m (50 lb/ft) or a concentrated load of 1.0 kN (225 lb.) applied at any point along the top rail, whichever governs (NBCC/OBC 4.1.10.1.1c). For this system, both the distributed 0.75 kN/m and concentrated 1.0 kN loads were applied, with the concentrated load applied at the juncture between the rail and post and at midpoint of the rail.

Section 4.1.10.1.4: The guardrail system shall be designed to resist a 1.5 kN/m (100 lb/ft) load applied vertically (force directed downward) at the top of the guard (NBCC/OBC 4.1.10.1.4).

Section 4.1.10.1.2: Individual elements within the guard, including pickets, shall be designed to resist a concentrated load of 0.5 kN (113 lb.) at any point in the element (NBCC/OBC 4.1.10.1.2). The force was applied at the midpoint of the picket.

Factored load = 1.5 x specified design load.

The following equipment was utilized in accomplishing the above test procedures:

Load Cell:	Boycote MII # B05195
Dead Weights:	Boycote MII # B04109

4.0 TEST RESULTS

Results from testing are summarized in Table 1. Refer to the test program for test descriptions.

Table 1 - NBCC/OBC Guardrail Test Results				
Test Description	Minimum Design Load	Factored Load (1.5 x)	Pass/Fail	BMTC Sample No.'s. Tested
Concentrated Load Test				
Mid Top Rail Horizontal Concentrated	1.0 kN (225 lbf)	1.5 kN (337.5 lbf)	Pass	05-06-M0208-1, -2, -3
End Top Rail Horizontal Concentrated	1.0 kN (225 lbf)	1.5 kN (337.5 lbf)	Pass	05-06-M0208-1, -2, -3
Mid Top Rail Vertical Down Concentrated	1.0 kN (225 lbf)	1.5 kN (337.5 lbf)	Pass	05-06-M0208-1, -2, -3
End Top Rail Vertical Down Concentrated	1.0 kN (225 lbf)	1.5 kN (337.5 lbf)	Pass	05-06-M0208-1, -2, -3
Mid Top Rail Vertical Up Concentrated	1.0 kN (225 lbf)	1.5 kN (337.5 lbf)	N/A	No samples were tested
End Top Rail Vertical Up Concentrated	1.0 kN (225 lbf)	1.5 kN (337.5 lbf)	N/A	No samples were tested
Distributed Load Tests				
Top Rail Horizontal Distributed	1.33 kN (300 lbf)	2.0 kN (450 lbf)	Pass	05-06-M0208-1, 2, 3
Top Rail Vertical Down Distributed	2.66 kN (600 lbf)	4.0 kN (900 lbf)	Pass	05-06-M0208-1, 2, 3
Top Rail Vertical Up Distributed	2.66 kN (600 lbf)	4.0 kN (900 lbf)	N/A	No samples were tested
In-Fill Test				
Glass Panel / Mid-Point Horizontal Concentrated	0.5 kN (113 lbf)	0.76 kN (170 lbf)	Pass	05-06-M0208-1, 2, 3

Note: Pass indicates that the samples successfully resisted the minimum design load and the factored load (1.5 times the minimum design load) required for NBCC and OBC for a minimum of 2 minutes.
 N/A = Not Applicable

Based on the results of the testing summarized in Table 1, the glass panel measuring 60" (1,524 mm) wide x 39" (990 mm) high x 1/4" (6 mm) thick in the GSW Building Products 72" (1,829 mm) wide x 42" (1,067 mm) high Guardrail System, successfully carried loads as specified in the codes below, with a safety factor of 1.5 times:

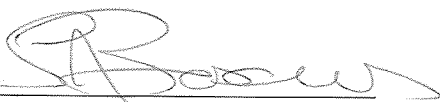
- 1995 National Building Code of Canada Sections, 4.1.10.1.1(c), 4.1.10.1.2, and 4.1.10.1.4. (factored at 1.5 times the specified design load)
- 1997 Ontario Building Code Sections, 4.1.10.1.1(c), 4.1.10.1.2, and 4.1.10.1.4. (factored at 1.5 times the specified design load).

The manufacturer has provided drawings and specifications of hardware and other materials used to construct the tested unit. They are identified in Appendices B & C, respectively.

5.0 CONCLUSIONS:

Based on the results of the testing, the GSW Building Products 60" (1,524 mm) high x 39" (990 mm) wide x 1/4" (6 mm) thick glass panel in the 72" (1,829 mm) wide x 42" (1,067 mm) high Guardrail System meets a 1.5 x factored load performance requirement as outlined in the 1995 National Building Code of Canada (NBCC); and the 1997 Ontario Building Code (OBC).

Reported by:

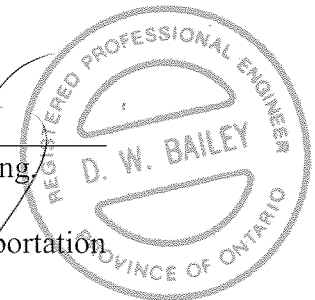


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Reviewed by:



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REGISTRATION

ISO 9001: 2000 registered by QMI, Registration #001109

APPENDIX A

Photographs

(5 Pages)

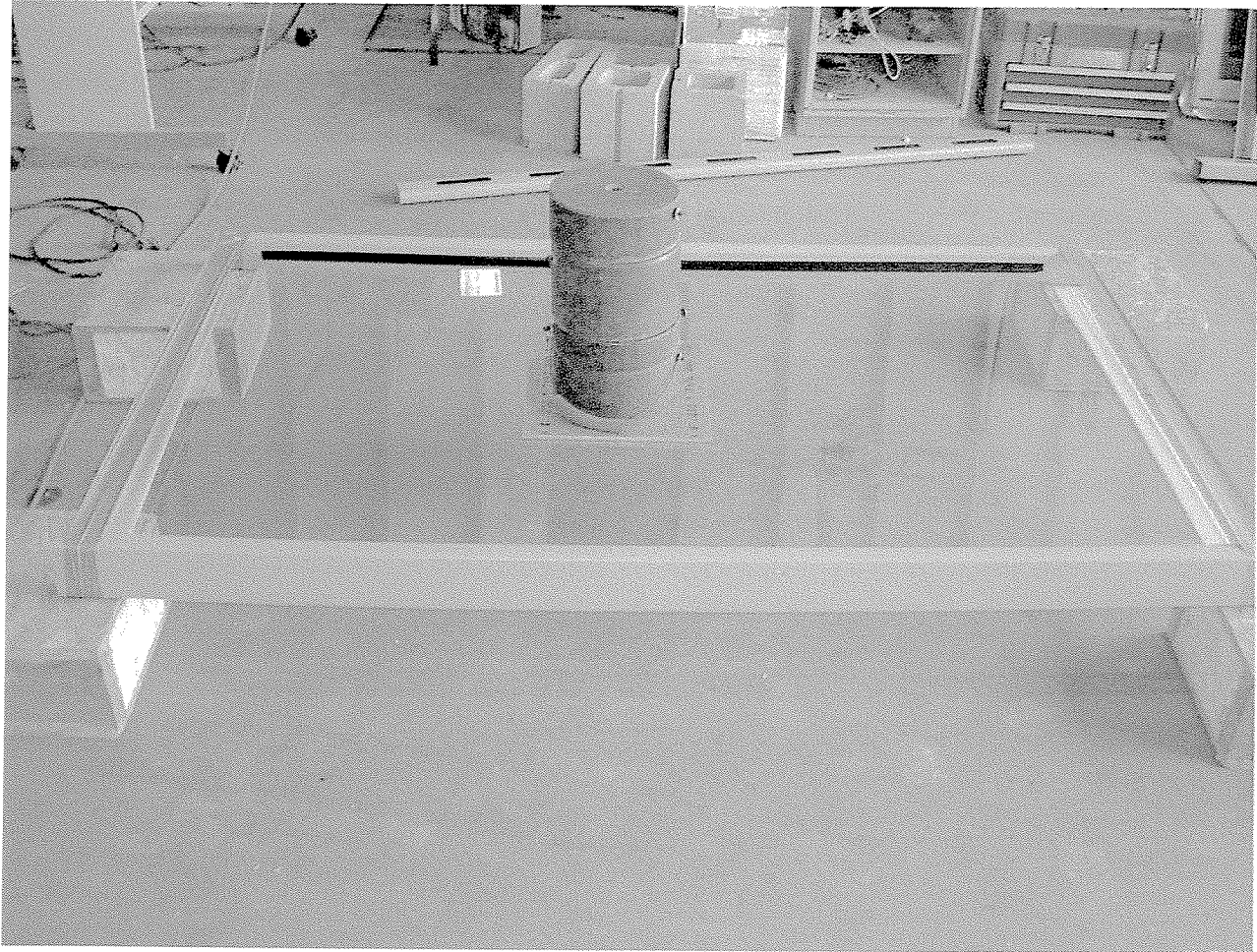


Figure 1: Test set-up for the 60" x 39" glass in-fill panel in the 72" guardrail system.

