

HOUSE OF FORGINGS LLC TEST REPORT

SCOPE OF WORK

OSHA 1910.29 TESTING ON STEEL GUARDRAIL

REPORT NUMBER

L8190.01-119-19 R0

TEST DATES

02/01/21 - 02/02/21

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TEST REPORT FOR HOUSE OF FORGINGS LLC

Report No.: L8190.01-119-19 R0

Date: 03/02/21

REPORT ISSUED TO

HOUSE OF FORGINGS LLC

353 Greens Landing Drive

Houston, Texas 77038

SECTION 1

SCOPE

Architectural Testing, Inc. (an Intertek company) dba Intertek Building & Construction (B&C) was contracted by House of Forgings LLC to perform structural testing in accordance with OSHA 1910.29 on their 6 ft. level and stair steel guardrail. Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted at Intertek test facility in York, PA.

Intertek B&C in York, Pennsylvania has demonstrated compliance with ISO/IEC International Standard 17025 and is consequently accredited as a Testing Laboratory (TL-144) by International Accreditation Service, Inc. (IAS). Intertek B&C is accredited to perform all testing reported herein.

Unless differently required, Intertek reports apply the "Simple Acceptance" rule also called "Shared Risk approach," of ILAC-G8:09/2019, Guidelines on Decision Rules and Statements of Conformity.

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

For INTERTEK B&C:

COMPLETED BY:	Adam J. Schrum
TITLE:	Project Manager
SIGNATURE:	
DATE:	03/02/21

REVIEWED BY:	V. Thomas Mickley, Jr., P.E.
TITLE:	Senior Staff Engineer
SIGNATURE:	
DATE:	03/02/21

AJS:vtm/aas

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TEST METHOD

The specimens were evaluated in accordance with the following:

OSHA 1910.29, *Fall Protection Systems and Falling Object Protection-Criteria and Practices*

Limitations

All tests performed were to evaluate structural performance of the railing assembly to carry and transfer imposed loads to the supports. The test specimen evaluated included the rails, posts, and attachment of the posts to the supporting structure. Structural capacity of the floor framing, blocking and attachment of the floor framing and blocking is not included in the scope of this testing and would need to be evaluated separately.

SECTION 3

MATERIAL SOURCE

Test samples were provided by the client.

Representative samples of the test specimens will be retained by Intertek B&C for a minimum of four years from the test completion date.

SECTION 4

LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Adam J. Schrum	Intertek B&C

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SECTION 5**TEST PROCEDURE**

Railing assembly tests were performed per OSHA 1910.29 in a self-contained structural frame designed to accommodate anchorage of a rail assembly and application of the required test loads. The specimen was loaded using an electric winch mounted to a rigid steel test frame. High strength steel cables, nylon straps, and load distribution beams were used to impose test loads on the specimen. Applied load was measured using an electronic load cell located in-line with the loading system. Deflections were measured to the nearest 0.01 in using electronic linear displacement transducers.

The railing assembly was installed and tested as a single railing section by directly securing (surface-mounting) the base of the post mounts to a simulated wood floor mockup. The railing was assembled by an Intertek B&C technician. Transducers mounted to an independent reference frame were located to record movement of reference points on the railing system components (ends and mid-point) to determine net component deflections. See photographs in Section 9 for test setups.

The test specimen was inspected prior to testing to verify size and general condition of the materials, assembly, and installation. No potentially compromising defects were observed. One specimen was used for all load tests which were performed in the order reported. Each design load test was performed using the following procedure:

1. Zeroed transducers and load cell at zero load;
2. Increased load to specified test load in no less than ten seconds; and

Unless otherwise noted, all loads and displacement measurements were normal to the rail (horizontal). The test results apply only to the railing assembly between supports and anchorage to the support.

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TEST SPECIMEN DESCRIPTION

The guardrail system is comprised of steel tube rails and posts. Drawings are included in Section 10 to verify the overall dimensions and other pertinent information of the tested product, its components, and any constructed assemblies. Photographs are provided in Section 9.

MATERIAL	Steel
RAIL AND POST	1.660 in outside diameter by 0.068 in thick wall (16 gauge)
RAIL LENGTH	-68-3/8 in (inside of post to inside of post; level) -69 in (inside of post to inside of post measured parallel to the rail; stair)
RAIL HEIGHT	-66 in (top of top rail to bottom of post/kick plate; level) -39 in (top of top rail to bottom of post measured parallel to the post; stair)
POST BASE	Two, 1.315 in outside diameter by 16 in long by 0.110 in thick wall (12 gauge) tubes attached to 6 in square 3/16 in thick steel plate with 1/4 in fillet welds all around. The base plate included six 1/2 in diameter by 1-1/2 in long slotted holes
KICK PLATE	6-1/8 in high by 9/16 in deep by 0.100 in thick (12 gauge) C-shaped member (level rail only)
CONNECTIONS	- Intermediate Rail to Post: 3/16 in fillet weld all around - Kick Plat to Post: Three 1 in long by 3/16 in fillet welds - Post Base to Wood Floor Mockup: Six, 3/8-7 by 1-1/2" hex head lag bolts (three per side) located at end of slot next to edge of plate
WOOD FLOOR MOCKUP CONSTRUCTION	2X SPF joist and headers with 3/4 in thick plywood sheathing and a piece of 2x8 SPF dimensioned lumber blocking laid flatwise directly under the plywood

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TEST RESULTS

Key to Test Results Tables:

Load Level: Target test load

Test Load: Actual applied load at the designated load level (target).

Elapsed Time (E.T.): The amount of time into the test with zero established at the beginning of the loading procedure.

Test Series No. 1

6 ft by 66 in Level Steel Guardrail

Test No. 1 - Test Date: 02/01/21

Design Load: 200 lb Horizontal Concentrated Load at Mid-Span of Top Rail

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
200 lb (D.L.)	201	00:48	9.69

Result: Withstood load equal to or greater than 200 lb without failure

Test No. 2 - Test Date: 02/01/21

Design Load: 200 lb Vertical Concentrated Load at Mid-Span of Top Rail

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
200 lb (D.L.)	202	00:18	0.26

Result: Withstood load equal to or greater than 200 lb without failure

Test No. 3 - Test Date: 02/01/21

Design Load: 150 lb Horizontal Concentrated Load at Mid-Span of Mid Rail

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
150 lb (D.L.)	154	00:32	2.66

Result: Withstood load equal to or greater than 150 lb without failure

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Test No. 4 - Test Date: 02/01/21

Design Load: 150 lb Vertical Concentrated Load at Mid-Span of Mid Rail

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
150 lb (D.L.)	152	00:21	0.12

Result: Withstood load equal to or greater than 150 lb without failure

Test No. 5 - Test Date: 02/01/21

Design Load: 200 lb Horizontal Concentrated Load at End of Top Rail

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
200 lb (D.L.)	201	00:58	9.31

Result: Withstood load equal to or greater than 200 lb without failure

Test No. 6 - Test Date: 02/01/21

Design Load: 150 lb Horizontal Concentrated Load at End of Mid Rail

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
150 lb (D.L.)	153	00:32	2.76

Result: Withstood load equal to or greater than 150 lb without failure

Test Series No. 2 of 2

6 ft by 39 in Stair Steel Guardrail installed in ¾ in OSB and 1-1/2 in Pine Lumber

Test No. 1 - Test Date: 02/02/21

Design Load: 200 lb Horizontal Concentrated Load at Mid-Span of Top Rail

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
200 lb (D.L.)	200	00:30	2.35

Result: Withstood load equal to or greater than 200 lb without failure

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Test No. 2 - Test Date: 02/02/21

Design Load: 200 lb Vertical Concentrated Load at Mid-Span of Top Rail

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
200 lb (D.L.)	204	00:25	0.33

Result: Withstood load equal to or greater than 200 lb without failure

Test No. 3 - Test Date: 02/02/21

Design Load: 150 lb Horizontal Concentrated Load at Mid-Span of Mid Rail

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
150 lb (D.L.)	154	00:31	0.59

Result: Withstood load equal to or greater than 150 lb without failure

Test No. 4 - Test Date: 02/02/21

Design Load: 150 lb Vertical Concentrated Load at Mid-Span of Mid Rail

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
150 lb (D.L.)	156	00:31	0.15

Result: Withstood load equal to or greater than 150 lb without failure

Test No. 5 - Test Date: 02/02/21

Design Load: 200 lb Horizontal Concentrated Load at End of Top Rail

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
200 lb (D.L.)	201	00:38	2.59

Result: Withstood load equal to or greater than 200 lb without failure

Test No. 6 - Test Date: 02/02/21

Design Load: 150 lb Horizontal Concentrated Load at End of Mid Rail

LOAD LEVEL	TEST LOAD (lb)	E.T. (min:sec)	DISPLACEMENT (in)
150 lb (D.L.)	154	00:22	0.42

Result: Withstood load equal to or greater than 150 lb without failure

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SECTION 8

CONCLUSION

Using performance criteria of withstanding a downward and outward point load of 150 lbs on the midrail, a downward and outward point load of 200 lbs on the top rail and an overall rail height greater than 39 in when a downward point load of 200 lbs is applied, the test results substantiate compliance with the requirements of OSHA 1910.29.

SECTION 9

PHOTOGRAPHS



Photo No. 1

Concentrated Horizontal Load at Mid-Span of Top Rail

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Photo No. 2
Concentrated Vertical Load at Mid-Span of Top Rail



Photo No. 3
Concentrated Horizontal Load at Mid-Span of Mid Rail

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Photo No. 4
Concentrated Vertical Load at Mid-Span of Mid Rail



Photo No. 5
Concentrated Horizontal Load at End of Top Rail

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Photo No. 6
Concentrated Horizontal Load at End of Mid Rail



Photo No. 7
Level Post Base Connection to 3/4 in Plywood Over Flat 2X SPF Lumber

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Photo No. 8

Stair Post Base Connection to 3/4 in Plywood Over Flat 2X SPF Lumber



Photo No. 9

3/4 in Plywood Over Flat 2X SPF Lumber



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130 Derry Court
York, Pennsylvania 17406

Telephone: 717-764-7700
Facsimile: 717-764-4129
www.intertek.com/building

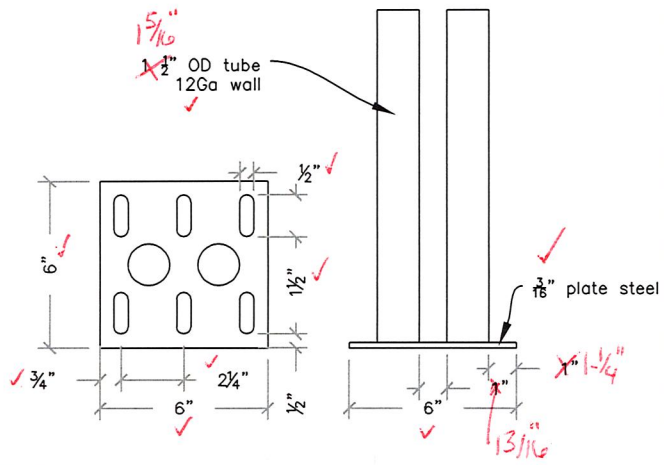
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SECTION 10 DRAWINGS

The "As-Built" drawings for the level and stair steel guardrail which follow have been reviewed by Intertek B&C and are representative of the project reported herein. Project construction was verified by Intertek B&C per the drawings included in this report. Any deviations are documented herein or on the drawings.

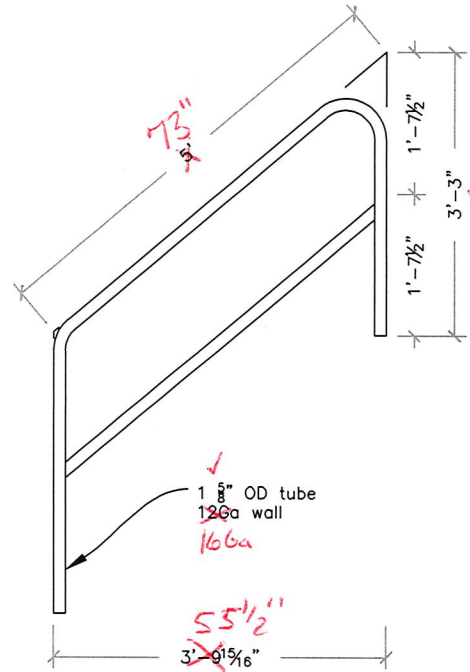
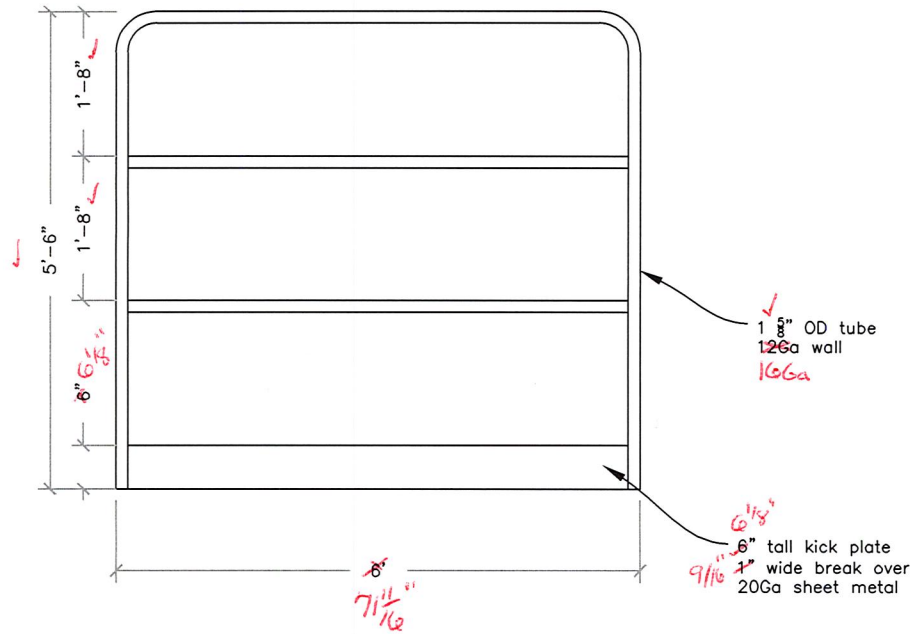


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Test sample complies with these details.
Deviations are noted.

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Date 2-18-21 Tech T. MICKLEY



Ironwood Connection
Safety Rail system

1	2	3	4	5	6
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Ironwood Connection
353 Greens Landing
Houston, TX 77038
Phone (281) 209-0000
Fax (281) 209-0132

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130 Derry Court
York, Pennsylvania 17406

Telephone: 717-764-7700
Facsimile: 717-764-4129
www.intertek.com/building

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SECTION 11

REVISION LOG

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