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LIV BUILDING PRODUCTS TEST REPORT

SCOPE OF WORK
TESTING OF VARIOUS GUARD RAIL COMPONENTS IN ACCORDANCE WITH ASTM B117-16, *STANDARD PRACTICE FOR OPERATING SALT SPRAY (FOG) APPARATUS*

REPORT NUMBER
103507801COQ-004

TEST DATES
07/19/18 – 08/30/18

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09/05/18

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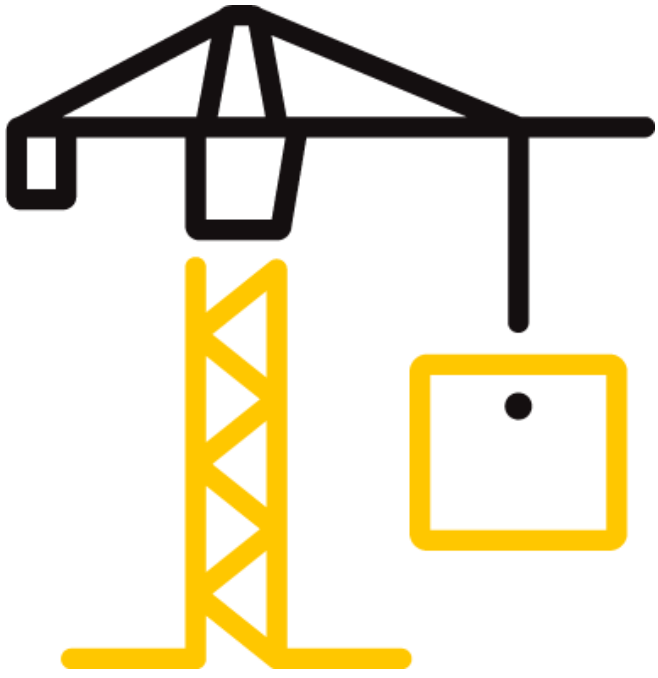

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Report No.: 103507801COQ-004
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REPORT ISSUED TO
LIV BUILDING PRODUCTS
6050 Owen Road
Uxbridge, ON L6P 1R1
Canada

SECTION 1
SCOPE

Intertek Building & Construction (B&C) was contracted by Liv Building Products to perform testing in accordance with ASTM B117-16, *Standard Practice for Operating Salt Spray (Fog) Apparatus,* on their various guard rail components. Results obtained are tested values and were secured by using the designated test method. Testing was conducted at the Intertek test facility in Coquitlam, BC, Canada.

This report does not constitute certification of these products nor an opinion or endorsement by this laboratory.

For INTERTEK B&C:

COMPLETED BY:	Chris Chang	**REVIEWED BY:**	Baldeep Sandhu
TITLE:	Senior Tech – Building & Construction	**TITLE:**	Manager – Building & Construction
SIGNATURE:		**SIGNATURE:**	
DATE:	09/05/18	**DATE:**	09/05/18

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SECTION 2
SUMMARY OF TEST RESULTS

All samples were exposed to 1000 hours of salt spray per ASTM B117. Observations are outlined below:

DESCRIPTION	OBSERVATIONS
SS Handrail Bracket	Corrosion at corner of bracket
SS Wedge Block	No sign of any corrosion
SS Glass Connector (both halves)	Corrosion spots on bottom and on bolt head
ALX Post Matte Black	No sign of any corrosion
ALX Contemporary Brushed Titanium Top Rail with Bracket Attached	No sign of any corrosion; surface staining from salt remained after washing
ALX Post Satin Black	Corrosion on baseplate and in mounting holes
Satin Black Invisipost	No sign of any corrosion
SS Pipe	Surface corrosion/staining; corrosion at end of pipe and at surface defects
42 in. SS Invisipost (2 bolts in flange 3M SAND NO WAX)	Surface corrosion/staining; corrosion at surface defect locations
42 in. SS Invisipost (1 bolt in flange 3M SAND + WAX)	Surface corrosion/staining; corrosion at mounting holes
36 in. SS Invisipost (no bolts in flange NO 3M NO WAX)	Surface corrosion/staining; corrosion at mounting holes and surface defect locations
42 in. Matte Black Invisipost	No sign of any corrosion
42 in. Textured White Invisipost	No sign of any corrosion

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SECTION 3
TEST METHOD

The specimens were evaluated in accordance with the following:

ASTM B117-16, *Standard Practice for Operating Salt Spray (Fog) Apparatus*

SECTION 4
MATERIAL SOURCE

The various guard rail components were submitted to the Evaluation Center on July 17, 2018 (Coquitlam ID# VAN1807171505-001). Samples were not independently selected for testing.

SECTION 5
EQUIPMENT

ITEM	ID#	CALIBRATION
Atlas SF850 Salt Spray Chamber	22080	June 21, 2019

SECTION 6
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Chris Chang	Intertek B&C
Frank Gadea-Lopez	Intertek B&C

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SECTION 7
TESTING AND EVALUATION METHODS

CONDITIONING

Before testing, specimens were held in standard laboratory conditions for at least 24 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5 %.

SALT FOG RESISTANCE

Salt spray resistance was tested in accordance with ASTM B117-16, *Standard Practice for Operating Salt Spray (Fog) Apparatus*. All guard rail components were placed into an Atlas SF850 Salt Spray Chamber and supported between 15° and 30° from the vertical. Samples were all subjected to 1000 hours of exposure at 35 ± 2°C (95 ± 3°F). The salt solution was prepared to 5 ± 1 parts by mass of sodium chloride in 95 parts of water. Two fog collectors were placed within the test chamber to ensure that the fog quantity was maintained at 1.0 to 2.0 mL of solution per hour. Additionally, the collected solution was tested to ensure the sodium chloride concentration was 5 ± 1 mass % and the pH was 6.5 to 7.2. At the completion of 1000 hours of exposure, samples were gently washed in warm running water. A visual examination was then performed to check for signs of corrosion or other physical changes.

SECTION 8
SAMPLE AND ASSEMBLY DESCRIPTION

The products were identified as the following:

- SS Handrail Bracket
- SS Wedge Block
- SS Glass Connector (both halves)
- ALX Post Matte Black
- ALX Contemporary Brushed Titanium Top Rail (short section) with bracket attached
- ALX Post Satin Black
- Satin Black Invisipost
- SS Pipe
- 42" SS Invisipost (2 bolts in flange representing 3M SAND NO WAX)
- 42" SS Invisipost (1 bolt in flange representing 3M SAND + WAX)
- 36" SS Invisipost (no bolts in flange representing NO 3M NO WAX)
- 42" Matte Black Invisipost
- 42" Textured White Invisipost

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SECTION 9
RESULTS AND OBSERVATIONS

Photos of the samples after 1000 hours of salt spray can be found below:

Figure 1. SS Handrail Bracket

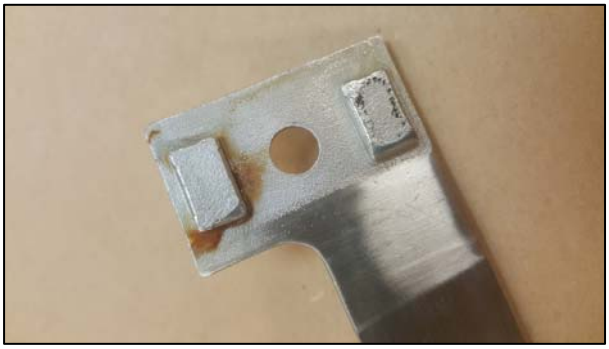

Figure 2. SS Handrail Bracket

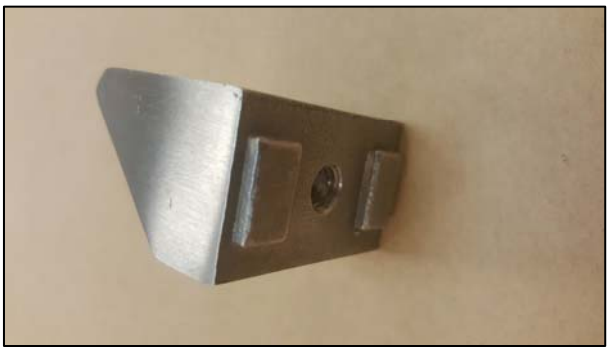

Figure 3. Wedge Block

Figure 4. Wedge Block

Figure 5. SS Glass Connector

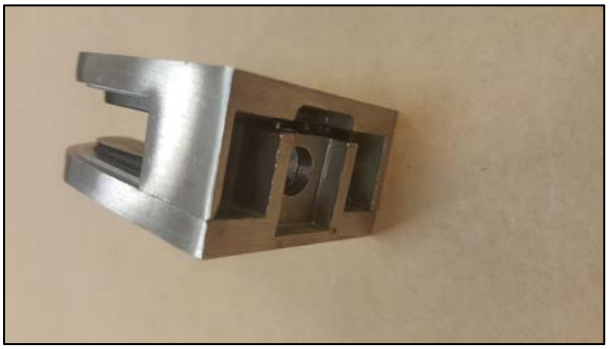

Figure 6. SS Glass Connector

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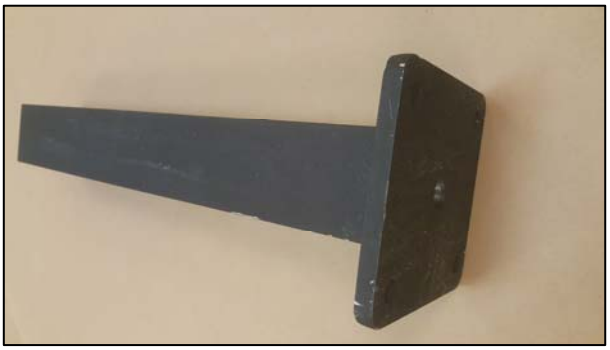

Figure 7. ALX Post Matte Black

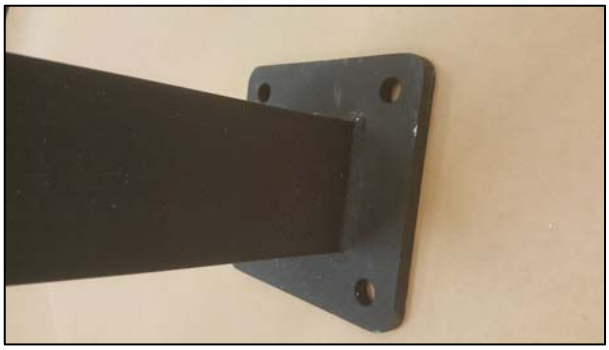

Figure 8. ALX Post Matte Black

Figure 9. ALX Contemporary Brushed Titanium Top Rail with Bracket

Figure 10. ALX Contemporary Brushed Titanium Top Rail with Bracket

Figure 11. ALX Post Satin Black

Figure 12. ALX Post Satin Black

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Figure 13. Satin Black Invisipost

Figure 14. Satin Black Invisipost

Figure 15. SS Pipe

Figure 16. SS Pipe

Figure 17. 42 in. SS Invisipost – 2 Bolts in Flange

Figure 18. 42 in. SS Invisipost – 2 Bolts in Flange

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Figure 19. 42 in. SS Invisipost – 1 Bolt in Flange

Figure 20. 42 in. SS Invisipost – 1 Bolt in Flange

Figure 21. 36 in. SS Invisipost – No Bolt in Flange

Figure 22. 36 in. SS Invisipost – No Bolt in Flange

Figure 23. 42 in. Matte Black Invisipost

Figure 24. 42 in. Matte Black Invisipost

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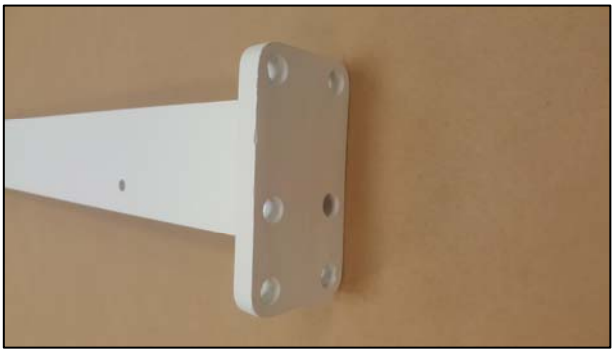

Figure 25. 42 in. Textured White Invisipost

Figure 26. 42 in. Textured White Invisipost

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SECTION 10
CONCLUSION

The Liv Building Products various guard rail components identified and evaluated in this report have been tested per ASTM B117-16, *Standard Practice for Operating Salt Spray (Fog) Apparatus*. As there is no pass/fail criterion, only the product test results are presented in Section 9 of this report.

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SECTION 11
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	09/05/18	N/A	Original Report Issue