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FRONTLINE FALL PROTECTION TEST REPORT

SCOPE OF WORKS
ANSI Z359.18 – 2017 Safety Requirements for Anchorage Connectors for Active Fall Protection Systems

REPORT NUMBER
104389130CRT-001

ISSUE DATE
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TEST REPORT FOR FRONTLINE FALL PROTECTION
Report No.: 104389130CRT-001
Date: July 27, 2020

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Report Number..... 104389130CRT-001

Signed Quote Number..... Qu-01055411-3

PO Number N/A

Name of Testing Laboratory Preparing the Report ..... Intertek Testing Services NA Inc.

Test Specification:

Standard.....ANSI/ASSE Z359.18-2017

Date(s) of Testing..... 12/13/18 – 12/17/18

Product Description: Anchor

Product Type ..... Type A

Brand Name ..... Toggle Bolt Anchor

Model Number(s)..... COT345K

Date(s) Samples Received 12/12/18

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SECTION 1

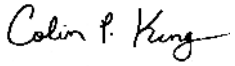
SUMMARY OF TESTING

TESTS COMPLETED	ANSI/ASSE Z359.18-2017 CLAUSE	STATUS
Design Requirements	3	PASS
Conditioning (pre-dynamic strength) - Non Textile Abrasion	4.2.2.1.2	PASS
Dynamic Strength Test- Type A	4.2.2.1.4	PASS
Residual Dynamic Strength-Type A	4.2.3.2	PASS
Static Strength Test- Type A	4.2.1.2	PASS
Serviceability Static Load Test- Type A	4.2.4.2	PASS
Markings and Instructions	5	PASS

SECTION 2

SUMMARY OF TESTING

This test report concludes the work anticipated in the testing phase of your project. If there are any questions regarding this report please contact the undersigned at 607-753-6711.

COMPLETED BY:	Colin P. King	**REVIEWED BY:**	Andrew Rulison
TITLE:	Technical Writer	**TITLE:**	Department Manager
SIGNATURE:		**SIGNATURE**	
DATE	7/27/2020	**DATE:**	7/27/2020

Please see attached test data for details.

SECTION 3
TESTING EQUIPMENT CALIBRATION INFORMATION

USED FOR TEST	DESCRIPTION	MANUFACTURER	CONTROL NO.	MODEL NO.	SERIAL NO.	CAL. DATE	CAL. DUE
X	Drop Test Structure	Intertek	NA	CAT. 3	-	N/A	N/A
X	Test Dead Weight	NA	15064	282 lbs	-	VBU	VBU
X	Test Dead Weight	NA	15065	300 lbs	-	VBU	VBU
X	Load Cell	Interface	558451	-	-	12/29/18	12/29/19
X	Tape Measure	Stanley	H339	25'	-	4/26/18	4/26/19

SECTION (TEST)	REQUIREMENT	RESULTS	COMPLIANCE
3	Design Requirements		**PASS**
3.1.1	Connection points shall meet the following requirements: A) A connection point shall support only one user or system at a time.		**PASS**
	B) A connection point eye on a type A anchorage connector shall be closed eye with a minimum 1" inside radius.		**PASS**
	C) Except for cinching anchorage connectors, anchorage connectors shall not have closed loops that are not intended for, or could be mistaken for, a connection point.		**PASS**
	D) Anchorage connectors that include an operable gate, rings, buckle, adjuster or other hardware covered by ANSI Z359.12 shall use hardware that compiles with the requirements of that standard.		**PASS**
	E) Multiple connection points shall only be permitted on tripod and davit style anchorage connectors.		**PASS**
3.1.2	Anchorage connector surfaces that can come in contact with other components shall be free of burrs, pits, sharp corners and roughness that could accelerate cutting or abrading of the components.		**PASS**
3.1.3.1	Corrosion Resistance: all hot-dip galvanized steel shall conform with ASTM A123/A123M, standard specification for Zinc (hot-dip galvanized) Coatings on iron and steel products.		**PASS**
3.1.3.2.1	Type A: load bearing metallic materials used in the anchorage connectors shall maintain adequate toughness at temperatures between -30 degrees F (-34C) and +130 degrees F (+54C) or be engineered to account for the reduced toughness at low temperatures. Metallic components that have been tested and certified as meeting ANSI Z359.12 are deemed to comply with this section.		**PASS**
3.1.3.2.2	Type D anchorage connectors shall be clearly labeled with a minimum service temperature of -10 degrees F (-23 C) if load bearing parts are made of materials specified in sections 3.1.3.2.2		**PASS**

SECTION (TEST)	REQUIREMENT	RESULTS	COMPLIANCE
3.1.3.2.3	Where a type D anchorage connector is allowed to be used in temperatures below -10 degrees F (-23 C), a qualified person shall verify the anchorage connector will perform as specified per the manufacturers instructions.		**PASS**
3.1.3.3	Finishes: hardware finishes shall be clean and free of scale, rust and deposits of foreign material other than applied protective coatings.		**PASS**
3.1.3.4	Welded Assembly: When components are welded, the welding shall meet ANSI/AWS D1.1 for steel, ANSI/AWS D1.2 for aluminum and ANSI/AWS D1.6 for stainless steel.		**PASS**
3.1.3.5	Fasteners: Manufacturer shall provide or specify fasteners for connecting an anchorage connector to an anchorage in its intended application. Information must be included in the user instructions.		**PASS**
3.1.4.1	Textiles shall not contain natural fibers, and shall be made of pure non-recycled synthetic material, having strength, aging, abrasion and heat resistance characteristics equivalent or superior to polyamide or polyester and shall be marked with any restrictions.		**PASS**
3.1.4.2	Stitching/Cutting: If a subsystem uses stitching for connection of load bearing components it shall meet the following requirements: A) Use lock stitching B) Secure the end of threads by backstitching, overlapping stitching or other methods. C) Threads used for sewing shall be physically compatible with the webbing and of a quality comparable to that of the webbing. D) Hot-cut or fuse thermoplastic materials, cord, tape and webbing to prevent fraying. E) The tread color or shade shall contrast with that of the webbing to facilitate visual inspection.		**PASS**
3.1.5.1	Other load bearing materials used in anchorage connectors shall meet the performance requirements of ANSI Z359.18-2017.		**PASS**
3.1.5.2	Integrally connected components to which another standard in the ANSI Z359 series exists shall meet the requirements of ANSI Z359.18-2017.		**PASS**

<table>
<tr><th>SECTION (TEST)</th><th>REQUIREMENT</th><th>RESULTS</th><th>COMPLIANCE</th></tr>
<tr><td>3.2.2.2/4.2.2.2.4</td><td colspan="2"><u>Dynamic Strength (Type A Anchor)</u> :
A) Install anchorage connector, conditioned according the applicable requirements of 4.2.2.1.2 or 4.2.2.1.3 on the test anchorage in accordance with 4.1.2
B) Connect one end of the test lanyard to the connection point of the anchorage connector to be loaded or to the arrest force measuring instrumentation.
C) Connect the other end of the test lanyard to the test weight specified in 4.1.3
D) Raise the test weight to achieve a free-fall distance of 3’ (+0.1/-0).
E) Release the test weight by means of quick release mechanism.
F) Evaluate the test results per 3.2.2.1

<table><tr><th>Dynamic Strength Test</th><th>SAMPLE: 1</th><th>SAMPLE: 2</th><th>SAMPLE: 3</th></tr><tr><td>Anchorage connector successfully arrest the test weight?</td><td>YES</td><td>YES</td><td>YES</td></tr><tr><td>If deformation occurred did it create more than 1/8” (3mm) between gate and body?</td><td>N/A</td><td>N/A</td><td>N/A</td></tr><tr><td>MAF (Ref Only) Lbs.</td><td>4023</td><td>4000</td><td>4030</td></tr></table>
Note: Mounted through ¾” thick I-Beam Substrate.</td><td>PASS</td></tr>
</table>

<table>
<tr><th>SECTION (TEST)</th><th>REQUIREMENT</th><th>RESULTS</th><th>COMPLIANCE</th></tr>
<tr><td>3.2.3.1/4.2.3.2</td><td colspan="2"><u>Residual Dynamic Strength Test:</u>
1. <u>Repetition of the test specified in 4.2.2.1 using same anchorage connector without further conditioning and the same test lanyard used in first test.</u>
2. <u>Must support the test weight an additional minute after the residual dynamic drop.</u>
3. <u>Evaluate the test results per 3.2.3.1</u>

<table>
<tr><th>Residual Dynamic Strength</th><th>SAMPLE: 1</th><th>SAMPLE: 2</th><th>SAMPLE: 3</th></tr>
<tr><td>Anchorage connector successfully arrest the test weight?</td><td>YES</td><td>YES</td><td>YES</td></tr>
<tr><td>Maintain the test weight for a period of at least 1 minute?</td><td>YES</td><td>YES</td><td>YES</td></tr>
<tr><td>If deformation occurred did it create more than 1/8” (3mm) between gate and body?</td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
</table></td><td>PASS</td></tr>
</table>

<table>
<tr><th>SECTION (TEST)</th><th>REQUIREMENT</th><th>RESULTS</th><th>COMPLIANCE</th></tr>
<tr><td>3.2.1.1/4.2.1.2</td><td><u>Static Strength Test for Type A Anchorage Connectors:</u>
A) A <u>new anchorage connector may be used for each test.</u>
B) <u>Test force shall be 5,000 pounds (+50/-0)</u>
C) <u>Install anchorage connector on the test anchorage in accordance with requirements of 4.1.2.</u>
D) <u>Apply load to the anchorage connector in the direction(s) of loading specified in 4.1.2.5.</u>
E) <u>Apply load at no greater than 2”/min and maintain 5,000 pound test load for at least 3 minutes.</u>
F) <u>Release load</u>
G) <u>Evaluate the test results per 3.2.1.1</u>

<table><tr><th>Static Strength Requirements</th><th>SAMPLE 3</th><th>SAMPLE 4</th><th>SAMPLE 5</th></tr><tr><td>Anchorage resist the test load?</td><td>YES</td><td>YES</td><td>YES</td></tr><tr><td>If deformation occurred did it create more than 1/8” (3mm) between gate and body?</td><td>NA</td><td>NA</td><td>NA</td></tr></table></td><td></td><td>PASS</td></tr>
<tr><td>3.2.1.1/4.2.4.2</td><td><u>Serviceability Load for Type A Anchorage Connectors:</u>
<u>A new anchorage connector may be used for each test.</u>
<u>Test force shall be greater than twice the work load or 2,500 pounds (Whichever is Greater)</u>
<u>Install anchorage connector on the test anchorage in accordance with requirements of 4.1.2.</u>
<u>Apply load at no greater than 90lbs/min and maintain load for at least 3 minutes.</u>
<u>Release load</u>
<u>Evaluate the test results per 3.2.4.2</u>

<table><tr><th>Static Strength Requirements</th><th>SAMPLE 3</th><th>SAMPLE 4</th><th>SAMPLE 5</th></tr><tr><td>Anchorage resist the test load?</td><td>YES</td><td>YES</td><td>YES</td></tr><tr><td>Cracking/Breaking or Deformation</td><td>NO</td><td>NO</td><td>NO</td></tr></table></td><td></td><td>PASS</td></tr>
</table>

SECTION (TEST)	REQUIREMENT	COMPLIANCE
5	Marking and Instruction Requirements	**PASS**
5.1.1	The following marking shall appear in English on the label, marking or tag that is designed to last for the lifetime of the anchorage connector and is permanently affixed to the anchorage connector: A) The manufacture's name or mark	**PASS**
	B) The year of manufacture	**PASS**
	C) Model number	**PASS**
	D) "ANSI Z359.18 and the type	**PASS**
	E) Marking to indicate restrictions on directions of loading, if applicable	**PASS**
	F) Where specified by the manufacturer, the working load.	**PASS**
	G) An individual serial number or a lot or batch number that provides traceability	**PASS**
	H) Minimum breaking strength followed by "MBS"	**PASS**
5.1.2	As required for the specific anchorage connector, the following marking shall appear in English on a label, marking or tag that is designed to last for the lifetime of the anchorage connector and is permanently affixed to the anchorage connector.	**PASS**
5.1.2.1	Anchorage connector that incorporates a closed loop not intended for connection, but may be mistake for a connection point shall be permanently labeled with a warning not to connect a fall protection system or suspended component to the closed loop when used in a cinching application.	**PASS**
5.1.2.2	For type D anchorage connectors only, any information that is needed for clearances calculations and anchorage strength identification	**PASS**
5.1.2.3	The minimum service temperature the anchorage connector according to 3.1.3.2	**PASS**
5.1.2.4	For tripods and davit systems, the maximum number of users permitted on the system.	**PASS**
5.2	Instruction Requirements	**PASS**
5.2.1	Instruction and information shall be provided in English with each anchorage connector.	**PASS**

SECTION (TEST)	REQUIREMENT	COMPLIANCE
5.2.1.1	Overall: A) A statement that the anchorage connector has been tested in compliance with the requirements of ANSI/ASSE Z359.7, and caution that the ANSI compliance and testing covers only the hardware and does not extend to the anchorage and substrate w=to which the anchorage connector is attached. B) Specifications for appropriate anchorage(s) to which the anchorage connector can be attached, including instructions on how to proceed when the user is unable to determine whether the anchorage meets the manufactures specification and instructions that the anchorage connector shall only be connected to anchorages that: i) Can withstand 5,000 pounds without failure, except that lower strengths are acceptable when permitted by applicable legislation ii) Are certified by a professional engineer as having the required strength for fall arrest or travel restraint, as applicable iii) The manufacturer may provide specifications of allowable materials including the minim shapes, sizes and geometry of structural elements to which the anchors connector may be fastened C) The manufacturer shall clearly label the minimum service temperature for the anchorage connector according to 3.1.3.2. D) The manufacturer shall supply complete specifications for fasteners E) The anchorage connector type	**PASS**

SECTION (TEST)	REQUIREMENT	COMPLIANCE
5.2.1.1	Overall: F) The permitted uses of the anchorage connector G) The connection point(s), working load limit H) The material used in the anchorage connectors construction I) The length of the anchorage connector and any other dimensions that may affect its compatibility with anchorages to which it may be connected. J) The manufacturer shall make available upon request information for the design of systems, such as AAF and/or force vs. displacement curve(s) for the device. K) A statement that only one fall protection system or positioning system may be attached to an individual connection point L) Specification providing the intended direction(s) of loading of the anchorage connector M) A complete list of the anchorage connector components provided by the manufacturer at the time of sale N) A warning against unauthorized alterations, relocations or additions to the anchorage connector	**PASS**
5.2.1.2	Use: A) Instructions on proper installation and use, including, but not limited to, compatibility with other fall protection components B) The length of the anchorage connector and any other dimensions that may affect its compatibility with anchorages to which it may be connected C) Where applicable, directions regarding the appropriate length of lanyard to use with the anchorage connector to compensate for the additional length that it may add to the lanyard. (Instructions to include the length of anchorage connector, manner of use and location relative to working surface in the calculation of fall clearance). D) Permitted and forbidden uses, including clear description of and the recommended ways of dealing with the applicable compatibility concerns E) A warning to remove any surface contamination such as concrete, stucco, roofing material, etc., that could accelerate the cutting or abrading of attached components F) Warnings concerning environments and conditions that may degrade the anchorage connector G) Training requirements	**PASS**

SECTION (TEST)	REQUIREMENT	COMPLIANCE
5.2.1.3	Inspection and Field Testing: A) Instructions on testing, if needed B) Where applicable, directions for the installer to perform and document proof testing upon installation. Directions shall include proof load forces and acceptable methods C) Field serviceability testing: The manufacturer shall provide guidelines for how often field load testing must be undertaken to prove that the anchorage connector continues to be adequately secured to the structure. These guidelines shall include recommended methods for testing, including the direction and point of application of test loads D) The recommended frequencies and procedures for inspection, maintenance, and when applicable, testing E) Instructions for inspecting and servicing an anchorage connector after it is subjected to a fall or an inspection reveals an unsafe condition F) If applicable, guidelines for the retirement of the anchorage connector G) The action to be taken if an inspection of the anchorage connector reveals an unsafe condition H) The action to be taken after the anchorage connector is subjected to a fall I) Criteria for removal of an anchorage connector from service if deformed from its original installed configuration	**PASS**
5.2.1.4	Clinching and Non-Clinching Style Anchorage Connectors: A) Where the anchorage connector includes an abrasion pad, provide directions that the abrasion pad shall be installed between the anchorage and the lead bearing loop B) The proper method of installing the anchorage connector including, as applicable for non-clinching anchorage connectors. The maximum angle permitted between the connection legs	**PASS**

SECTION 4
REVISION HISTORY

REPORT NUMBER	DATE OF REVISION	DESCRIPTION OF CHANGE:	PROJECT OWNER	REVIEWED BY
103768463CRT-002	9/9/2019	Original Report	Matthew Stevens	Andrew Rulison
104389130CRT-001	7/28/2020	Changed all references of “Type T” to “Type A”	Matthew Stevens	Andrew Rulison