

ANSI Z359.18 Type A/T Test Report


Test Report Number: 2018092700690
 Job Number: Prototype 607
 Product Type: Type A/T Anchorage Connector
 Product Model: FM-24 Anchor for Concrete and Backer Plate
 Dates of Manufacture: 09/22/17, 10/12/17, 07/01/18
 Date(s) of Testing: 03/12/18, 3/17/18, 05/17-18/18, 08/02/18

This test report covers these additional products:

00653, 45020, 45022

<u>Tests Completed</u>	<u>Test Date</u>	<u>ANSI/ASSE Z359.18-2017</u>	<u>Pass/Fail</u>
General Requirements	9/27		Pass
Static Strength	3/12		Pass
Dynamic Strength	3/17, 5/17-18		Pass
Residual Strength	3/17, 5/17-18		Pass
Serviceability	8/2		Pass
Corrosion			N/A
Markings and Instructions	9/27		Pass

Please see attached test data for details

John Halas, Engineer  Date: 10/2/2018

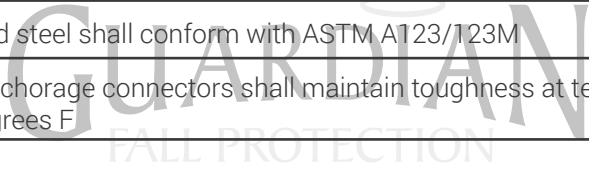
Craig Allen, Test Technician:  Date: 10/03/18

Andre Pelland Compliance and Quality Manager  Date: 10/03/18

TEST EQUIPMENT

Equipment	Model	Serial	
Static load cell		3479898	
282 lb. test weight			
Static load cell		347898A	

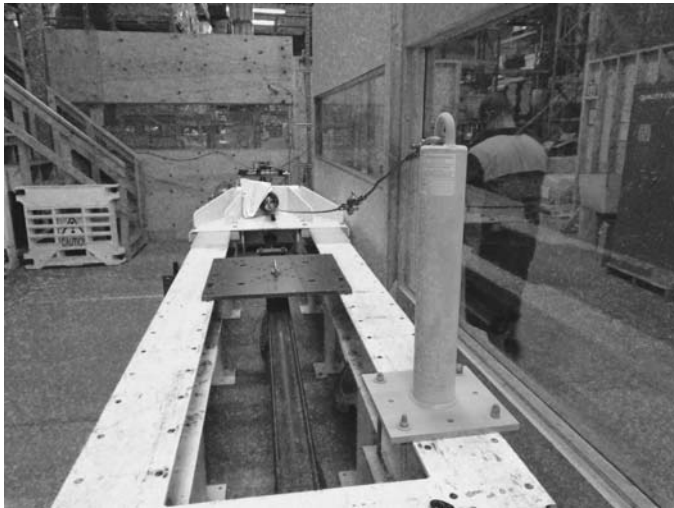
3.1	Design Requirements	
3.1.1 (a)	Connection points shall support only one user or system at a time	Pass
(b)	Type T connection points shall be minimum 1" inside radius closed eye	Pass
(c)	Anchorage connectors shall not have closed loops that could be mistaken for a connection point	Pass
(d)	Any operable gates, rings, buckles or other hardware covered by ANSI Z359.12-2012 shall comply with ANSI Z359.12-2012	Pass
(e)	Multiple connections shall only be permitted on tripod or davit style anchorages	N/A
3.1.2	Surfaces shall be free from burrs, pits, sharp corners and roughness	Pass
3.1.3	Hot-dipped galvanized steel shall conform with ASTM A123/123M	Pass
3.1.3.2.1	Type A and Type T anchorage connectors shall maintain toughness at temps between -30 degrees F and +130 degrees F	Pass



Substrate: 8" x 8.25" steel beam	Fastener: Threaded rod
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4.2.1 Static Strength Testing of Anchorage Connectors

- a) Attach anchorage on approved substrate per 4.1.2
- b) (Type A and T) Apply 5,000 lbs. load in permitted direction(s) at a rate no greater than 2 inches per minute for at least 3 minutes
- c) Release load
- d) Evaluate results per 3.2.1.1, 3.2.1.2, 3.2.1.3 as required



Static Strength Test Requirements per 3.2.1.1, 3.2.1.2, 3.2.1.3		
SAMPLE #1	Type: A/T	
Anchorage connector withstands applied load		Pass
Actual load applied	5056	lbs.
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	

Static Strength Test Requirements per 3.2.1.1, 3.2.1.2, 3.2.1.3		
SAMPLE #2	Type: A/T	
Anchorage connector withstands applied load		Pass
Actual load applied	5082	lbs.
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	

Static Strength Test Requirements per 3.2.1.1, 3.2.1.2, 3.2.1.3		
SAMPLE #3	Type: A/T	
Anchorage connector withstands applied load		Pass
Actual load applied	5057	lbs.
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	

Substrate: Tower upright	Fastener: (4) 12" threaded rods and backer plate
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4.2.2 Dynamic Strength Testing of Anchorage Connectors

a) Condition sample as necessary per 4.2.2.3.1
 b) Attach anchorage on approved substrate per 4.1.2
 c) Connect 282 lbs. test weight to anchorage connector via test lanyard
 d) (Type A and T) Raise weight to achieve 3 ft. free fall
 e) Release test weight and evaluate in accordance with 3.2.2.1, 3.2.2.2, 3.2.2.3 as required



Dynamic Strength Test Requirements per 3.2.2.1, 3.2.2.2, 3.2.2.3		
SAMPLE #1	Type: A/T	
Anchorage connector arrests test weight		Pass
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	

Dynamic Strength Test Requirements per 3.2.2.1, 3.2.2.2, 3.2.2.3		
SAMPLE #2	Type: A/T	
Anchorage connector arrests test weight		Pass
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	

Dynamic Strength Test Requirements per 3.2.2.1, 3.2.2.2, 3.2.2.3		
SAMPLE #3	Type: A/T	
Anchorage connector arrests test weight		Pass
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	

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PROTECTION

Substrate: Tower upright	Fastener: (4) 12" threaded rods and backer plate
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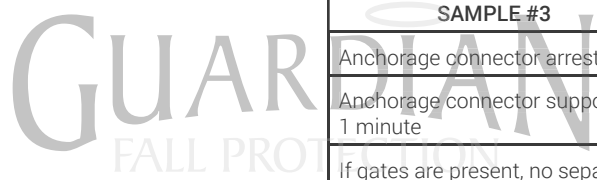
4.2.3 Residual Dynamic Strength Testing of Anchorage Connectors

a) Repeat dynamic test as specified in 4.2.2
b) Evaluate results in accordance with 3.2.2.1, 3.2.2.2, 3.2.2.3 as required

Residual Dynamic Strength Test Requirements per 3.2.3.1, 3.2.3.2, 3.2.3.3		
SAMPLE #1	Type: A/T	
Anchorage connector arrests test weight		Pass
Anchorage connector supports test weight for min 1 minute		Pass
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	

Residual Dynamic Strength Test Requirements per 3.2.3.1, 3.2.3.2, 3.2.3.3		
SAMPLE #2	Type: A/T	
Anchorage connector arrests test weight		Pass
Anchorage connector supports test weight for min 1 minute		Pass
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	

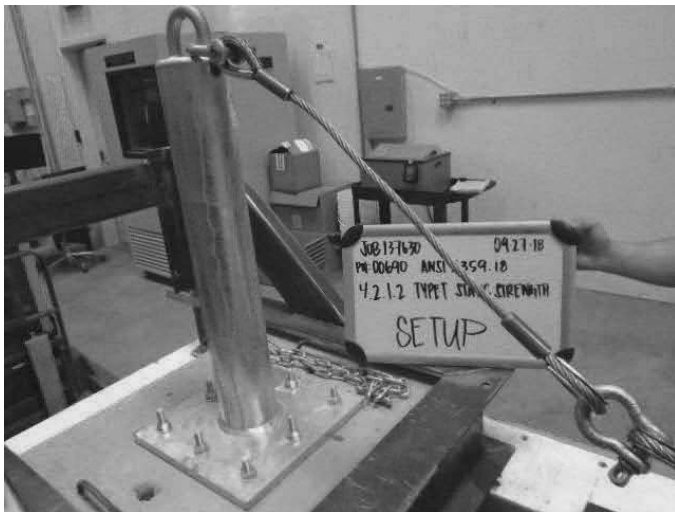
Residual Dynamic Strength Test Requirements per 3.2.3.1, 3.2.3.2, 3.2.3.3		
SAMPLE #3	Type: A/T	
Anchorage connector arrests test weight		Pass
Anchorage connector supports test weight for min 1 minute		Pass
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	



Substrate: Concrete	Fastener: (8) Concrete bolts
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4.2.1 Static Strength Testing of Anchorage Connectors

- a) Attach anchorage on approved substrate per 4.1.2
- b) (Type A and T) Apply 5,000 lbs. load in permitted direction(s) at a rate no greater than 2 inches per minute for at least 3 minutes
- c) Release load
- d) Evaluate results per 3.2.1.1, 3.2.1.2, 3.2.1.3 as required



Static Strength Test Requirements per 3.2.1.1, 3.2.1.2, 3.2.1.3		
SAMPLE #1	Type: A/T	
Anchorage connector withstands applied load		Pass
Actual load applied	5049	lbs.
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	

Static Strength Test Requirements per 3.2.1.1, 3.2.1.2, 3.2.1.3		
SAMPLE #2	Type: A/T	
Anchorage connector withstands applied load		Pass
Actual load applied	5045	lbs.
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	

Static Strength Test Requirements per 3.2.1.1, 3.2.1.2, 3.2.1.3		
SAMPLE #3	Type: A/T	
Anchorage connector withstands applied load		Pass
Actual load applied	5045	lbs.
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	

Substrate: Concrete	Fastener: (8) Concrete bolts
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4.2.2 Dynamic Strength Testing of Anchorage Connectors

a) Condition sample as necessary per 4.2.2.3.1
b) Attach anchorage on approved substrate per 4.1.2
c) Connect 282 lbs. test weight to anchorage connector via test lanyard
d) (Type A and T) Raise weight to achieve 3 ft. free fall
e) Release test weight and evaluate in accordance with 3.2.2.1, 3.2.2.2, 3.2.2.3 as required

Dynamic Strength Test Requirements per 3.2.2.1, 3.2.2.2, 3.2.2.3		
SAMPLE #1	Type: A/T	
Anchorage connector arrests test weight		Pass
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	

Dynamic Strength Test Requirements per 3.2.2.1, 3.2.2.2, 3.2.2.3		
SAMPLE #2	Type: A/T	
Anchorage connector arrests test weight		Pass
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	

Dynamic Strength Test Requirements per 3.2.2.1, 3.2.2.2, 3.2.2.3		
SAMPLE #3	Type: A/T	
Anchorage connector arrests test weight		Pass
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	



Substrate: Concrete	Fastener: (8) Concrete bolts
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4.2.3 Residual Dynamic Strength Testing of Anchorage Connectors

a) Repeat dynamic test as specified in 4.2.2
b) Evaluate results in accordance with 3.2.2.1, 3.2.2.2, 3.2.2.3 as required

Residual Dynamic Strength Test Requirements per 3.2.3.1, 3.2.3.2, 3.2.3.3		
SAMPLE #1	Type: A/T	
Anchorage connector arrests test weight		Pass
Anchorage connector supports test weight for min 1 minute		Pass
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	

Residual Dynamic Strength Test Requirements per 3.2.3.1, 3.2.3.2, 3.2.3.3		
SAMPLE #2	Type: A/T	
Anchorage connector arrests test weight		Pass
Anchorage connector supports test weight for min 1 minute		Pass
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	

Residual Dynamic Strength Test Requirements per 3.2.3.1, 3.2.3.2, 3.2.3.3		
SAMPLE #3	Type: A/T	
Anchorage connector arrests test weight		Pass
Anchorage connector supports test weight for min 1 minute		Pass
If gates are present, no separation more than 1/8"		N/A
COMPLIANT	Yes	



4.2.4 Serviceability Load Testing of Anchorage Connectors

- a) Attach anchorage on approved substrate per 4.1.2
- b) (Type T) Apply greater of 2x working load or 2,500 lbs. at a maximum of 900 lbs./minute and maintain for at least 3 minutes.
- c) Release load
- d) Evaluate results per 3.2.4.2, 3.2.4.3

Serviceability Load Test Requirements per 3.2.4.2, 3.2.4.3			
SAMPLE #1	Type: T		
Anchorage connector shall not show any cracking, breaking, or permanent deformation			Pass
COMPLIANT	Yes		

Serviceability Load Test Requirements per 3.2.4.2, 3.2.4.3			
SAMPLE #2	Type: T		
Anchorage connector shall not show any cracking, breaking, or permanent deformation			Pass
COMPLIANT	Yes		

Serviceability Load Test Requirements per 3.2.4.2, 3.2.4.3			
SAMPLE #3	Type: T		
Anchorage connector shall not show any cracking, breaking, or permanent deformation			Pass
COMPLIANT	Yes		

4.2.5 Corrosion Testing of Anchorage Connectors

- a) (Type T) Expose ferrous components of anchorage connector to a 500-hour salt spray exposure
- b) Evaluate results in accordance with 3.2.5.1, 3.2.5.2 as required

Corrosion Test Requirements per 3.2.5.1, 3.2.5.2			
SAMPLE #1	Type: T		
Type T anchorage connectors shall not show presence of red rust over more than 5% of the surface area			N/A
COMPLIANT	N/A		

Corrosion Test Requirements per 3.2.5.1, 3.2.5.2			
SAMPLE #2	Type: T		
Type T anchorage connectors shall not show presence of red rust over more than 5% of the surface area			N/A
COMPLIANT	N/A		

Corrosion Test Requirements per 3.2.5.1, 3.2.5.2			
SAMPLE #3	Type: T		
Type T anchorage connectors shall not show presence of red rust over more than 5% of the surface area			N/A
COMPLIANT	N/A		

5	Markings and Instructions	
5.1	Marking Requirements	
5.1.1	General: The following markings 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.	
	a) The manufacturer's name and mark	Yes
	b) The year of manufacture	Yes
	c) Model number	Yes
	d) "ANSI Z359.18" and the type	Yes
	e) Markings to indicate restrictions on directions of loading, if applicable	N/A
	f) Where specified by the manufacturer, the working load	Yes
	g) An individual serial number or a lot or batch number that provides traceability	Yes
	h) Minimum Breaking Strength, followed by "MBS."	Yes
5.1.2	As required for the specific anchorage connector, the following markings 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	Yes
5.1.2.1	An anchorage connector that incorporates a closed loop not intended for connection, but may be mistaken 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 operation	N/A
5.1.2.3	The minimum service temperature for the anchorage connector according 3.1.3.2	Yes
5.1.2.4	For tripods and davit systems, the maximum number of users permitted on the system	N/A

5.2	Instruction Requirements	
5.2.1	General: Provide the following instructions and information in English with each anchorage connector.	
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 testing covers only the hardware and does not extend to the anchorage and substrate to which the anchorage connected is attached	Yes
	b) Specifications for appropriate anchorages(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 manufacturer's specification and instructions that the anchorage connector shall only be connected to anchorages that:	Yes
	i) can withstand 5,000 lbs. (22.2 kN) without failure, except that lower strengths are acceptable when permitted by applicable legislation; or	N/A
	ii) are certified by a professional engineer as having the required strength for fall arrest or travel restraint, as applicable, or;	Yes
	iii) the manufacturer may provide specifications of allowable materials including the minimum shapes, sizes and geometry of structural elements to which the anchorage connector may be fastened. A qualified person shall approve these specifications.	Yes
	c) The manufacturer shall clearly label the minimum service temperature for the anchorage connector according to 3.1.3.2	Yes
	d) The manufacturer shall supply complete specifications for fasteners	Yes
	e) The anchorage type	Yes
	f) The permitted uses of the anchorage connector	Yes
	g) The connection point(s), working load limit	Yes
	h) The material used in the anchorage connector's construction	Yes
	i) The length of the anchorage connector and any other dimensions that may affect its compatibility with anchorage to which it may be connected	N/A
	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	N/A
	k) A statement that only one fall protection system or positioning system may be attached to an individual connection point	Yes
	l) Specification providing the intended directions(s) of loading of the anchorage connector	Yes
	m) A complete list of the anchorage connector components provided by the manufacturer at the time of sale	Yes
	n) A warning against unauthorized alterations, relocations or additions to the anchorage connector	Yes

5.2.1.2	Use:	
	a) Instructions on proper installation and use, including, but not limited to, compatibility with other fall protection components	Yes
	b) The length of the anchorage connector and any other dimensions that may affect its compatibility with anchorages to which it may be connected	N/A
	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	N/A
	d) Permitted and forbidden uses, including clear description of and the recommended ways of dealing with applicable compatibility concerns	Yes
	e) A warning to remove any surface contamination such as concrete, stucco, roofing material, etc., that could accelerate cutting or abrading of attached components	Yes
	f) Warnings concerning environments and conditions that may degrade the anchorage connector	Yes
	g) Training requirements	Yes
5.2.1.3	Inspection and Field Testing:	
	a) Instructions on testing, if needed	N/A
	b) Where applicable, directions for the installer to perform and document proof testing upon installation. Directions shall include proof load forces and acceptable methods	N/A
	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	N/A
	d) The recommended frequencies and procedures for inspection, maintenance, and when applicable, testing.	Yes
	e) Instructions for inspecting and servicing an anchorage connector after it is subjected to a fall or an inspection reveals an unsafe condition	Yes
	f) If applicable, guidelines for retirement of the anchorage connector	Yes
	g) The action to be taken if an inspection of and anchorage connector reveals an unsafe condition	Yes
	h) The action to be taken after the anchorage connector is subjected to a fall	Yes
	i) Criteria for removal of an anchorage connector from service if deformed from its original installed configuration	Yes