

TEST REPORT

Rendered to:

COLLINS LIMITED, LLC

For:

48 in *Rook*[®] Post Mount and Structural Post Assembly

 Report No:
 94449.01-119-16

 Report Date:
 03/11/10

130 Derry Court York, PA 17406-8405 phone: 717-764-7700 fax: 717-764-4129 www.archtest.com



TEST REPORT

94449.01-119-16 March 11, 2010

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TEST REPORT

Rendered to:

COLLINS LIMITED, LLC 745 Fourth Street Somers Point, New Jersey 08244

Report No:	94449.01-119-16
Test Date:	11/11/09
Report Date:	03/11/10

1.0 General Information

1.1 Product

48 in *Rook*[®] Post Mount and Structural Post Assembly

1.2 Project Description

Architectural Testing was contracted by Collins Limited to perform static post testing on their 48 in high $Rook^{(0)}$ Post Mount and structural post assembly. This report includes comprehensive written and photographic documentation of the testing performed.

2.0 Reference Standard

ASCE/SEI 7-05, *Minimum Design Loads for Buildings and Other Structures*, American Society of Civil Engineers

3.0 Product Description

3.1 General

The static post test specimens were six 48 in tall, surface-mounted steel posts, with $Rook^{(B)}$ Post Mount spacers, and PVC sleeves. Collins Limited provided all test materials. See Appendix A for component drawings and Appendix B for component photographs.

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3.2 Component Details

- 4 in *Rook*[®] Structural Steel Post Mount 1-1/2 in Schedule 40 by 48 in long galvanized steel pipe welded to a 3-7/8 in square by 1/4 in thick HR steel base plate with four 0.55 in diameter holes for surface mounting
- 5 in *Rook*[®] Structural Steel Post Mount 1-1/2 in Schedule 40 by 48 in long galvanized steel pipe welded to a 4-7/8 in square by 3/8 in thick HR steel base plate with four 0.65 in diameter holes for surface mounting
- 4 in *Rook*[®] Post Mount (pipe to post sleeve spacer) 1.95 in ID by 4-7/8 in high by 4 in square PVC injection molding with eight 0.19 in diameter holes for attachment to pipe, manufactured by LMT-Mercer Group, Inc.
- 5 in *Rook*[®] Post Mount (pipe to post sleeve spacer) 1.95 in ID by 5-7/8 in high by 5 in square PVC injection molding with eight 0.19 in diameter holes for attachment to pipe, manufactured by LMT-Mercer Group, Inc.

4 in Post Sleeve - 4 in square by 0.14 in wall by 54 in long PVC co-extrusion

5 in Post Sleeve - 5 in square by 0.13 in wall by 6 ft long PVC co-extrusion

4.0 Post Static Load Testing

4.1 Test Equipment

Each support post was tested in a self-contained structural frame designed to accommodate surface mounting of the specimen and application of the test loads. The specimen was loaded using an electric winch mounted to a rigid steel test frame. High strength steel cables and nylon lifting straps were used to impose test loads on the specimen. Applied load was measured using an electronic load cell located in-line within the loading system. Deflection at point of load application was measured to the nearest 0.01 in using an electronic linear displacement transducer.

4.2 Test Setup

Each tested post was surface-mounted to a steel channel with four 3/8 in grade 8 steel bolts. Post anchorage was not within the scope of testing and would need to be evaluated separately. The test load was applied with a 3 in wide nylon strap around the post sleeve at a height from the mounting surface as indicated in the test results below.

4.3 Test Procedure

Each post was loaded at a uniform rate until failure.



4.4 Post Test Results

Specimen	Test Height (in)	Ultimate Test Load (lb)	Deviation from Average	Failure Mode
1		546	9 %	Pasa Diata
2	49	600	0 %	Dase Flate
3		655	9 %	Deformation
Average:		600		
Av	erage Ultimate Moment:	2450 ft-lbf		

4 in *Rook*[®] Structural Steel Post Mount

5 in *Rook*[®] Structural Steel Post Mount

Specimen	Test Height (in)	Ultimate Test Load (lb)	Deviation from Average	Failure Mode
4	70	377	N/A	Pipe Bending
T II4:	mata Mamante	2100 ft lbf		

Ultimate Moment: 2199 ft-lbf

¹ Note that the test load was applied to the empty PVC post sleeve, approximately24 in above the top of the top Rook[®] Post Mount spacer.

Specimen	Test Height (in)	Ultimate Test Load (lb)	Deviation from Average	Failure Mode
5	45	623	5 %	Pipe
6	43	684	5 %	Bending
Average:		653		
Average Ultimate Moment:		2449 ft-lbf		

5 in *Rook*[®] Structural Steel Post Mount

The near identical moment results of the posts tested at 45 in and 49 in may be combined to equal 2450 ft-lbf.



4.5 Post Test Analysis

The design wind load for three privacy fence systems was calculated using ASCE 7-05 (as referenced in Section 2.0) based on three-second-gust basic wind speeds of 90 mph and 110 mph, which correlate to 76 mph and 95 mph sustained ("fastest mile") winds, respectively. These two velocities were chosen for later comparison purposes because the calculation constants for Design Wind Force are different above and below 100 mph. See Appendix C for design wind load calculations.

Fence Size (Solid Height x Post Spacing)	Fence Area (ft ²)	Design Wind Force (lb)	3-Second Gust Wind Velocity, V _{3S} (mph)	Equivalent Sustained ("Fastest Mile") Wind Velocity, V _{fm} (mph)
48-1/2 in by 6 ft	24.2	378		
48-1/2 in by 8 ft	32.3	504	00	76
6 ft by 6 ft	36.0	562	90	
6 ft by 8 ft	48.0	749		
48-1/2 in by 6 ft	24.2	502		
48-1/2 in by 8 ft	32.3	669	110	05
6 ft by 6 ft 36.0		745	110	75
6 ft by 8 ft	48.0	994		

The average ultimate loads for the posts were then translated into equivalent loads at the horizontal centerline of the fence systems as follows:

Post Load Height (in)	Average Ultimate Moment (ft-lbf)	Fence Size (Solid Height x Post Spacing)	Fence Horizontal CL Above Grade (in)	Equivalent Post Load Capability at Fence CL (lb)
40 1	2450	48-1/2 in by 6 ft 48-1/2 in by 8 ft	26 1/4	1120
49 in or less		6 ft by 6 ft 6 ft by 8 ft	38	774
70 in	2199	6 ft by 6 ft 6 ft by 8 ft	38	694

Both rails of the 4 ft high fence would be attached to a $Rook^{(B)}$, as would the lower rail of the 6 ft high fences. The upper rail of the 6 ft high fences would attach to the post sleeve, approximately 24 in above the top of the top $Rook^{(B)}$ spacer. So the Post Load capability for the 6 ft high fences would be the average of 774 lb and 694 lb, or 734 lb.



4.5 Post Test Analysis (Continued)

The wind velocity capabilities of the posts can now be determined by ratio of the Design Wind Force and Post Load Capability.

Fence Size (Solid Height x	Post Load Capability	Equivalent 3-Second Gust Wind Velocity, V ₃₈ (mph)		
Post Spacing)	(lb)	No Factor of Safety	1.5 Factor of Safety ¹	
48-1/2 in by 6 ft	1120	164	134	
48-1/2 in by 8 ft	1120	142	116	
6 ft by 6 ft	724	109	84 ²	
6 ft by 8 ft	/ 34	89	73 ²	

¹ Miami-Dade County, Florida requires that a 1.5 safety factor be applied to static post test results.

² Wind velocities below 85 mph are below hurricane wind speeds.

5.0 Closing Statement

Detailed drawings, data sheets, representative samples of test specimens, a copy of this test report will be retained by Architectural Testing for a period of four years from the original test date. At the end of this retention period such materials shall be discarded without notice and the service life of this report by Architectural Testing will expire. Results obtained are tested values and were secured using the designated test methods. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimens tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing.

For ARCHITECTURAL TESTING:

Justin M. Mann Laboratory Supervisor Structural Systems Testing David H. Forney, P.E. Senior Project Engineer Structural Systems Testing

DHF:dhf/alb

Attachments (pages): This report is complete only when all attachments listed are included.Appendix A: Drawings (3)Appendix B: Photographs (3)Appendix C: Calculations (1)



Revision Log

Rev. # Date Page(s)

0 03/11/10

Revision(s)



94449.01-119-16

APPENDIX A

Drawings









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APPENDIX B

Photographs





Photo No. 1 Bottom of *Rook*[®] Post Mount



Photo No. 2 Top of *Rook*[®] Post Mount





Photo No. 3 Static Load Test at 49 in Height



Photo No. 4 Static Load Test at 70 in Height





Photo No. 5 Typical 4 in Failure Mode



Photo No. 6 Typical 5 in Failure Mode



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APPENDIX C

Calculations



WIND DESIGN PRESSURE ANALYSIS Ref. ASCE 7-05

for Privacy Fence

	c	Project: Collins Lir Job No.: 94449.01- Component: Rook Pos Date: 12/10/200	nited 119-16 t Mount 9 dhf
			ASCE 7-05 Ref
Basic Wind Speed, V_{3s} =	90 mph	(eq. 75 mph V _{fm})	
Basic Wind Speed, V_{3s} =	110 mph	(eq. 75 mph V _{fm})	
Structure Classification, Category:	Ι	Low Hazard	Tbl. 1-1
Exposure Category (A, B, C, D):	С	Open Terrain	6.5.6.1
Exposure Coefficient, Kz =	0.85	0 to 15 ft High	Tbl. 6-3
Topographic Factor, Kzt =	1.0		-
Note: Value does not account for wind speed-up over	hills and esca	rpments.	
Directionality Factor, Kd =	1.0		Tbl. 6-4
Hurricane Prone Region Importance Factor, / =	0.87	85 to 100 mph	Tbl. 6-1
=	0.77	> 100 mph	
Velocity Pressure, $q_z = 0.00256 K_z K_{zl} K_d V^2 I =$	15.3 psf	90 mph	
=	20.3 psf	110 mph	
Gust Effect Factor, G =	0.85	Rigid Structure	6.5.8
Net Force Coefficient, $C_f =$	1.2	Free Standing Wall	Tbl. 6-11
Design Wind Force, $F = q_z GC_f A_f$ (Af = Projection	cted Area, f	ť)	6.5.13

Design Load:

Height (ft)	Length (ft)	Af (sq ft)	F (lb)		
6.0	8.0	48.0	749	 (90 mph)	
6.0	8.0	48.0	994	(110 mph)	
4.04	8.0	32.3	504	(90 mph)	
4.04	8.0	32.3	669	(110 mph)	
6.0	6.0	36.0	562	(90 mph)	
6.0	6.0	36.0	745	(110 mph)	added
4.04	6.0	24.2	378	(90 mph)	03.09.10
4.04	6.0	24.2	501	(110 mph)	

6.0	8.0		
	Test Results	s (lb):	_
	Ult.	Ult. / 1.5	(Miami-Dade)
4x4 Rook @ 2450 ftlb	774	516	
5x5 Rook @ 2199 ftlb	694	463	
5x5 Rook @ 2449 ftlb	773	515	
	Faulualant	lanta M/Ind	Canad (mak)
Sofoty Footon		asic winu	Speed (mpn)
Aud Deals @ 2450 filb	1.0		1.5 (IVI-D)
4x4 ROOK @ 2450 10	91		75
5x5 ROOK @ 2199 TID	87	89	71 73
5x5 Rook @ 2449 ftlb	91		75
values in red (<85 mph) are below hi	urricane w	ind speeds
4.04	8.0		
4	Test Results	(lb):	
	Ult.	Ult. / 1.5	(Miami-Dade)
4x4 Rook @ 2450 ftlb	1120	747	_(
5x5 Rook @ 2449 ftlb	1119	746	
	Equivalent B	asic Wind	Speed (mph)
Safety Factor:	1.0		1.5 (M-D)
4x4 Rook @ 2450 ftlb	142		116
5x5 Rook @ 2449 ftlb	142		116
4.04	6.0		03.09.10 dhf
	Test Results	(lb):	_
	Ult.	Ult. / 1.5	(Miami-Dade)
4x4 Rook @ 2450 ftlb	1120	747	
5x5 Rook @ 2449 ftlb	1119	746	
	Equivalent B	asic Wind	Speed (mph)
Safety Factor:	10	4010 11114	L5 (M-D)
4x4 Rook @ 2450 ftlb	164		134
5x5 Rook @ 2449 ftlb	164		134
0x0 1100k @ 2440 http	104		154
60	60		03.09.10 dbf
	Toet Regulte	(Ib)·	00.00.10 dill
	I lif	1111 / 1 5	- (Miami-Dado)
Avd Rook @ 2450 All	774	516	
5v5 Pook @ 2400 110	604	462	
5x5 Dook @ 2199 110	772	403	
5x5 rook @ 2449 πid	113	515	
	Equivalent Ba	asic Wind	Speed (mph)
Safety Factor:	1.0	1	.5 (M-D)
4x4 Rook @ 2450 ftlb	112		86
5x5 Rook @ 2199 ftlb	106	400	82 04
5x5 Rook @ 2449 ftlb	112	109	86 84
			~~

values in red (<85 mph) are below hurricane wind speeds