



NATIONAL CERTIFIED TESTING LABORATORIES

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GUARDRAIL PERFORMANCE TEST REPORT

Report Number NCTL-110-19595-1

Report Date 10/14/16

Report To Worthington
17842 Ashley Drive
Panama City, FL 32413

Date Testing Started 09/22/16
Date Testing Completed 09/22/16

Specification ICC-ES AC174, Section 5.0
Acceptance Criteria For Deck Board Span Ratings and Guardrail Systems (Guards and Handrails)

ASTM D7032-15, Section 6
Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite and Plastic Lumber Deck Boards, Stair Treads, Guards, and Handrails

Description of Specimen(s) Tested

Note: All dimensions are in the order (Width x Height x Thickness) unless otherwise noted.

Model/ Series Balustrade System

Size
Overall
155.5" x 47.5"
Top Rail
144.5" long, 44.375" from the decking to the top of the rail
Newal Post
47.5" tall
Baluster
36" tall
Bottom Rail
144.5" long, 5" from the decking to the top of the rail

Material Specifications All components were manufactured in a high density silicone rubber mold using a water based Polyol Resin Blend combined with equal amounts of Aromatic Isocyanate, components for polyurethane; All components have a Core Molded Density (pcf) of 14 pounds (ASTM D1622); All components have a "Shore A" durometer reading of 43 (ASTM D2240); All components were primed and finish painted using Behr PPUE flat 4850 paint; All components were entirely manufactured in the USA using 100% USA raw materials.

Assembly Description (26) Balusters were used to comply with the 4" ball code on a 12 foot span top and bottom rail. Balusters were spaced 5-1/2" center to center. Part Number 20-230-36; Balusters measured 1-3/4" square x 36" exposed polyurethane. A 40" by 3/4" (OD), 0.065 tube was inserted through the middle of the polyurethane, with 2" of tubing exposed on each end for insertion to top and bottom rails. See attached drawing "A".

Fasteners/ Attachment

Top Rail

(1) Top rail measuring 12' in length with a 2" square, aluminum (1/8" wall) pipe, inserted in the middle of the polyurethane. Part Number 21-100-12; Top rail "cross measurement" is 3-1/8" high, 3-5/8" at top of rail and 2-7/8" at the bottom of the top rail. See attached drawing "A"

Bottom Rail

(1) Bottom rail measuring 12' in length with a 2" square, aluminum (1/8" wall) pipe, inserted in the middle of the polyurethane. Part Number 21-150-12; Bottom rail "cross measurement" is 3-1/8" high, 2-7/8" at top of rail and 3-5/8" at the bottom of the bottom rail. See attached drawing "A"

Newel Posts

(2) Newel posts were used: (1) at each end of the 12' rail. Part Number 22-100; Newel posts measured 5-1/2" square by 48" in length; inserted through the middle of the newel post, a 48" PVC schedule 40
See attached drawing "A"

Support Block

(1) Support block was used to "strengthen" the support on the mid-rail section. The support block was used at the midpoint on the bottom rail. Part Number 26-150; Support block measured 4" in height, 3-5/8" in width and 4" in length; See attached drawing "A"

Installation Method

Newel Post Installation Kit

(2) Installation kits were used: (1) for each of the (2) newel posts. Part Number 24-100SS; See attached drawing "B"

Rail Installation Kit

(2) Installation kits were used: (1) for the top rail, and (1) for the bottom rail. Part Number 25-100; See attached drawing "C"

Test Results - AC174, Section 5.0 & ASTM D7032, Section 6.

Note: AC174, Section 5.0 Guardrail System (Guard and Handrail) Performance Requirements references Sections 6.1, 6.2, and 6.3 of ASTM D7032 and those results are reported below

Section
6.2.2

Test
In-Fill Load Test

Applied to load-resisting elements between posts/ vertical supports, at "worst-case" position, over one-square foot

Specimen 1

Applied Load = 125 lbf
Center of Sample = Pass

NOTE: There was no failure, evidence of disengagement of any component, or visible cracks in any component

Specimen 2

Applied Load = 125 lbf
Center of Sample = Pass

NOTE: There was no failure, evidence of disengagement of any component, or visible cracks in any component

Specimen 3

Applied Load = 125 lbf
 Center of Sample = Pass

NOTE: There was no failure, evidence of disengagement of any component, or visible cracks in any component

Section
6.2.3

Test
Uniform Load Test

Specimen 1

Applied Load = 125 plf
 Top Rail - Vertically = Pass
 Top Rail - Horizontally = Pass

NOTE: There was no failure, evidence of disengagement of any component, or visible cracks in any component

Specimen 2

Applied Load = 125 plf
 Top Rail - Vertically = Pass
 Top Rail - Horizontally = Pass

NOTE: There was no failure, evidence of disengagement of any component, or visible cracks in any component

Specimen 3

Applied Load = 125 plf
 Top Rail - Vertically = Pass
 Top Rail - Horizontally = Pass

NOTE: There was no failure, evidence of disengagement of any component, or visible cracks in any component

Section
6.2.4

Test
Concentrated Load Test at maximum height

Specimen 1

Applied Load = 500 lbf
 Top Rail - midspan between posts
 Deflection at 200 lbf = 3.00"
 Allowable = 3.34"
 Top Rail - adjacent to post (5" from post)
 Deflection at 200 lbf = 3.675"
 Allowable = 3.94"
 Top of Post
 Deflection at 200 lbf = 3.75"
 Allowable = 3.94"

NOTE: There was no failure, evidence of disengagement of any component, or visible cracks in any component

Specimen 2

Applied Load	=	500 lbf
Top Rail - midspan between posts		
Deflection at 200 lbf	=	2.875"
Allowable	=	3.34"
Top Rail - adjacent to post (5" from post)		
Deflection at 200 lbf	=	3.5675"
Allowable	=	3.94"
Top of Post		
Deflection at 200 lbf	=	3.875"
Allowable	=	3.94"

NOTE: There was no failure, evidence of disengagement of any component, or visible cracks in any component

Specimen 3

Applied Load	=	500 lbf
Top Rail - midspan between posts		
Deflection at 200 lbf	=	2.875"
Allowable	=	3.34"
Top Rail - adjacent to post (5" from post)		
Deflection at 200 lbf	=	00"
Allowable	=	00"
Top of Post		
Deflection at 200 lbf	=	00"
Allowable	=	00"

NOTE: There was no failure, evidence of disengagement of any component, or visible cracks in any component

Specimen parts were randomly selected by the client and shipped to NCTL for assembly by test personnel per manufacturer requirements. Compatibility of the supporting construction materials with all fasteners, metal post mount components, and other hardware components is beyond the scope of this report. Only those types of fasteners and fastening methods described in this report have been evaluated for the installation of the product; other methods of attachment are outside the scope of this report.

This report is a reissued report. All information has been reviewed prior to re-submission. It is reissued via authorization from the lineal supplier and no test sample was submitted for testing. This test report was prepared by National Certified Testing Laboratories (NCTL), for the exclusive use of the above named client and it does not constitute certification of this product. The results are for the particular specimen tested and do not imply the quality of similar or identical products manufactured or installed from specifications identical to the tested product. The test specimen was supplied to NCTL by the client. The results in this report are actual tested values and are applicable to the specimen tested only, using the components and construction methods described herein.

Detailed drawings were available for laboratory records. A copy of this report will be retained by NCTL per applicable retention requirements. This report does not constitute certification or approval of the product, which may only be granted by a certification program validator or recognized approval entity. All tests were conducted in full compliance with the referenced specifications and/or test methods. Tests were performed in the order set forth by the applicable standard or specification. This report is the joint property of National Certified Testing Laboratories Inc. and the Client to whom it is issued. Permission to reproduce this report by anyone other than National Certified Testing Laboratories, Inc. and the Client must be granted in writing. This report may not be reproduced, except its entirety, without the written consent of NCTL.

National Certified Testing LaboratoriesA handwritten signature in black ink that reads "Jay Leader". The signature is written in a cursive style. Below the signature is a small, semi-transparent NCTL logo and the text "DIGITAL SIGNATURE".

Jay Leader
Technician

A handwritten signature in black ink that reads "R. H. Zeiders". The signature is written in a cursive style. Below the signature is a small, semi-transparent NCTL logo and the text "DIGITAL SIGNATURE".

Robert H. Zeiders, P.E.
Vice-President Engineering & Quality

NJL/ dro
Ref Report No. 110-19504-1

Attachments

- Appendix A - Revision Summary
- Appendix B – Photographs
- Appendix C – Drawings

Appendix A
Revision Log

<u>Identification</u>	<u>Date</u>	<u>Page & Revision</u>
Original Issue	10/06/16	Not Applicable
Reissue	10/14/16	Worthington

Appendix B
Photographs



Photo No. 1



Photo No. 2



Photo No. 3



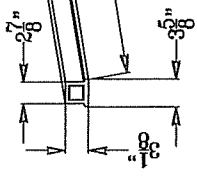
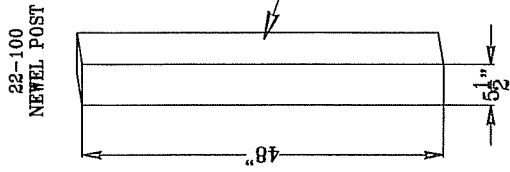
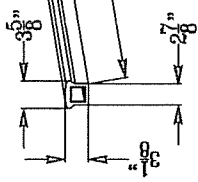
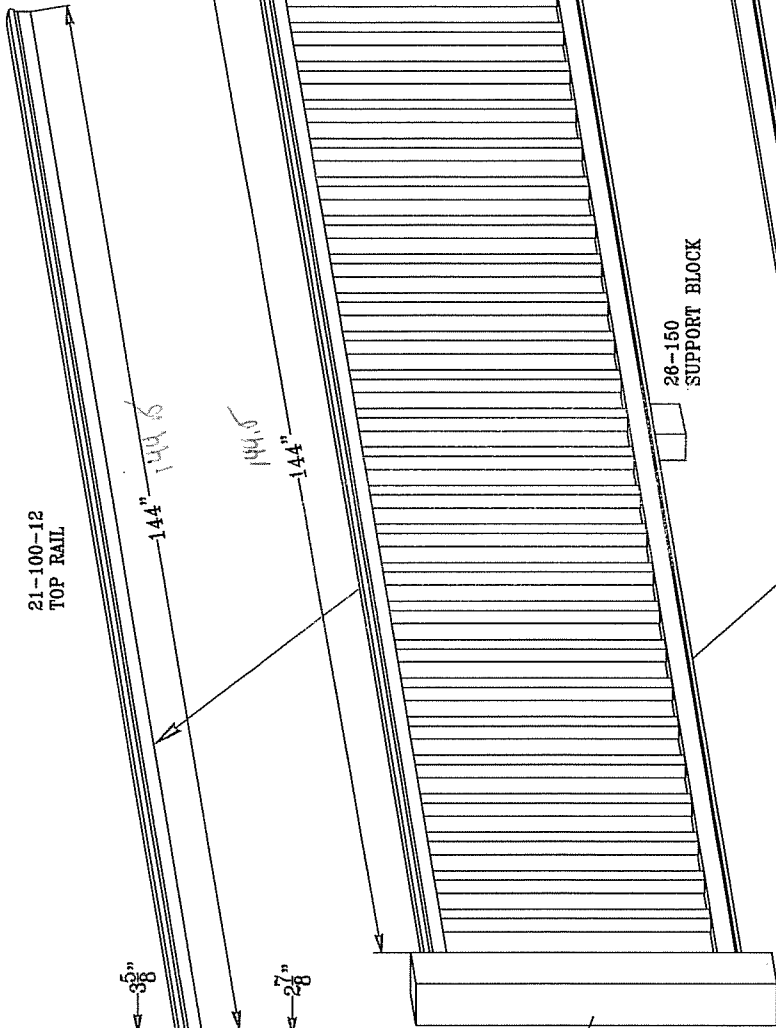
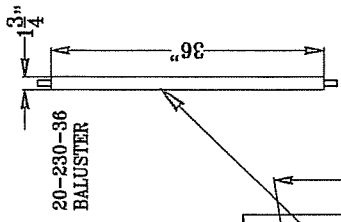
Photo No. 4



Photo No. 5

Appendix C

Drawings



TEST SPECIMEN COMPLIES
 WITH THESE DETAILS.
 ANY DEVIATION IS NOTED
 REPORT NO. NCTL-110-19595-7
 TEST DATE 9/22/16

DWG. A

STRUCTURAL TEST FOR BALUSTRADE SYSTEMS

9-26-16

25-100 RAIL INSTALLATION KIT - DWG C

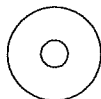
HARDWARE



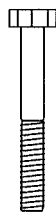
(8)- 1/4" NUTS



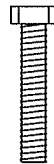
(8)- LOCK WASHERS



(8)- FLAT WASHERS



(8)- 1/4" X 2" MACHINE BOLTS

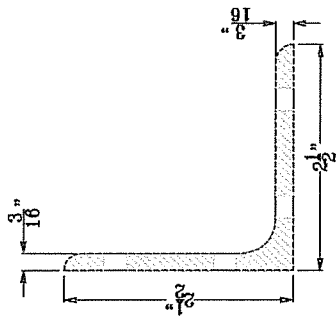


(2)- 5/16" X 1-1/2" HEX HEAD BOLTS

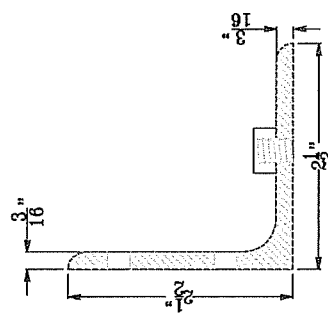


(8)- #14 - 2" SELF TAPPING SCREWS

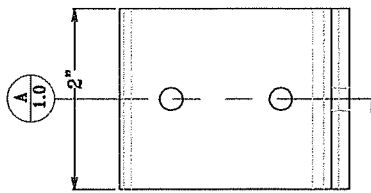
BRACKETS



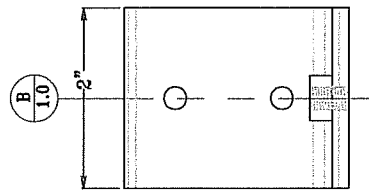
A
SECTION
SCALE 8"=1'0"



B
SECTION
SCALE 8"=1'0"

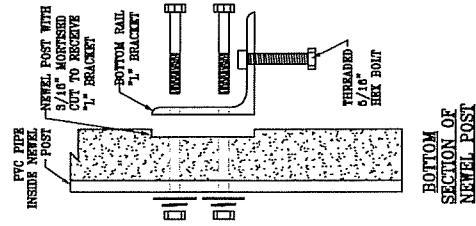
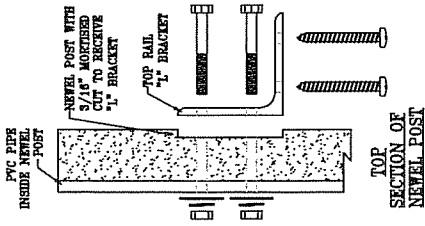


ELEVATION A - (2) TOP RAIL "L" BRACKET
ARCH. REF. N.A. SCALE 8"=1'0"



ELEVATION B - (2) BOTTOM RAIL "L" BRACKET
ARCH. REF. N.A. SCALE 8"=1'0"

INSTALLATION



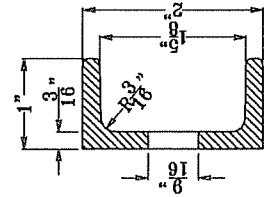
TEST SPECIMEN COMPLIES WITH THESE DETAILS.
ANY DEVIATION IS NOTED
REPORT NO. NCTL-110-19595-1
TEST DATE 9/22/16

24-100 NEWEL INSTALLATION KIT - DWG B

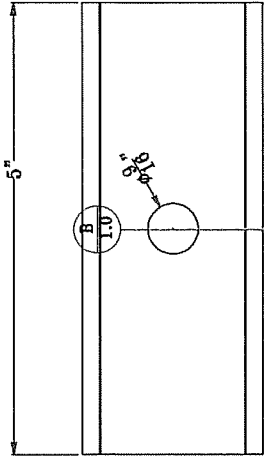
24-100 HARDWARE KIT

QTY.	DESCRIPTION
(1)	1" X 2" X 5" C-CHANNEL
(1)	1/2" X 48" ALL THREAD ROD
(1)	1/4" X 2-1/2" X 2-1/2" FIR. FLANGE
(4)	3/8" X 2-1/2" LAG BOLTS
(1)	1/2" NUT
(1)	1/2" WASHER
(1)	1/2" LOCK WASHER
(4)	1-3/4" CONCRETE ANCHORS

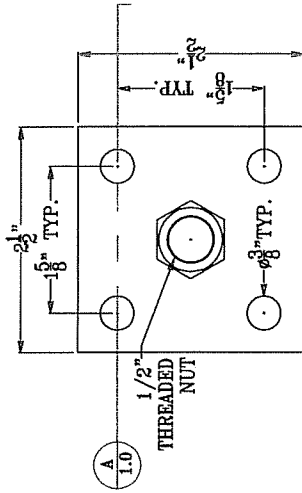
TEST SPECIMEN COMPLIES WITH THESE DETAILS.
 REPORT NO. NCTL-410-19598-1
 TEST DATE 9/22/16



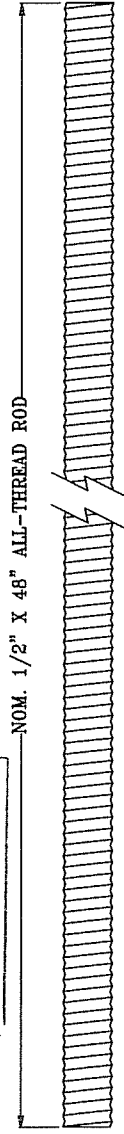
SECTION A
SCALE 6"=1'0"



ELEVATION - (1) C-CHANNEL
ARCH. REF. N.A. SCALE 6"=1'0"



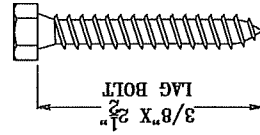
SECTION A - FLANGE
SCALE 6"=1'0"



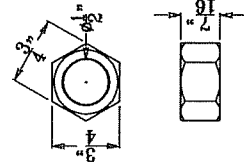
ELEVATION - (1) ALL-THREAD ROD
ARCH. REF. N.A. SCALE 6"=1'0"

ELEVATION - (1) FLOOR FLANGE

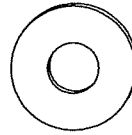
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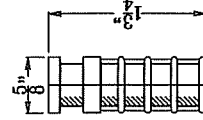
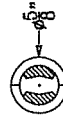
(4) LAG BOLTS



(1) 1/2" NUT



(1) 1/2" LOCK WASHER



(4) CONCRETE ANCHORS