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CENDEK RAILINGS LTD.
TEST REPORT

SCOPE OF WORK
Report of Century Welded Picket Aluminum Railing System for compliance with the applicable requirements of the following:

- 2015 International Residential Code (IRC), Section R301.5 *Live Load*

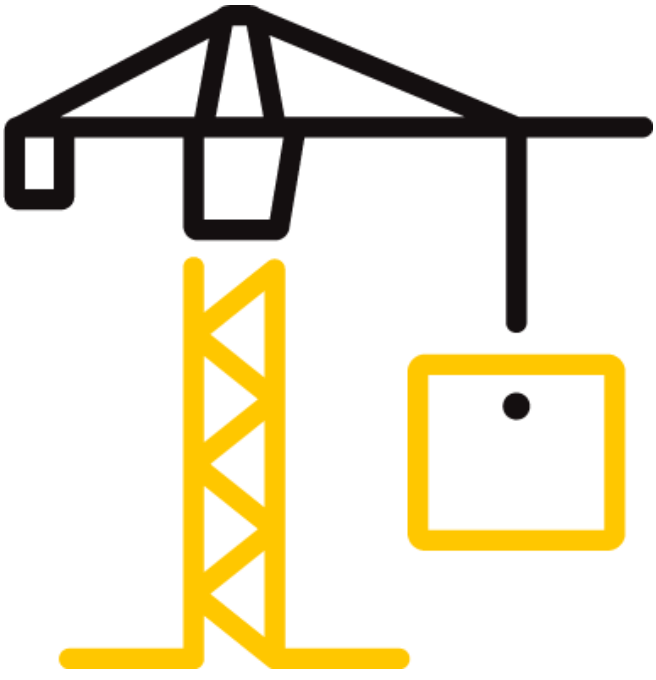
REPORT NUMBER
103427583COQ-001A

ISSUE DATE
9-May-2018

PAGES

Report	8 pages
Appendix A	3 pages
Appendix B	3 pages
Appendix C	7 pages

DOCUMENT CONTROL NUMBER
GFT-OP-10b (13-March-2017)



REPORT ISSUED TO
CENDEK RAILINGS LTD.
9685 Agur Street
Summerland, BC V0H 1Z2
Canada

CONCLUSION

The Cendek Railings Ltd. product identified and evaluated in this report has met the load requirements contained in the following:

- 2015 International Residential Code (IRC), Section R301.5 *Live Load*

The product test results are presented in Section 6 of this report.

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

SECTION 1
INDEX

SECTION 2
OBJECTIVE

Intertek Testing Services NA Ltd. (Intertek) has conducted a test program for the Century Welded Picket Railing System submitted by Cendek Railings Ltd. The evaluation was carried out to determine whether the railing would meet the requirements of the following:

- 2015 International Residential Code (IRC), Section R301.5 *Live Load*

This evaluation was conducted in the month of March 2018.

SECTION 3
SAMPLE SELECTION

The client submitted one (1) aluminum railing system to the Evaluation Center on March 26, 2018 (Coquitlam ID# VAN1803261211-001). Samples were not independently selected for testing.

SECTION 4
SAMPLE ASSEMBLY AND DESCRIPTION

The samples were identified as the following:

Table 1. Railing Configuration

Railing	Post	Post Spacing	Mounting Plate	Rails	Picket Insert
Century Welded Picket Aluminum Railing System	2-1/2” x 2-1/2”	98”	4” x 4” x 1/4”	42” high	5/8” x 5/8”

One (1) support leg was placed under the bottom rail mid-way between posts. The support leg was rigidly fixed to the test frame by screwing the front side with a 1 in. long wood screw into nominal 2x4 SPF lumber, which was then clamped to the steel test frame.

For detailed drawings of the test sample and components, refer to Appendix C.

Note: The installation of the guardrail to the deck was not within the scope of this report, and is subject to evaluation and approval by the building official. Four 3/8 in. grade 5 bolts and washers on each post were used to install the specimen for testing.

SECTION 5
TESTING AND EVALUATION METHODS

The test specimens were loaded at a rate to achieve the specified loads between 10 seconds and 5 minutes. The specified test loads were held for one minute before the load was released. The following tests were conducted:

2015 IRC: SECTION R301.5 LIVE LOAD

1) Handrails and guards shall be designed to resist a concentrated load of 200 pounds (0.89 kN), applied in any direction at any point on the handrail or top rail and to transfer the load through the supports to the structure to produce the maximum load effect on the element being considered.

2) Intermediate rails (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 pounds (0.22 kN) on an area not to exceed 12 in. by 12 in. (305 mm by 305 mm) including openings and space between rails and located so as to produce the maximum load effect.

Notes: A live load factor of 2.5 was applied to the above loads.

IN-FILL LOAD TEST

A load of 125 lbs was applied using a 1 square foot block normal to the in-fill. After release of the load, the system was evaluated for failure, any evidence of disengagements of any component and/or visible cracking from any component.

CONCENTRATED LOAD TEST

The top rail of the guardrail system was subjected to three (3) separate tests where a concentrated load of 500 lbs was applied:

- horizontally at the mid-span of the top rail,
- horizontally at the top rail adjacent to the post connection to verify the connection capacity, and
- horizontally at the top of the post.

SECTION 6
RESULTS AND OBSERVATIONS

The product test results are shown in Table 2. A copy of the test data is located in Appendix A**.**

Table 2. Test Results

System Description	Test	Compliance
Century Welded Picket Aluminum Railing System	In-fill Load	Pass
	Mid-Span Concentrated Load	Pass
	Adjacent to Post Connection Concentrated Load	Pass
	Top of Post	Pass

SECTION 7
CONCLUSION

Intertek Testing Services NA Ltd. (Intertek) has conducted a test program for the Century Welded Picket Aluminum Railing System submitted by Cendek Railings Ltd. The evaluation was carried out to determine whether the railing would meet the requirements of the following:

- 2015 International Residential Code (IRC), Section R301.5 *Live Load*

The product test results are presented in Section 6 of this report.

SECTION 8

APPENDIX A: TEST DATA (2 PAGES)

Company	Cendek Railings Ltd.	Technician(s)	Chris Chang
Project No.	G103427583	Reviewer	Baldeep Sandhu
Models	8 ft. Century Welded Picket Railing	Start/End Date	March 28, 2018
Product Name	Same as above	Sample ID	VAN1803261211-001
Standard	**2015 International Residential Code (IRC)**		

Test Data Package

Table of Contents

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Test:	**Loads on Guards**			Project:	G103427583
Date:	28-Mar-18			Eng/Tech:	Chris Chang
Client:	Cendek Railings Ltd.			Reviewer:	Baldeep Sandhu
Product:	**8 ft. Century Welded Picket Railing**			Location:	Coquitlam, BC
Post Spacing:	8.17 ft	2.49 m			
Height of Guard:	42 in	1067 mm			
Opening in Guard:	3.875 in	98 mm			
Method:	2015 International Residential Code (IRC)				
Safety Factor:	2.50				
Equipment:	Artech 5000 lbf Load Cell (Intertek ID# P60692, cal due August 4, 2018)				
	Vaisala Temp/RH Indicator (Intertek ID# 9-0176, cal due January 24, 2019)				
	Stopwatch (Intertek ID# P60444, cal due June 28, 2018)				
Time/Temp/RH:	8:05AM / 22.1° / 49.0%				

Direction	Test	Design Load (Inward/ Outward) (lbf)	Factored Load	Calculated Moment (lbf-ft)	Equivalent Quarter-Point Load (lbf)	Required Proof Load (lbf)	Pass/Fail
Outward	Individual Elements (over 12 in. x 12 in.) (most critical location)	50	125	-	-	125	**Pass**
	Midspan Horizontal Concentrated Load	200	500	-	-	500	**Pass**
	Top Rail Adjacent to Connection Concentrated Load	200	500	-	-	500	**Pass**
	Top of Post	200	500	-	-	500	**Pass**

Direction	Test	Design Load (Inward/ Outward) (kN)	Factored Load	Calculated Moment (kNm)	Equivalent Quarter-Point Load (kN)	Required Proof Load (kN)	Pass/Fail
Outward	Individual Elements (over 305 mm in. x 305 mm) (most critical location)	0.22	0.56	-	-	0.56	**Pass**
	Midspan Horizontal Concentrated Load	0.89	2.22	-	-	2.22	**Pass**
	Top Rail Adjacent to Connection Concentrated Load	0.89	2.22	-	-	2.22	**Pass**
	Top of Post	0.89	2.22	-	-	2.22	**Pass**

Mode of Failure: Max load of 927.9 lb reached during horizontal uniform test; screw attaching baseplate to post broke off and there was significant baseplate deformation throughout testing.

APPENDIX B: PHOTOS (2 PAGES)

Photo 1. In-fill Load Test

Photo 2. Mid-Span Concentrated Load Test

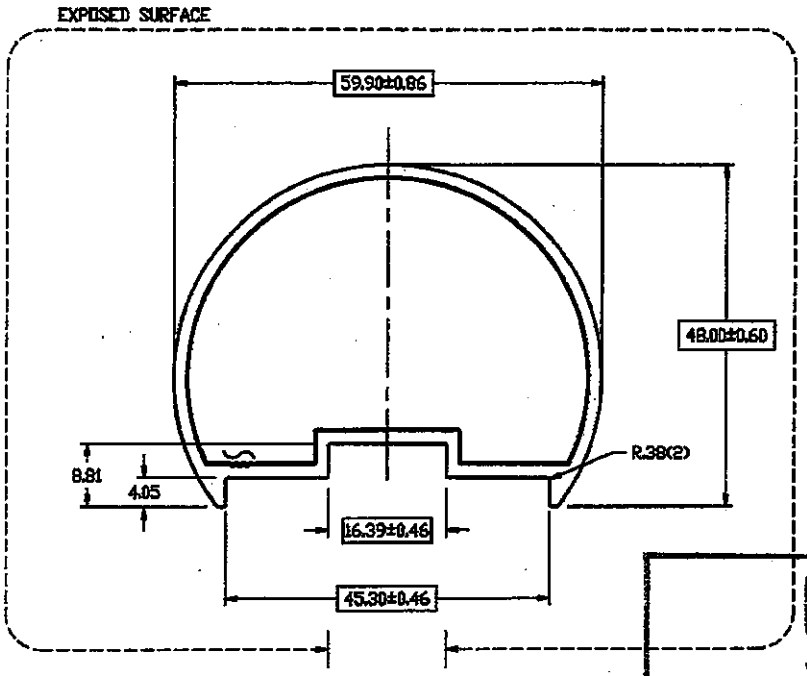
Photo 3. Adjacent to Post Connection Concentrated Load Test

Photo 4. Top of Post Concentrated Load Test

APPENDIX C: DRAWINGS (6 PAGES)

APEX aluminum extrusions

Customer Name:	Deksmart Railings	Quote No.: 1392-20	Apex Die Num.: 2186
Part Description:	Century Welded Top Rail	Part No.: 696114	
Note:	Standard Aluminum Association Tolerances to Apply Unless Otherwise Noted		Customer No.:



ACTUAL SIZE

Intertek
Valued Quality. Delivered.
Test sample complies with these details.
Deviations are noted.
Report #: 103427583COQ-001A
Date: 5/4/18 Tech: C.C.

Area=sq.mm	361.991
Weight=kg/m	1.001
Perimeter=mm	371.641
Outer Perimeter=mm	197.146
C.C.D.=mm	59.900
Factor:	22
Ratio:	87
Cavities:	1
Press No.:	1
Scale:	AS NOTED
Alloy:	6063 T5
Date:	3/20/2015
Drawn by:	dc

SAL-304-1 5/10/2012

TYP WALL U.O.S. 1.90±0.25

Denotes Apex ID Mark .25x90° V GROOVE (3X)

All unmarked radii .95R unless otherwise noted

Break all corners .25R unless otherwise noted

[ ] - Denotes Critical Dimension

No Exposed Surfaces Except As Marked

Rev:	Description:	Date:

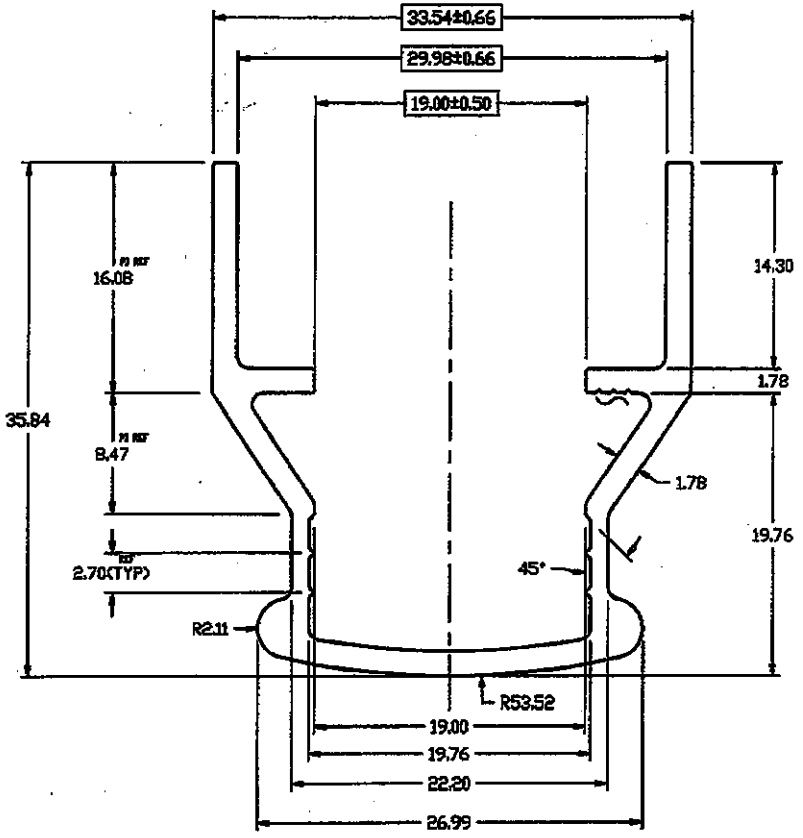
This is not an Apex Aluminum Extrusion design. Apex Aluminum Extrusion in accepts no responsibility or liability for the performance of products produced from it. Apex makes no warranty of fitness for a particular purpose with regards to the extrusions produced from this drawings.

PRINT APPROVAL: Customer signature indicates that dimensions and tolerances have been accepted as shown. Customer also assumes all legal responsibility for having this profile made and will fully protect Apex Aluminum Extrusions Ltd. in case of patent or any other claims.

Date: Signed:

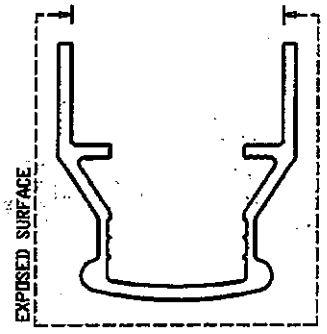
APEX aluminum extrusions

Customer Name: Deksmart Railings		Quote No.: 1392-4	Apex Die Num.: 2170
Part Description: Welded Bottom Rail		Part No.: 626646	
Note: Standard Aluminum Association Tolerances to Apply Unless Otherwise Noted			Customer No.:



SCALE 2/1

Intertek
Value Quality Delivered.
Test sample complies with these details.
Deviations are noted.
Report #: 103427583COQ-001A
Date: 5/9/18 Tech: C.C.



ACTUAL SIZE

Area=sq.mm	191.786
Weight=kg/m	0.531
Perimeter=mm	211.319
Outer Perimeter=mm	--
C.C.D.=mm	45.498
Factor:	23
Ratio:	55
Cavities:	3
Press No.:	1
Scale:	AS NOTED
Alloy:	6063 T5
Date:	3/20/2015
Drawn by:	dc

SAL-304-1 5/10/2012

TYP WALL U.O.S. 1.78±0.15

Denotes Apex ID Mark .25x90° V GROOVE (3X)

All unmarked radii .80R unless otherwise noted

Break all corners .25R unless otherwise noted

[ ] - Denotes Critical Dimension

No Exposed Surfaces Except As Marked

Rev:	Description:	Date:

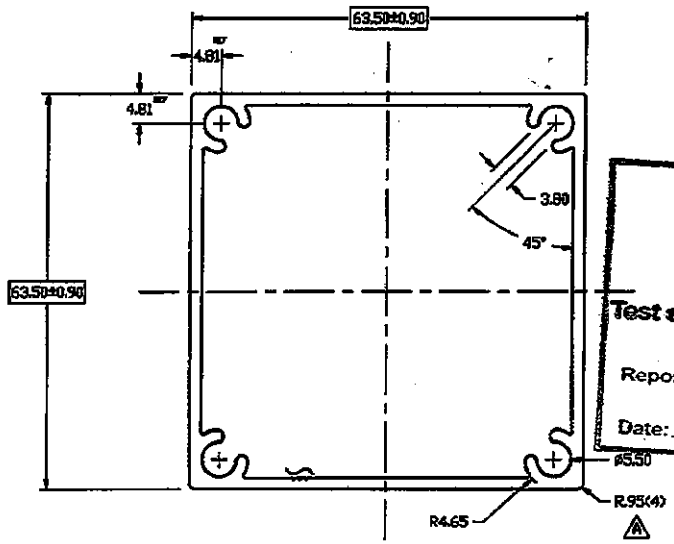
This is not an Apex Aluminum Extrusion design. Apex Aluminum Extrusion in accepts no responsibility or liability for the performance of products produced from it. Apex makes no warranty of fitness for a particular purpose with regards to the extrusions produced from this drawings.

PRINT APPROVAL: Customer signature indicates that dimensions and tolerances have been accepted as shown. Customer also assumes all legal responsibility for having this profile made and will fully protect Apex Aluminum Extrusions Ltd. in case of patent or any other claims.

Date: Signed:

APEX aluminum extrusions

Customer Name: Deksmart Railings		Quote No.: 1392-13	Apex Die Number: 2179
Part Description: 2 1/2" Post Material		Part No.: 665987	
Note: Standard Aluminum Association Tolerances to Apply Unless Otherwise Noted			Customer No.:



ACTUAL SIZE

Intertek
Valued Quality. Delivered.
Test sample complies with these details.
Deviations are noted.
Report #: 103427583COQ-001A
Date: 5/9/18 Tech: C.C.

Area=sq.mm	538.4483
Weight=kg/m	1.490
Perimeter=mm	530.119
Outer Perimeter=mm	253.313
C.C.D.=mm	89.471
Factor:	21
Ratio:	58
Cavities:	1
Press No.:	1
Scale:	AS NOTED
Alloy:	6063 T5
Date:	3/20/2015
Drawn by:	dc

SAL-304-1 5/10/2012

TYP WALL U.O.S. 1.90±0.25

Denotes Apex ID Mark .25x90° V GROOVE (3X)

All unmarked radii .95R unless otherwise noted

Break all corners .40R unless otherwise noted

[ ] - Denotes Critical Dimension

Exposed All Around

Rev:	Description:	Date:
A	RADII CHANGED FROM R0.40 to R0.95	5/25/2015

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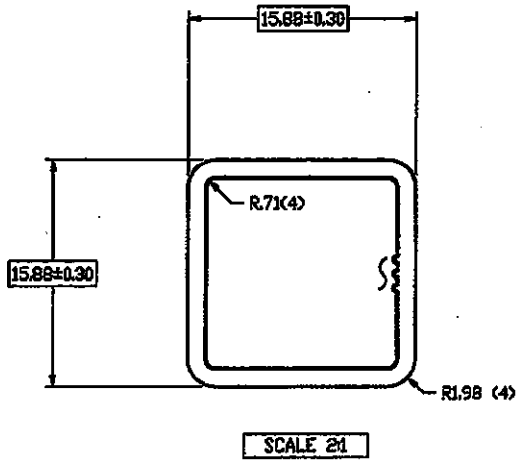
Date: 05/25/15 Signed: Michael Gill

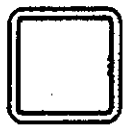
APEX aluminum extrusions

Customer Name:	Deksmart Railings	Quote No.: 1392-9	Apex Die Number: 2175
Part Description:	5/8" Picket	Part No.: 695273	
Note:	Standard Aluminum Association Tolerances to Apply Unless Otherwise Noted		Customer No.:



SCALE 2:1

Intertek
Valued Quality. Delivered.
Test sample complies with these details.
Deviations are noted.
Report #: 103427583COQ-001A
Date: 5/9/18 Tech: C.C.



ACTUAL SIZE

Area=sq.mm	71.286
Weight=kg/m	0.197
Perimeter=mm	112.282
Outer Perimeter=mm	60.121
C.C.D.=mm	20.817
Factor:	33
Ratio:	55
Cavities:	8
Press No.:	1
Scale:	AS NOTED
Alloy:	6063 T5
Date:	3/20/2015
Drawn by:	dc

SAL-304-1 5/10/2012

TYP WALL U.O.S. 1.27±0.25

Denotes Apex ID Mark .25x90° V GROOVE (3X)

All unmarked radii .00R unless otherwise noted

Break all corners .00R unless otherwise noted

[ ] - Denotes Critical Dimension

Exposed All Around

Rev:	Description:	Date:

This is not an Apex Aluminum Extrusion design. Apex Aluminum Extrusion in accepts no responsibility or liability for the performance of products produced from it. Apex makes no warranty of fitness for a particular purpose with regards to the extrusions produced from this drawings.

PRINT APPROVAL: Customer signature indicates that dimensions and tolerances have been accepted as shown. Customer also assumes all legal responsibility for having this profile made and will fully protect Apex Aluminum Extrusions Ltd. in case of patent or any other claims.

Date: Signed:

APEL Extrusions Limited

CALGARY, ALTA.

Alloy	6060–T5
Finish	ARCH
Exposed Surface	2
Area (mm^2)	540
Lineal mass	1.453
Perimeter	340.9
Outside Perimeter	
Factor	235
C.C.D.	89.2
Break corners	.80
Unmarked Thickness	3.18
Unmarked Radii	
Date	7DEC98
Drawn by	EJS
Scale	1:1
Class no.	
Gap ratio	

T Tolerance's Dimension
* Close Tolerance
APEL ID Rib R Full radii

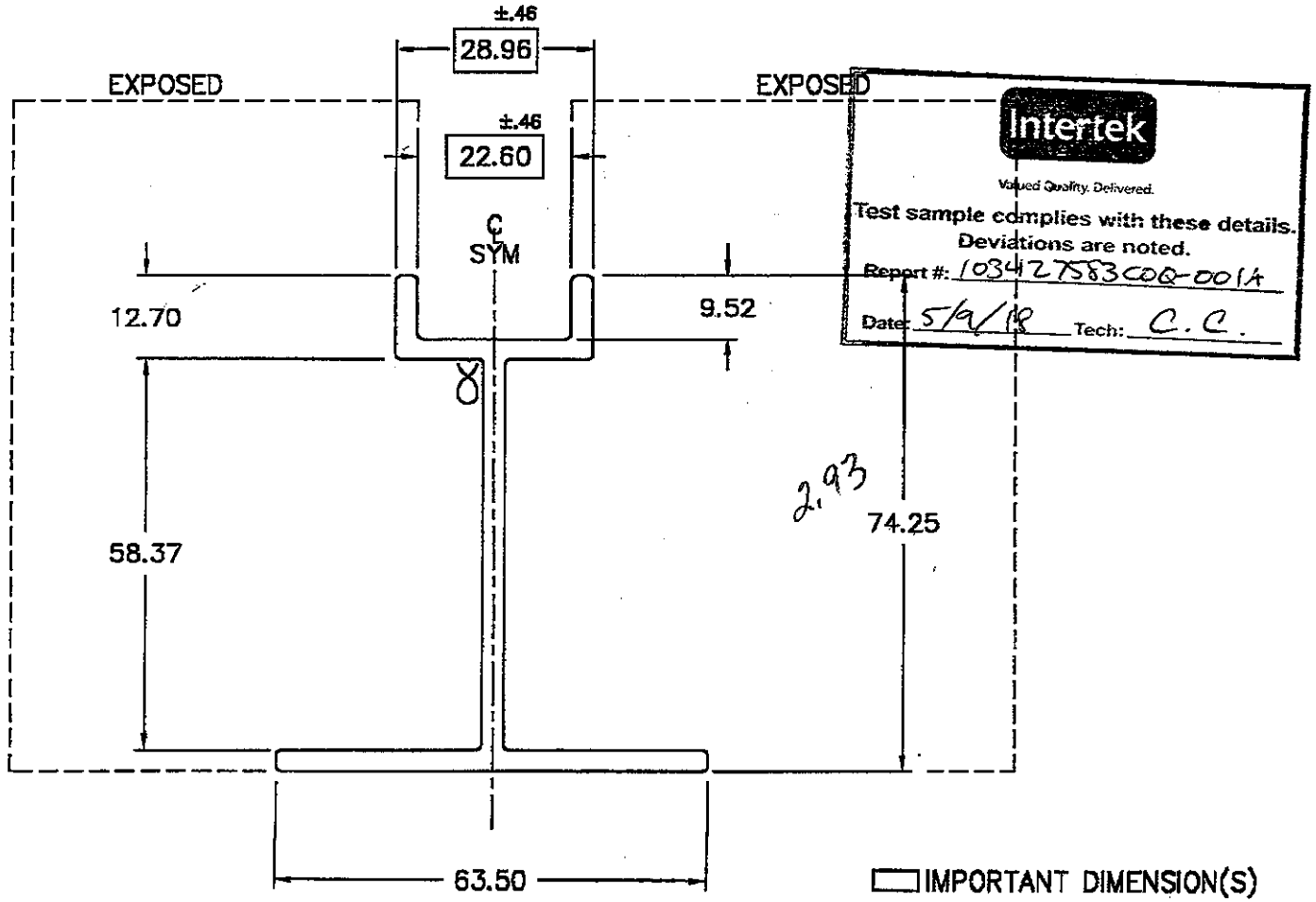
Customer no.
VS–10330

APEL SHAPE NO.
628025

NOTE: Commercial tolerances to apply unless otherwise stated.

APEL SHAPE NO.
628025

.97



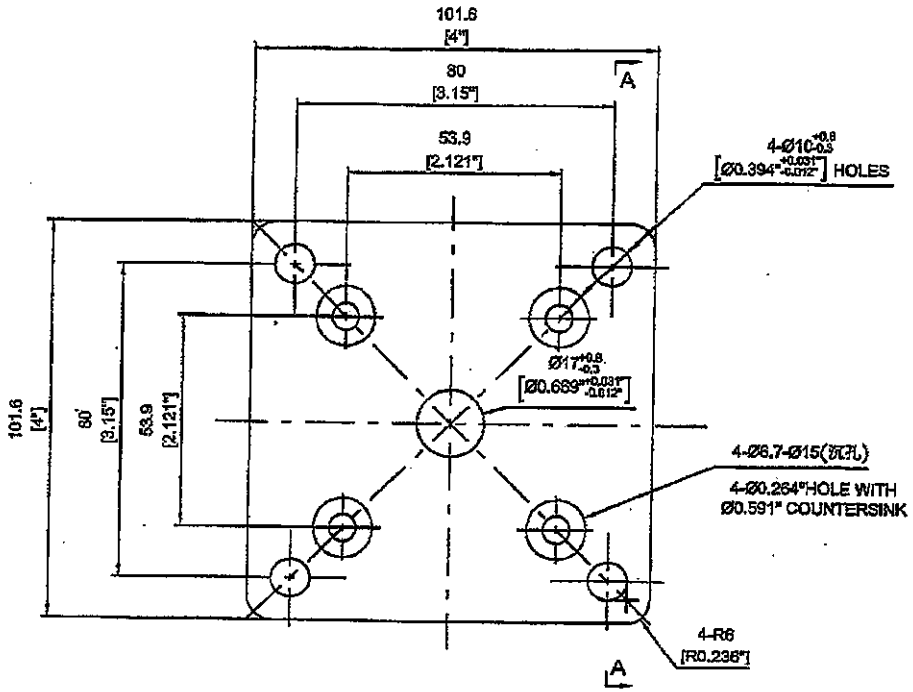
Intertek
Valued Quality. Delivered.
Test sample complies with these details.
Deviations are noted.
Report #: 10342758COQ-001A
Date: 5/9/18 Tech: C.C.

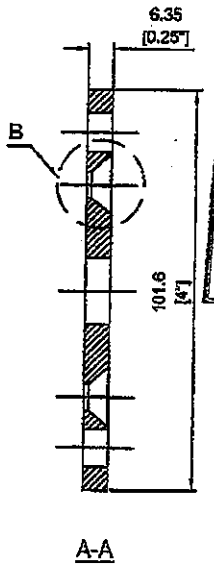
IMPORTANT DIMENSION(S)

		Description	BOTTOM RAIL SUPPORT LEG
		Customer	INTERIOR FENCE & RAILING
Date	Rev.		

PLATE PROCESSING DRAWING	EDITION NO: 0

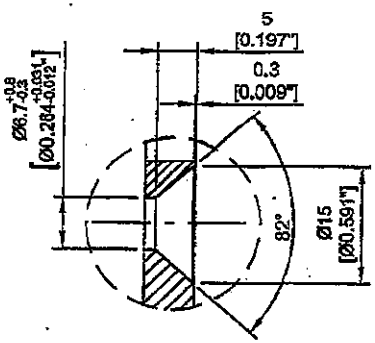
DRAWING NO:	0067-H-101.6-3(plate)
CUSTOMER PART NO.	-2.5 BP





A-A

Intertek
Valued Quality. Delivered.
Test sample complies with these details.
Deviations are noted.
Report #: 103427583COQ-001A
Date: 5/9/18 Tech: C.C



DETAIL:B
2:1

Cut length & Positional Dimension		Machining & Fabricated Dimension	
Dimension	Tolerance	Dimension	Tolerance
≤100	±0.5	≤10	±0.2
>100~500	±0.8	>10~20	±0.3
>500~1000	±1.0	>20~30	±0.4
>1000~1500	±1.5	>30~40	±0.5
>1500~3000	±1.8	>40~60	±0.6
>3000~6000	±2.0	>60~100	±0.8
Above 6000	±2.5	Above 100	±1.0
Tolerance of angular dimensions±0.5°			

NOTE:①UNIT: mm ②SCALE: N.T.S

EXTRUSION: PLATE	DRAWING: KITTY	APPROVED: AB	CHECKER:	DATE: 2012.02.14	ALLOY & TEMPER N/A	CUSTOMER: -