

TITAN BUILDING PRODUCTS TEST REPORT

SCOPE OF WORK

TESTING OF TITAN CEDAR WOODEN GUARD WITH ALUMINUM PICKETS TO ASSESS RESISTANCE TO LOADS ON GUARDS AS PRESCRIBED IN THE 2015 NATIONAL BUILDING CODE OF CANADA (NBC) AND 2012 ONTARIO BUILDING CODE (OBC).

REPORT NUMBER

103914490TOR-003

TEST DATE(S)

06/24/19

ISSUE DATE

06/28/19

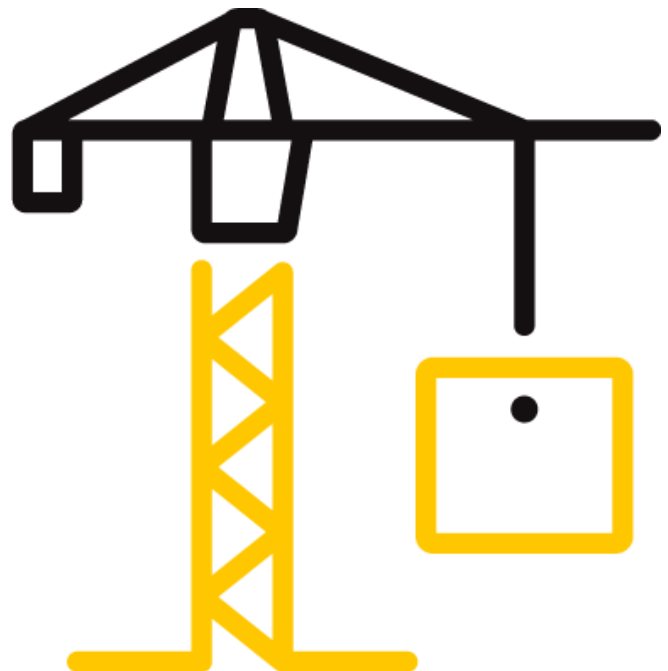
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TEST REPORT FOR TITAN BUILDING PRODUCTS

Report No.: 103914490TOR-003

Date: 06/28/19

REPORT ISSUED TO

TITAN BUILDING PRODUCTS.

5450 Canotek Rd Unit 71
Ottawa, ON K1J9G6
Canada

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by Titan Building Products to conduct Loads on Guards testing on their cedar wooden guard with aluminum pickets. The scope of the testing was to assess the ability of the guard system to resist the Specified and Factored Loads for guards within dwelling units and exterior guards serving not more than 2 dwelling units as prescribed in Table 9.8.8.2 of the following codes:

- 2015 National Building Code of Canada (NBC)
- 2012 Ontario Building Code (OBC)

Testing was conducted at Intertek test facility in Mississauga, ON, on June 24th, 2019.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. Intertek B&C will service this report for the entire test record retention period. The test record retention period ends four years after the test date. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained for the entire test record retention period.

SECTION 2

SUMMARY OF TEST RESULTS

The Titan cedar wooden guard with aluminum pickets as identified and detailed in this report has demonstrated resistance to the Specified Loads for guards within dwelling units and exterior guards serving not more than 2 dwelling units as prescribed in Table 9.8.8.2 of the 2015 National Building Code of Canada (NBC) and 2012 Ontario Building Code (OBC). Load adjustment factors were applied as detailed in this report.

For INTERTEK B&C:

COMPLETED BY:	Tyrone Williams	REVIEWED BY:	Joe DeRose, P. Eng.
TITLE:	Technician Building Products	TITLE:	Project Engineer, Evaluation Services
SIGNATURE:		SIGNATURE:	
DATE:	06/28/19	DATE:	06/28/19

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SECTION 3

TEST METHOD(S)

The specimens were subjected to the concentrated and uniform loads identified in:

- 2015 National Building Code of Canada (NBC), *Table 9.8.8.2, item 1*
- 2012 Ontario Building Code (OBC), *Table 9.8.8.2, item 1*

SECTION 4

MATERIAL SOURCE/INSTALLATION

An assembled guard system was submitted to Intertek directly from the client and received on June 5th, 2019. Samples were not independently selected for testing. Tests were performed at the Intertek laboratory in Mississauga, Ontario.

SECTION 5

EQUIPMENT

Calibration of test equipment was performed by Intertek B&C in accordance with ISO 17025 requirements.

Equipment Calibration		
Instrument/Equipment	Asset #	Calibration Due Date
2K Load Cell with Digital Indicator	280-01-0774	Aug-15-2019
Stop Watch	273-01-1202	Dec-18-2019
Tape Measure	280-01-1253	Nov-5-2019
Powerfist 24" stroke Hydraulic Ram	N/A	N/A
Electric Hydraulic Pump	N/A	N/A

SECTION 6

LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Joe DeRose	Intertek
Richard Bergman	Titan

Note: The above observers witnessed part or the entire test program

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SECTION 7**TEST PROCEDURE**

Samples were tested in the laboratory under ambient conditions. No specific conditioning parameters were required before testing.

Infill Load Test

Test Loads were applied over a 300 mm x 300 mm square platen normal to the infill at the intersection of the horizontal and vertical side edge of the infill. Specified and factored loads were applied and held for one (1) minute, whereupon deflection of the infill at the point of maximum deflection was recorded. After release of the load, the system was evaluated for failure, evidence of disengagement and visible cracks in any component.

Uniform Load Test

The top rail was subjected to vertical quarter point loads applied by means of a load distributing bar. Specified and factored loads were applied and held for one (1) minute, whereupon deflection of the top rail at mid-span was recorded. After release of the load, the system was evaluated for failure, evidence of disengagement and visible cracks in any component.

Concentrated Load Test

Concentrated test loads were applied separately and sequentially at the following critical locations: horizontally on the top rail at mid-span between posts, horizontally on the top rail adjacent to a post, and horizontally on top of a single post. Specified and factored loads were applied over a 100 mm x 100 mm square platen and held for one (1) minute, whereupon deflection was recorded at the point of application of the load. The load applied on the rail adjacent to the post was applied to the opposite post from which the top-of-post-test was performed on. After release of the load, the system was evaluated for failure, evidence of disengagement and visible cracks in any component.

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SECTION 8**TEST CALCULATIONS**

The applicable minimum factored loads to be applied were based on the specified loads in Table 9.8.8.2 of the 2015 National Building Code of Canada (NBC) and 2012 Ontario Building Code (OBC), increased by the material resistance factors below.

- Specified loads multiplied by $1.5/\phi$, where $\phi=0.9$ resistance factor for wood failure perpendicular to grain, the resulting safety factor was **1.67**
- Specified loads multiplied by $1.5/\phi$, where $\phi=0.6$ resistance for wood screw connection, the resulting safety factor was **2.5**

SECTION 9**TEST SPECIMEN DESCRIPTION**

The two-bay test assembly consisted of two (2) nominal 6x6 end posts and one (1) nominal 4x4 intermediate post fitted with 6x6 post anchors and 4x4 post anchor respectively.

Nominal 2x4 cedar wood top and bottom rails were fitted vertically between posts. A plastic shadow rail-female horizontal connector was fitted to each end of the rails using two (2) #10 x 2 in. flat head wood screws. The rails were subsequently fastened to the shadow rail-male horizontal connectors which were screwed to the posts using two (2) #10 x 2 in. flat head wood screws.

A continuous nominal 2x4 wood rail-cap was fitted between end posts, creating a "T-shaped" top rail screwed to the top of the 2x4 top rail using #10 x 3-1/4 in. flat head wood screws spaced approximately 380 mm on center. The ends of the rail cap were butted and toenailed into the nominal 6 x 6 post using three (3)-#10 x 3-1/4 in. flat head wood screws.

Fitted between the top and bottom rails were hollow round aluminium pickets measuring 785 mm long x 19 mm dia. x 1.42 mm thick walls. Pickets were held in place via plastic connectors with covers. The connectors were screwed to the rails using one (1) #9 x 1-3/4 in. pan head screw.

As installed, the posts were spaced 1890 mm on centre; seven (7) - #14 x 4 in. flat head wood screws were used to anchor the posts to a wood substrate. The wood substrate consisted of a layer of 5/4 in. thick cedar deck board and two (2) layers of 2 in. x 12 in. No. 2 grade SPF wood. The height of the guard measured 1055 mm from the surface of the cedar deck board to the top of the 2x6 wooden rail.

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Guard Assembly Components							
Drawing Title/ Part No.	QTY	Part Description	Part Dimensions (mm)				Reported Material
			Width	Height	length	Nominal Thickness	
No Drawing	2	Nominal 6x6 wood posts	135	135	1100	-	Cedar wood
No Drawing	1	Nominal 4x4 wood posts	85	85	1010	-	Cedar wood
No Drawing	4	Nominal 2x4 wood used for bottom rails and part of top rail.	35	85	1739	-	Cedar wood
No Drawing	1	Nominal 2x4 wood used for top rail cap	85	35	3560	-	Cedar wood
No Drawing	28	Picket infill	Dia.= 19		785	1.42	Aluminium
TIPR4402/ TIPR4402-Base	1	4x4 post anchor installed into 4x4 post and using four (4)- 3/8 in. x 5 in. lag screw	See Drawing				Hot Dip Zinc Steel
TIPR6602/ TIPR6602-Base	2	6x6 post anchor installed into 6x6 wood posts. Post anchors were installed using six (6)- 1/2 in. x 5 in. lag screw on one of the 6x6 post and six (6)-3/8 in x 5 in lag screw on the other 6x6 wood post. Three (3) screws oriented normal to the inward and three (3) screws oriented normal to the outward load of the guard system.	See Drawing				Hot Dip Zinc Steel
shadow rail- horizontal female	8	female plastic mount connector	37	14	84	-	Polycarbonate
shadow rail- Male horizontal connector	8	Male plastic mount connector	37	-	87	-	Polycarbonate
Round Connector	56	Round Connector	See Drawing				Polycarbonate
Connector cover	56	Decorative cover for picket and round connector.	See Drawing				Polycarbonate

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TEST RESULTS

Direction of Load	Test		Specified loads kN(lbf)	Deflection at Specified load mm (in)	Safety Factor	Required Factored Load kN (lbf)	Results & observation
Symmetrical Guard. Load applied in one direction	Horizontal load applied on elements within the guard. Load applied over a 300 mm x 300 mm area.		0.5 (112)	11 (0.43)	2.5	1.25 (261)	Load Resisted
	Evenly distributed vertical load applied as quarter point equivalent load at the top of the guard (mid span) across one span.		1.5 kN/m (103lbf/ft)	4 (0.16)	1.67	2.5kN/m (171lbf/ft)	Load resisted
	Horizontal concentrated load applied at the minimum required height of the guard	Top Rail (mid Span)	1.0 (225)	28 (1.10)	2.0	2.0 (450)	Load resisted
		Top Rail at 4x4 post	1.0 (225)	35 (1.38)	2.5	2.5 (562)	Load resisted
		Adjacent to end Post	1.0 (225)	39 (1.54)	2.5	2.5 (562)	Load resisted
		Top of end Post. (1/2" lag screws in 6x6 post anchors)	1.0 (225)	35 (1.38)	2.5	2.5 (562)	Load resisted
		Top of end Post (3/8" lag screws in 6x6 post anchors)	1.0 (225)	50 (1.97)	2.5	2.5 (562)	Base plate Screw withdrawal at 2.4kN

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SECTION 11

CONCLUSION

Intertek Testing Services NA Ltd. (Intertek) has conducted testing on the Titan cedar wooden guard with aluminum pickets. The scope of the testing was to assess the ability of the guard system to resist the Specified Loads on Guards within dwelling units and exterior guards serving not more than 2 dwelling units as prescribed in Table 9.8.8.2 of the following codes:

- 2015 National Building Code of Canada (NBC)
- 2012 Ontario Building Code (OBC)

The Titan cedar wooden guard with aluminum pickets as identified and evaluated in this report has demonstrated resistance to the Specified and Factored Loads as detailed in this report for guards within dwelling units and exterior guards serving not more than 2 dwelling units per Table 9.8.8.2 of the 2015 National Building Code of Canada (NBC) and 2012 Ontario Building Code (OBC). Load adjustment factors were applied as detailed in this report.

The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

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SECTION 12

PHOTOGRAPHS



Photo No. 1
Horizontal Top Rail mid-span Load Test

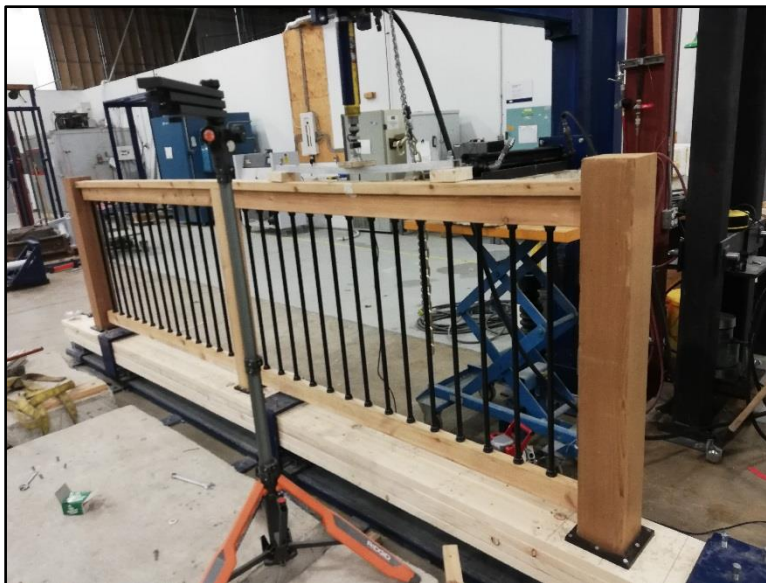


Photo No. 2
Vertical Top Rail 1/4 Point Load Test

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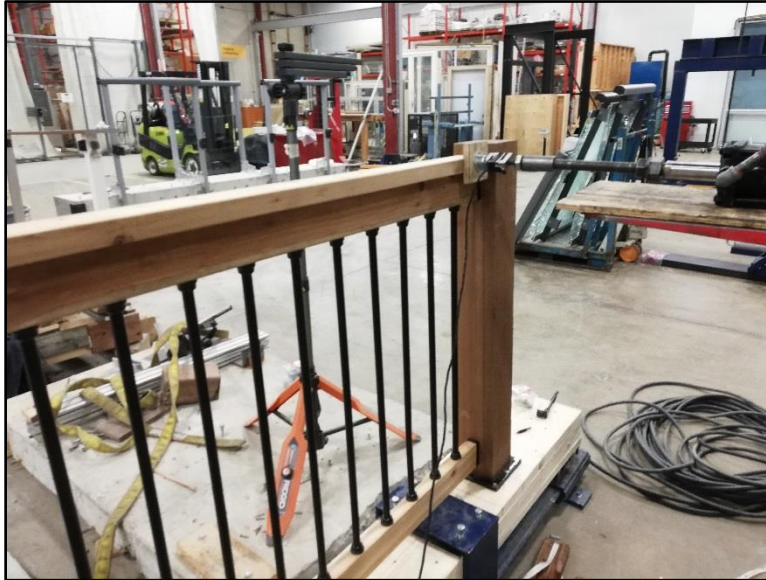


Photo No. 3
Adjacent to End Post Load Test

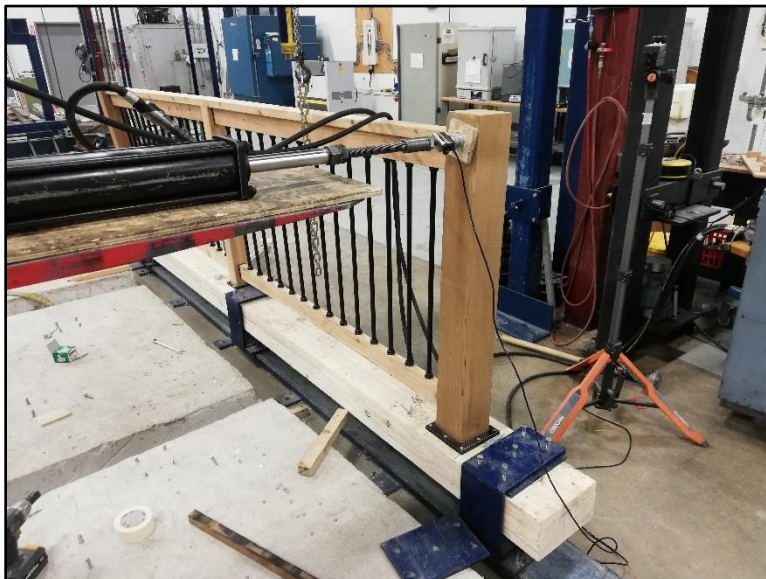


Photo No. 4
Top of End Post Load Test.

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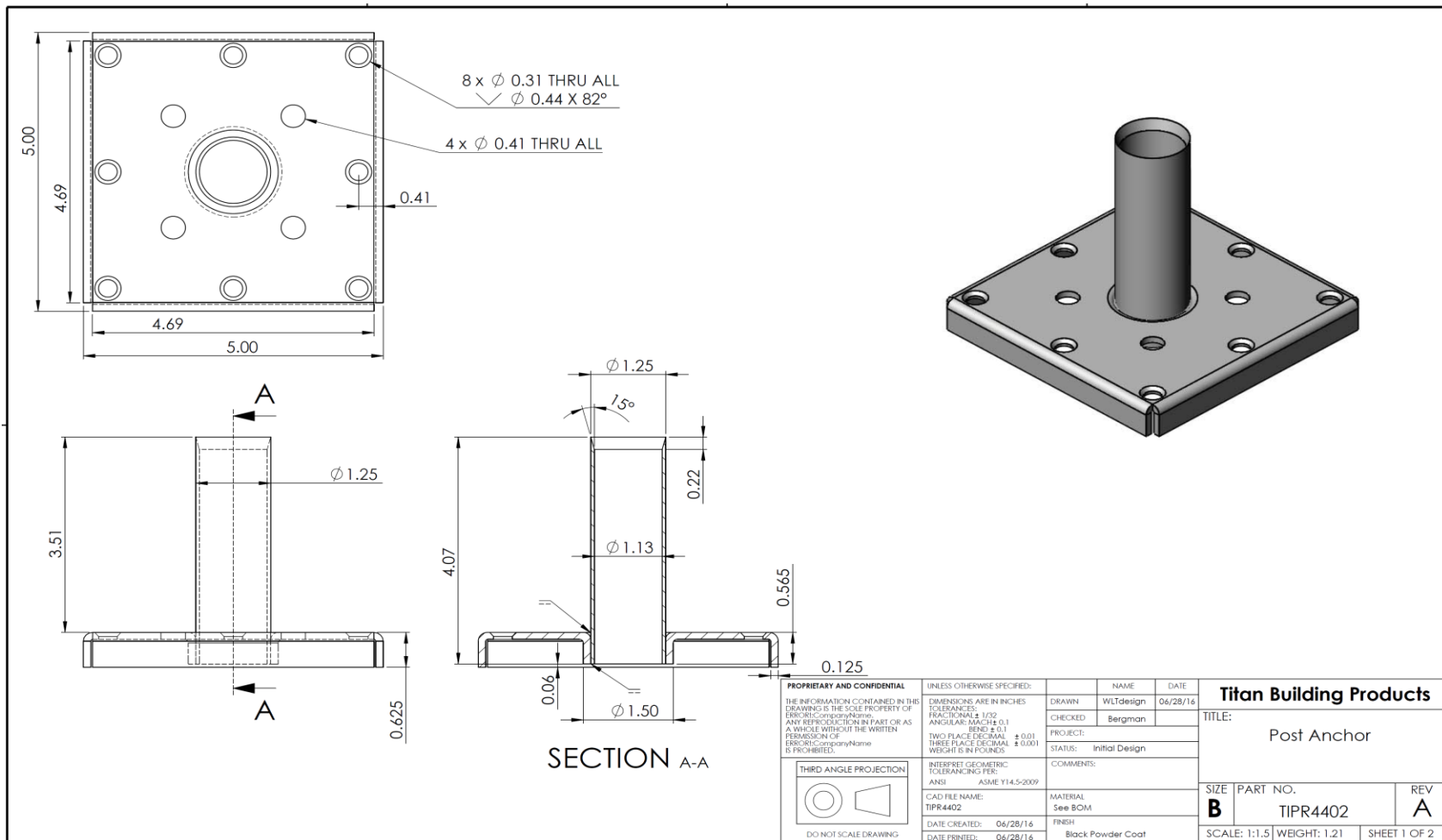
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DRAWINGS

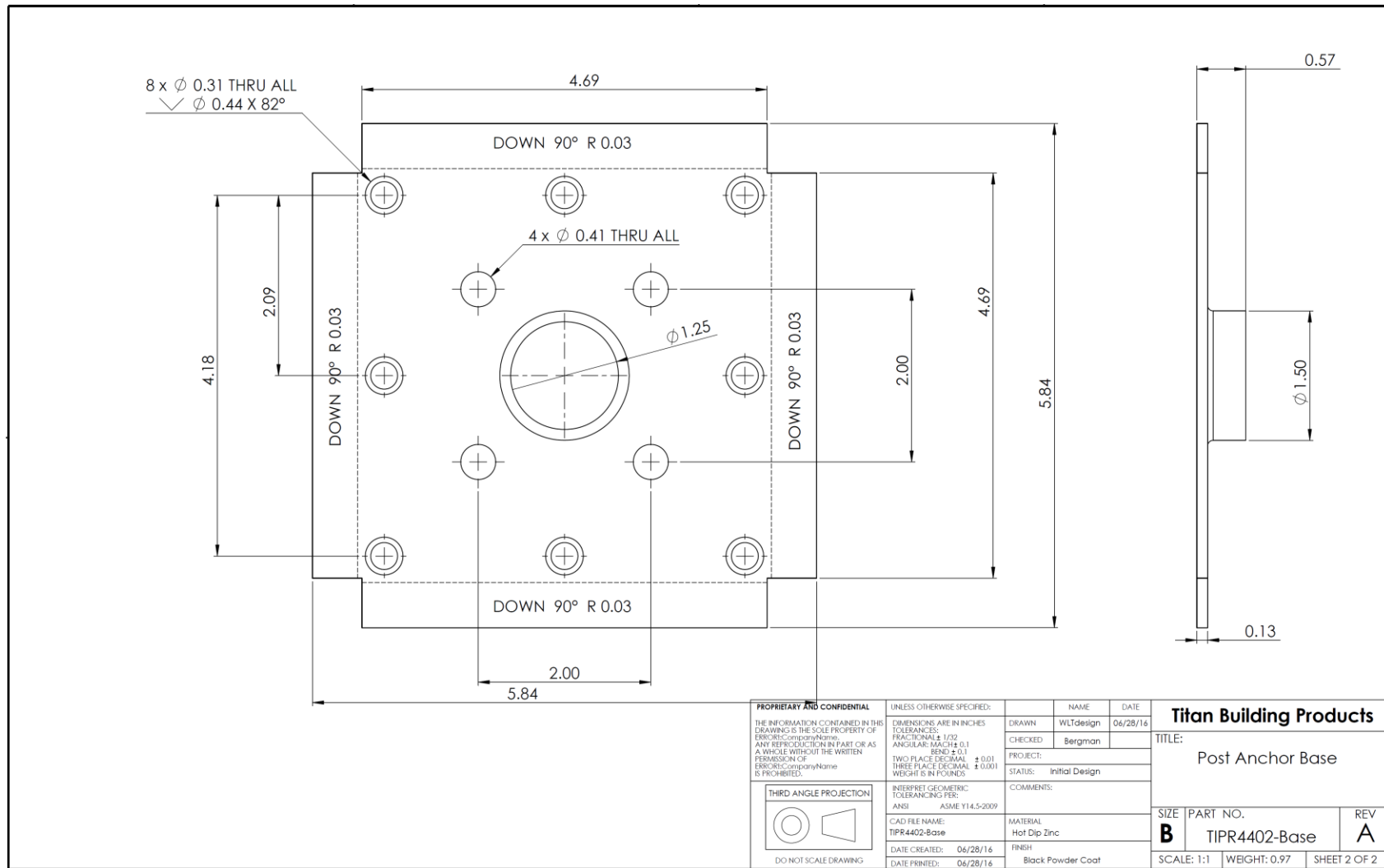
4X4 POST ANCHOR



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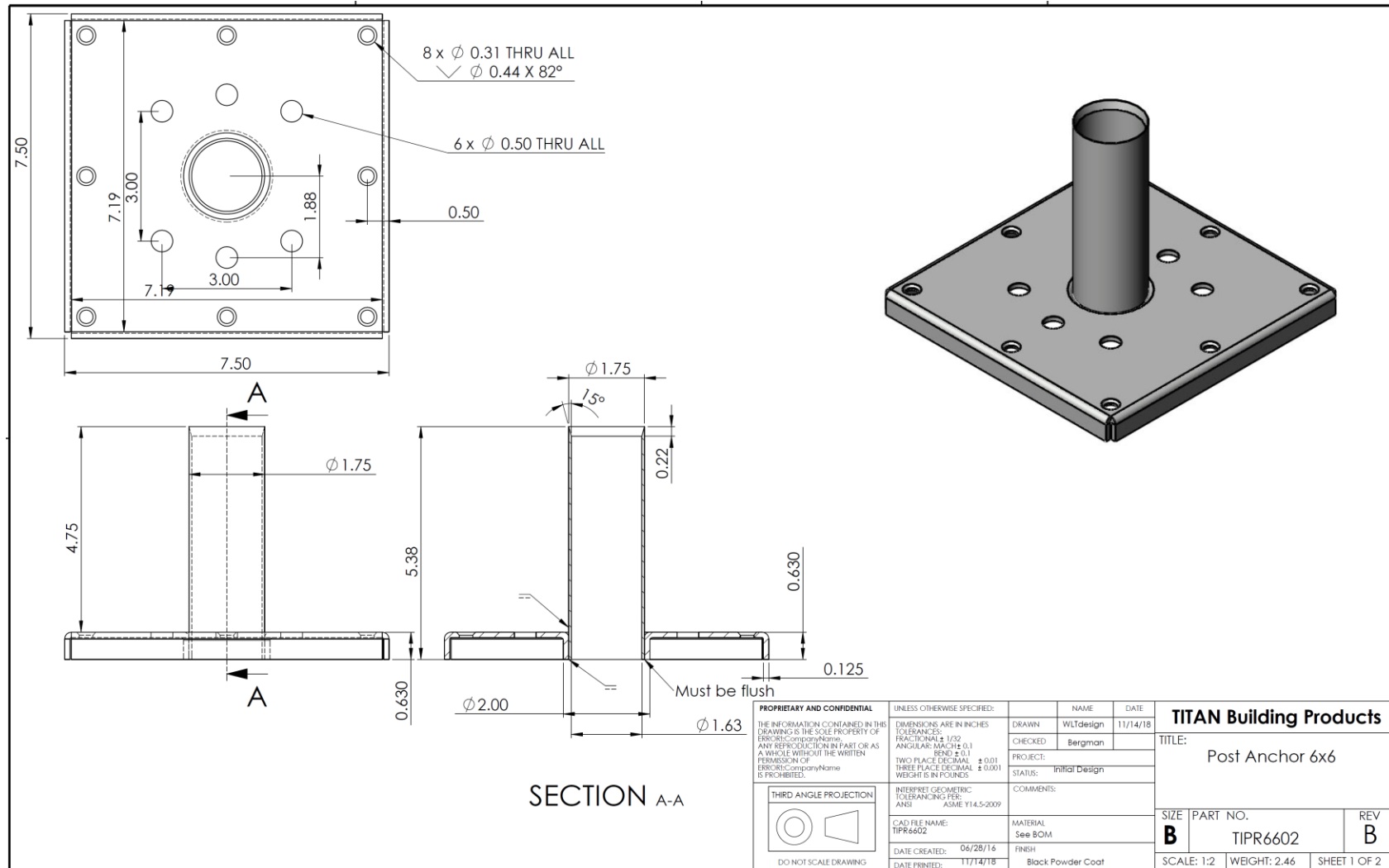
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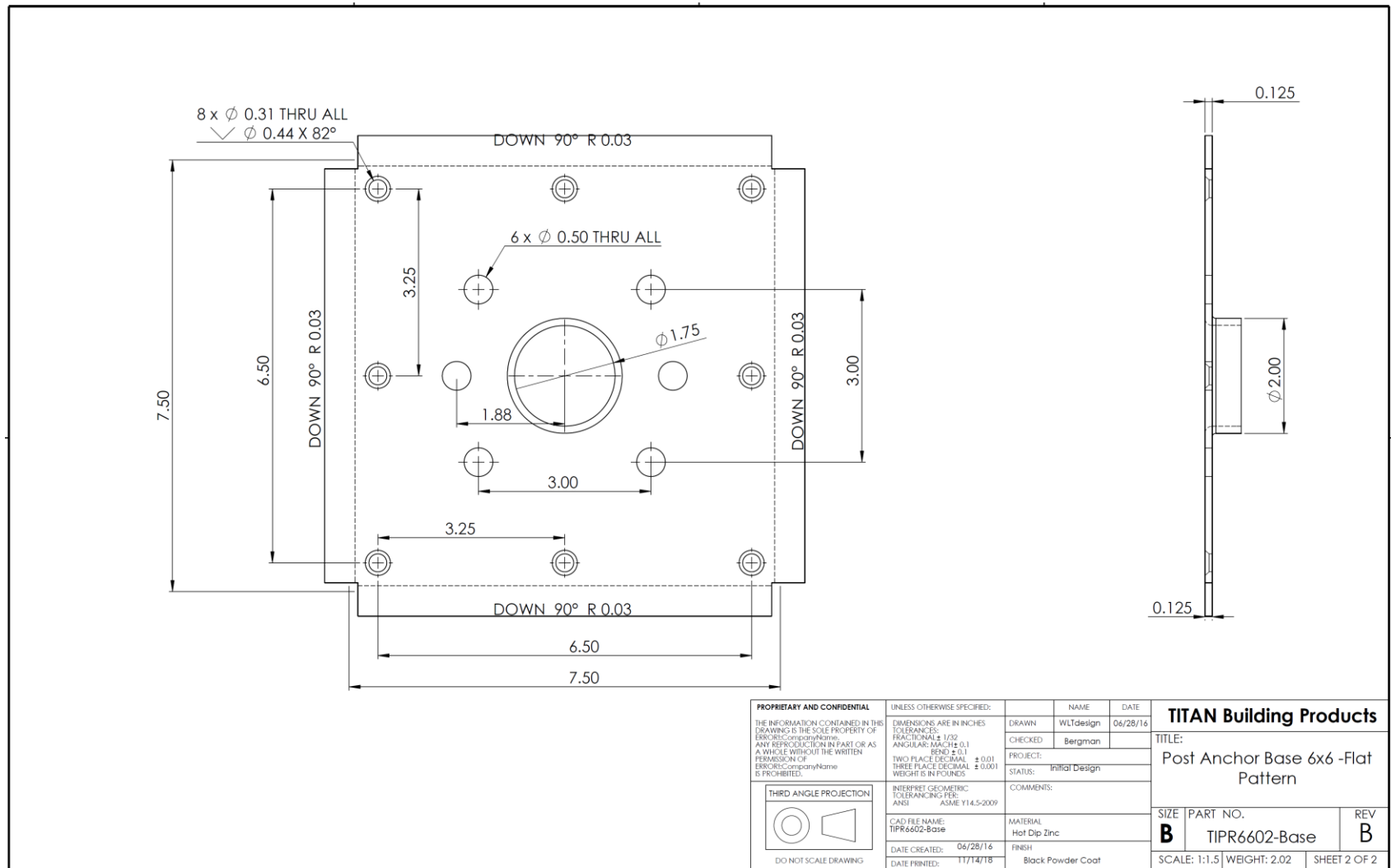
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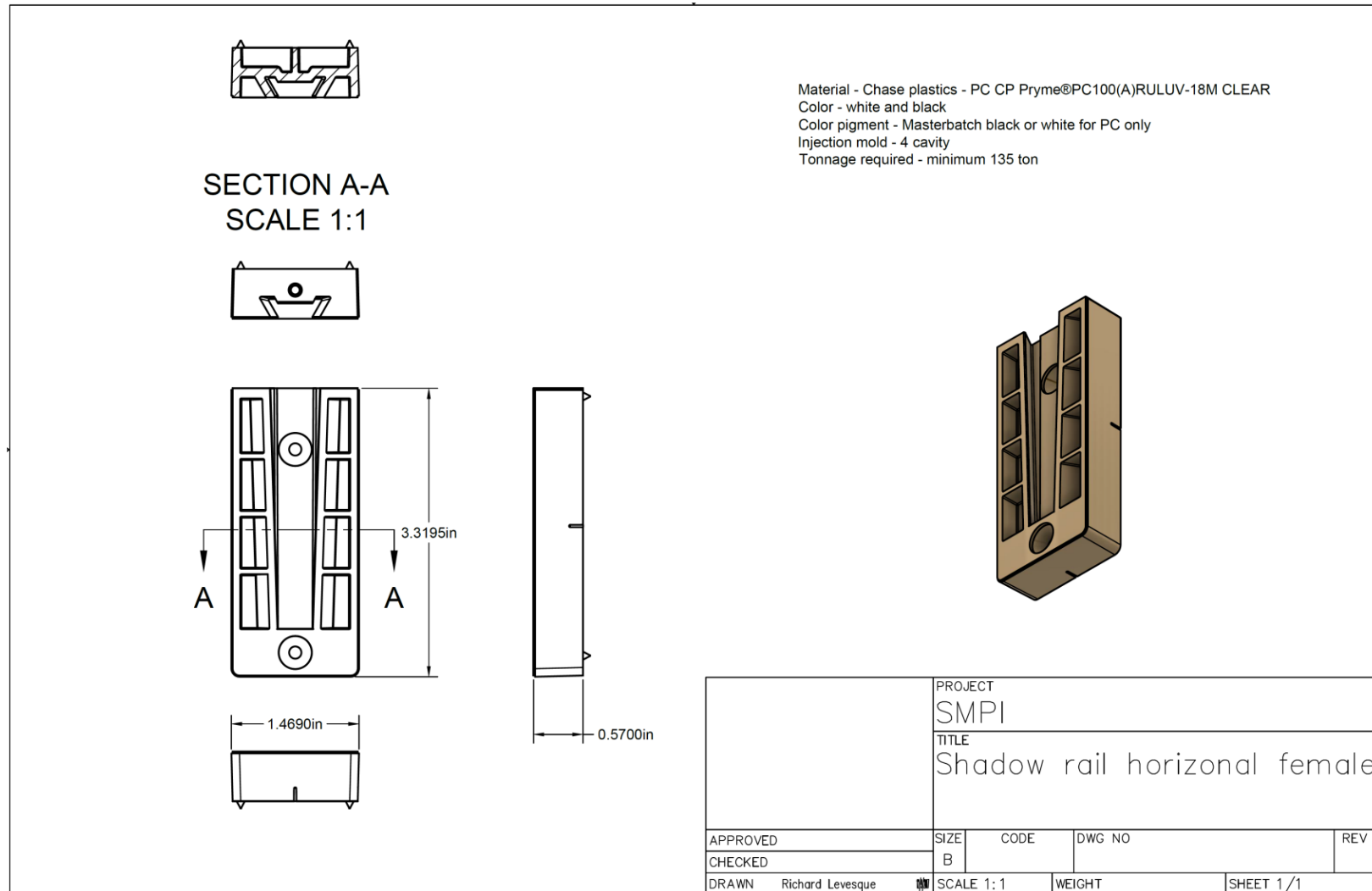
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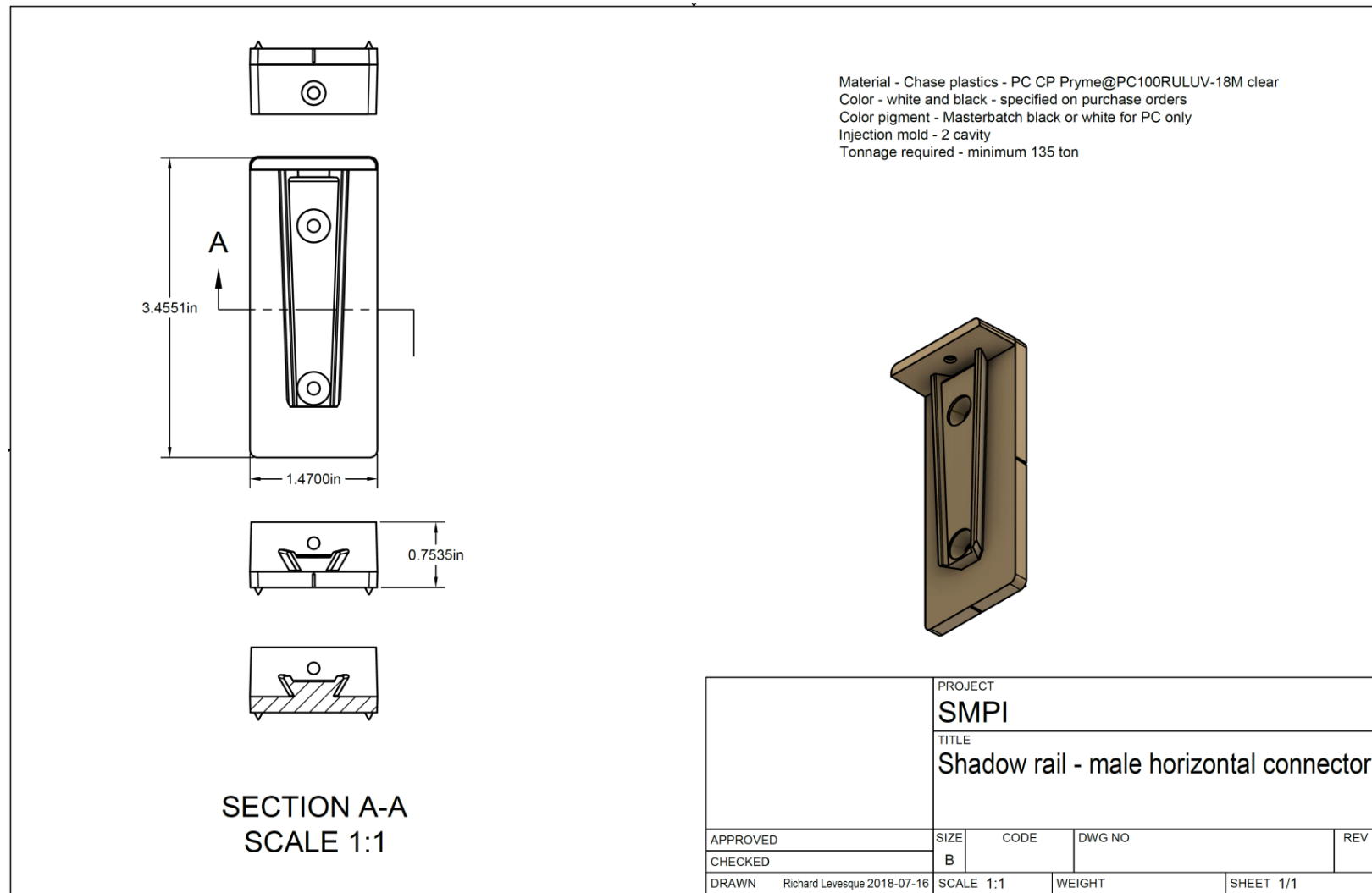
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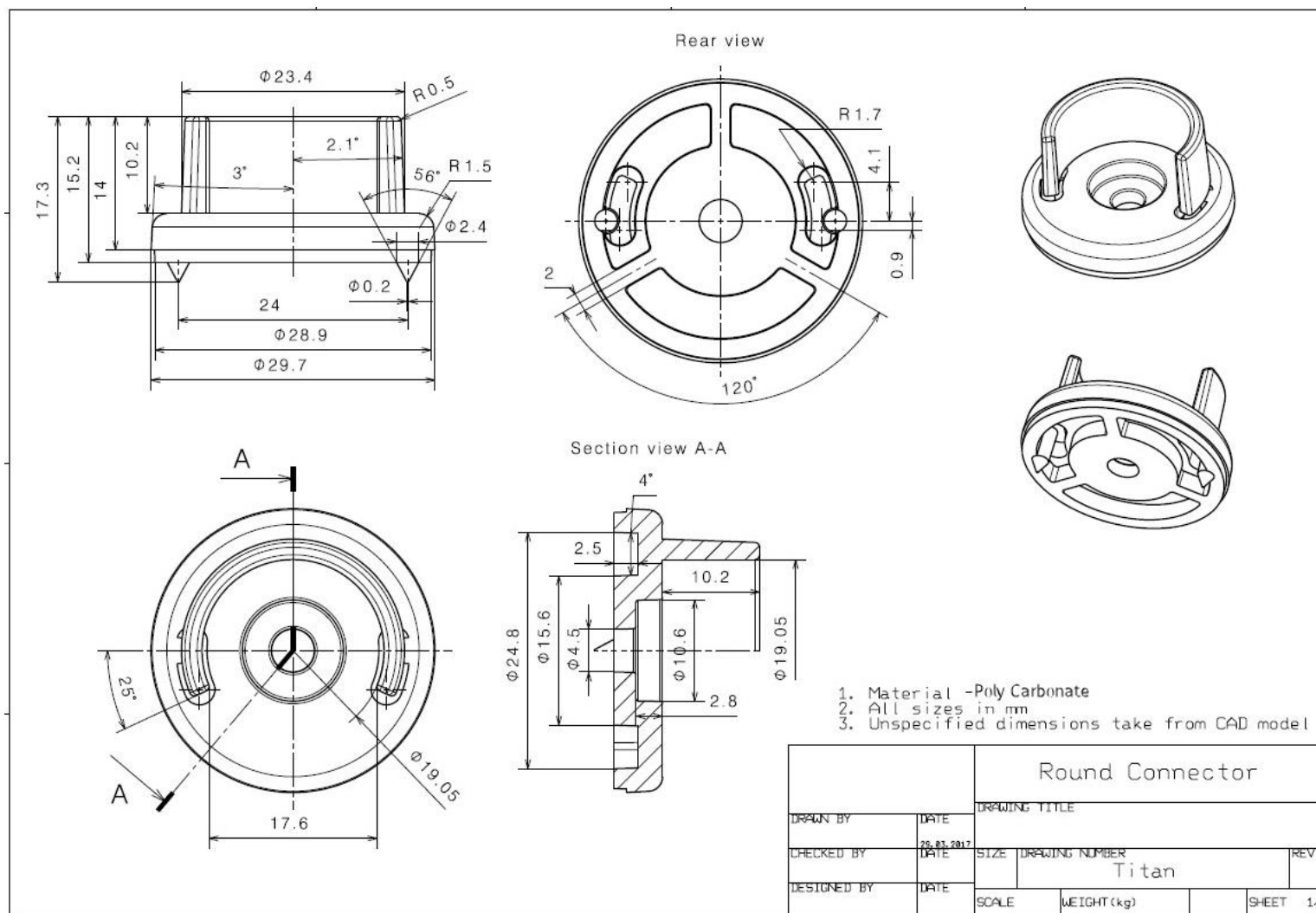
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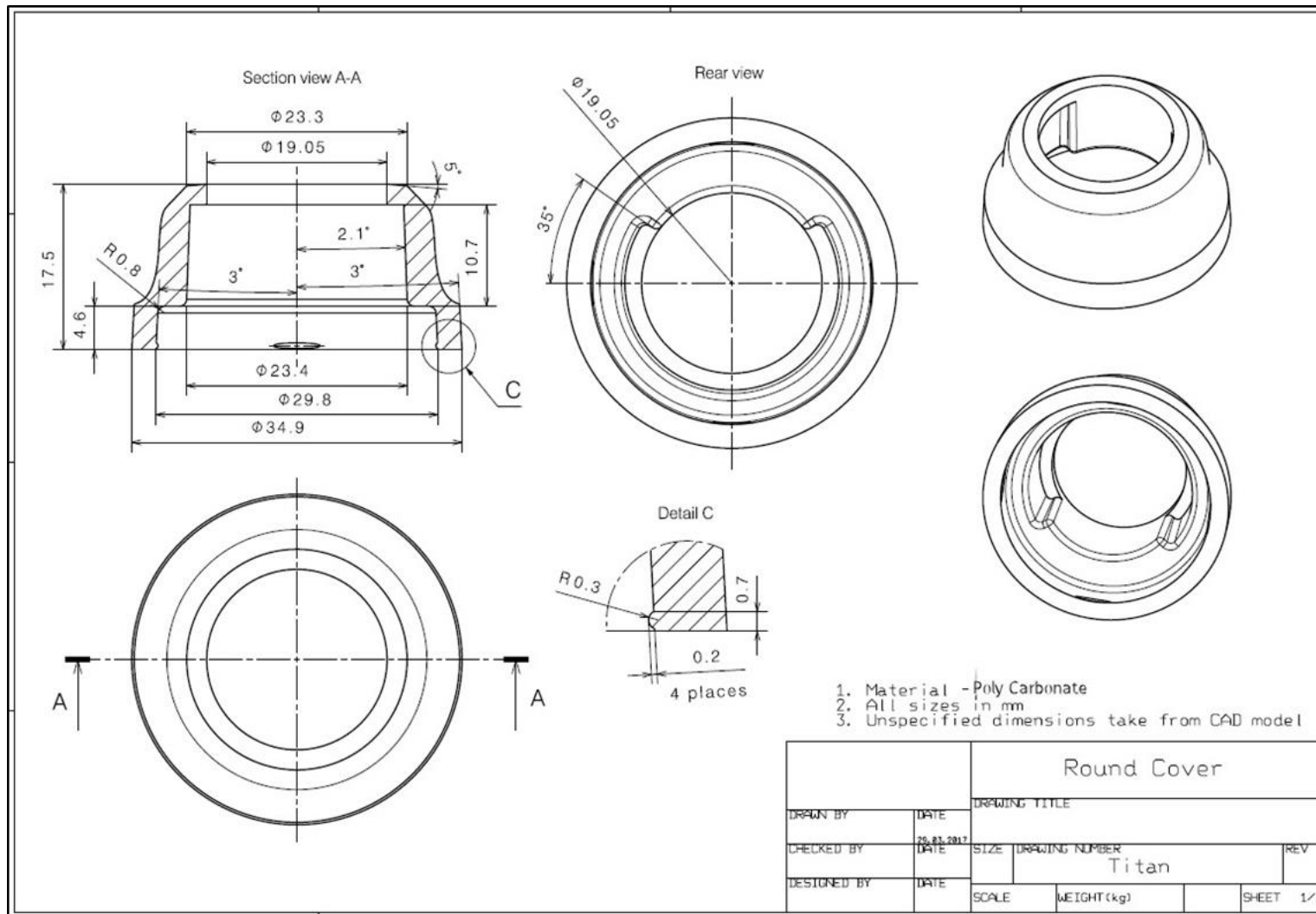
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REVISION LOG

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