

ENGINEERING EVALUATION

REPORT NUMBER: 3174887COQ-004B

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EVALUATION CENTER

Intertek Testing Services NA Ltd. 1500 Brigantine Drive Coquitlam, BC V3K 7C1

RENDERED TO

#306 – 12886 ANVIL WAY SURREY, BC V3W 8E7

PRODUCT EVALUATED:
Excell Welded Picket & Glass Railing System
EVALUATION PROPERTY:
2005 National Building Code, Section 4.1.5.15

Engineering Evaluation of Excell Welded Picket & Glass Railing System for compliance with the applicable requirements of the following criteria: 2005 National Building Code, Section 4.1.5.15

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1 Introduction

Intertek Testing Services NA Ltd. (Intertek) has conducted an engineering evaluation for Excell Railing System Ltd., on the Excell Welded Picket & Glass Railing System to evaluate the interchangeability of 2 types of top rails. The evaluation was conducted to determine if the testing performed on the 1-piece round top rail will show equivalency for the use of the 1-piece square top rail in accordance with the 2005 National Building Code, Section 4.1.5.15.

2 Sample and Assembly Description

Intertek has tested the following 2 railing systems in full accordance with the load requirements of the 2005 NBC, Section 4.1.5.15:

System 1 – 6 ft. Excell 1-Piece Round Welded Picket Railing System

Post: 1.72 in. x 1.72 in. 6061-T6 extruded aluminum post

Base Plate: 2 in. x 2 in. x 5 in. x 1/4 in. 6061-T6 fascia mounted angle bars (2) each

with 2 mounting holes

Top Rails: 42 in. high, 6063-T5 aluminum rail (1-piece round profile)

Picket Insert: 5/8 in. x 5/8 in. 6063-T5 aluminum spaced 4-1/2 in. o/c

Connections: 1 piece post mount bracket, other connection details are provided in

Intertek Test Report 3174778COQ-002C Appendix B.

System 2 – 5 ft. Excell 1-Piece Round Glass In-fill Railing System

Post: 1.72 in. x 1.72 in. 6061-T6 extruded aluminum post

Base Plate: 2 in. x 2 in. x 5 in. x 1/4 in. 6061-T6 fascia mounted angle bars (2) each

with 2 mounting holes

Top Rails: 42 in. high, 6063-T5 aluminum rail (1-piece round profile)

Panel Insert: 6 mm, tempered glass panel measuring 54 in. wide x 38 in. high

Connections: 1 piece post mount bracket, other connection details are provided in

Intertek Test Report 3174778COQ-002C Appendix C

The following systems have been evaluated to determine if they are equivalent to the systems



April 27, 2009 Page 3 of 19

above and would meet the requirements of the 2005 NBC, Section 4.1.5.15:

System 3 – 6 ft. Excell 1-Piece Square Welded Picket Railing System

Post: 1.72 in. x 1.72 in. 6061-T6 extruded aluminum post with a 6 in. 6061-T6

post insert

Base Plate: 2 in. x 2 in. x 5 in. x 1/4 in. 6061-T6 fascia mounted angle bars (2) each

with 2 mounting holes

Top Rails: 42 in. high, 1-piece 6063-T5 aluminum square rail (1-piece square profile)

Picket Insert: 5/8 in. x 5/8 in. 6063-T5 aluminum spaced 4-1/2 in. o/c

System 4 – 5 ft. Excell 1-Piece Square Glass In-fill Railing System

Post: 1.72 in. x 1.72 in. 6061-T6 aluminum rail

Base Plate: 2 in. x 2 in. x 5 in. x 1/4 in. 6061-T6 fascia mounted angle bars (2) each

with 2 mounting holes

Top Rails: 42 in. high, 1-piece 6063-T5 aluminum square rail (1-piece square profile)

Panel Insert: 6 mm, tempered glass panel measuring 54 in. wide x 38 in. high

Installation details of all 4 railing systems have been provided in the Appendix, along with specifications on each part.

3 Reference Documents

- 2005 National Building Code (2005 NBC)
- Intertek Test Report 3174887COQ-002C
- System Drawings
 - Excell Welded Picket System w/ 1.72" Posts
 - o Excell Glass System w/ 1.72" Posts



4 Evaluation Method

Intertek Test Report 3174887COQ-002C for Systems 1 and 2 show that these systems meet the load requirements stated in Section 4.1.5.15 of the 2005 NBC using a factor of safety of 1.5. Based on the noted test results, the alternate systems (Systems 3 and 4) mentioned in Section 2 of this report were evaluated for compliance in accordance with Section 4.1.5.15 of the 2005 NBC.

Systems 3 and 4 are identical to Systems 1 and 2 in terms of the components being utilized in the railing system and the installation of the product, however, there is one key difference. The top rail used in Systems 1 and 2 consists of a 1-piece round 6063-T5 aluminum rail as detailed in diagrams VS-40396B (glass infill) and VS-40827 (picket infill), whereas Systems 3 and 4 use a 1-piece square 6063-T5 aluminum rail as detailed in diagrams VS-39217B (glass infill) and VS-38399 (picket infill) (see Appendix). Comparing the moment of inertias (I_x , I_y) for both top rails (glass infill and picket infill compared respectively) as detailed in the noted drawings, the square top rail has greater I_x and I_y values than that of the round top rail. The maximum bending stress in the top rail is determined following the relationship noted in Equation 1 below.

$$\sigma = \frac{My}{I_n}$$
 (Equation 1)

Where σ = bending stress M = bending moment y = thickness / 2

 $I_n = I_x \text{ or } I_y$

Between the round top rail and square top rail systems, for equivalent loads the bending stress experienced in the square top rail would be lower than that experienced by the round top rail. As the bending stress is the failure cause for the top rail, the lower stress experienced by the square rail for equivalent loads means Systems 1 and 2 tested in Intertek Test Report 3174887COQ-002C would meet the requirements of Section 4.1.5.15 of the 2005 NBC using the 1-piece square top rail detailed in Appendix Drawings VS-39217B (glass infill) and VS-38399 (picket infill).



5 Conclusion

Intertek has conducted an engineering evaluation for Excell Railing System, on the Excell Welded Picket & Glass Railing System to evaluate the interchangeability of 2 types of top rails. The evaluation was conducted to determine if the testing performed on the 1-piece round top rail will show equivalency for the use of the 1-piece square top rail in accordance with the 2005 National Building Code, Section 4.1.5.15. The evaluation, as described in Section 4 of this report, shows that the following systems meet the load requirements of Section 4.1.5.15 of the 2005 NBC:

- System 1 6 ft. Excell 1-Piece Round Welded Picket Railing System
- System 2 5 ft. Excell 1-Piece Round Glass In-fill Railing System
- System 3 6 ft. Excell 1-Piece Square Welded Picket Railing System
- System 4 5 ft. Excell 1-Piece Square Glass In-fill Railing System

INTERTEK TESTING SERVICES NA LTD.

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ATTACHMENTS: Drawings of Durarail & Excell Railing Systems







