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TEST DATA EXTENSION REPORT

FRONTLINE FALL PROTECTION INC 6 LEE BLVD, MALVERN FL 33122 United States of America	SATRA reference:	SPC2019000	
		2505	3
	Report ID/Issue number:	50679/1	
	Your reference:		
	Date samples received:		
	Date(s) work carried out:	19/05/2021 to 19/05/2022	
	Date of report:	15/04/2025	

Testing Requirements

Qualification testing of a davit arm anchorage connector descibed as "DAC-WL" in accordance with ANSI Z359.18-2017 type A

This report is an extension of a previously issued SATRA test report, the details of which can be found within the content of this Test Data Extension Report.

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Report Signed by:

Edward Brooks

Report Signatory

WORK REQUESTED

Samples of anchorage connector described as “DAC-WL”, were received by SATRA on the 24th August 2020, for testing in accordance with ANSI Z359.18 – 2017 type A

“DAC-WL” is made from 3 different components: “DAC-36BOOM”, “DAC-54MAST” & “DAC-WALLMT”

This report is an extension of report SPC0282755 /1912/3 Issue 3, dated the 7th June 2022

CONCLUSIONS

SAMPLE REFERENCE	STANDARD	CLAUSE / PROPERTY	SUB CLAUSE	PASS / FAIL
DAC-WL	ANSI Z359.18 - 2017	3.1 Design Requirements	3.1.1 & 3.1.2 Connection Points	Not fully assessed
			3.1.3 Metallic Materials	PASS
			3.1.4 Textiles and Other Synthetic Materials	N/A
			3.1.5 Other requirements	Not fully assessed
		3.2 Performance Requirements	3.2.1 Static Strength Requirements	PASS
			3.2.2 Dynamic Strength Requirements	PASS
			3.2.3 Residual Strength Requirements	PASS
			3.2.4 Serviceability Load Requirements	N/A
			3.2.5 Corrosion Test Requirements	PASS

TESTING

Testing was carried out in accordance with ANSI Z359.18 – 2017 between the 19th May 2021 & 19th May 2022

For the purposes of testing, the anchorage connector was installed into a concrete wall using 4x Hilti M16 x 150mm chemical fasteners, cured for more than 7 days before testing was carried out

The anchorage connector was tested in 1 direction: From the cheek plate attachment point vertically down the length of the davit column

Other connection points are present, but no testing has been carried out on these points

Samples were tested as received, and were not subject to any pre-conditioning processes other than those stated in individual test clauses

Figure 1 – Anchorage connector described as “DAC-WL”

Figure 2 – Anchorage connector described as “DAC-WL” showing direction of test

TEST RESULTS

Table 1 – Testing of anchorage connector described as “DAC-WL” in accordance with ANSI Z359.18 – 2017

ANSI Z359.18 – 2017 CLAUSE / TEST	ANSI Z359.18 – 2017 REQUIREMENT	RESULT / COMMENT	UoM	PASS / FAIL
3.1 Design Requirements – 3.1.1 & 3.1.2 Connection Points	3.1.1 Connection points shall meet the following requirements:			
	a) A connection point shall support only one user or system at a time	The connection point can only support 1 user at a time		PASS
	b) A connection point eye on a Type T anchorage connector shall be a closed eye with a minimum 1 inch inside radius	Not applicable – anchorage connector is type A		N/A
	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	Not assessed – there are 3 closed loop points which could be mistaken for a connection point. No claims have been made for use as a connection point, and no testing has been carried out on these points		Not assessed
	d) Anchorage connectors that include an operable gate, rings, buckles, adjusters or other hardware covered by ANSI/ASSE Z359.12 shall use hardware that complies with the requirements of ANSI/ASSE Z359.12	Not applicable – no operable gates	N/A	N/A
	e) Multiple connection points shall only be permitted on tripod and davit style anchorage connectors	4 connection points are present, and the device allows for connection to a winch which can be used as a 5th connection point		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	The anchorage connector is free from any sharp edges, burrs, pits or roughness which could damage components		PASS

ANSI Z359.18 – 2017 CLAUSE / TEST	ANSI Z359.18 – 2017 REQUIREMENT	RESULT / COMMENT	UoM	PASS / FAIL
3.1 Design Requirements - 3.1.3 Metallic Materials	3.1.3.1 Corrosion resistance – All hot-dip galvanised steel shall conform with ASTM A123/A123M.	A declaration has been provided by the manufacturer dated the 1st June 2022 that states that the product tested fulfils the requirements of 3.1.3.1		PASS
	3.1.3.2.1 For type A and Type T, load-bearing metallic materials used in anchorage connectors shall maintain adequate toughness at temperatures between -30 degrees F (-34 degrees C) and +130 degrees F (+54 degrees C) or be engineered to account for the reduced toughness at low temperatures. Adequate toughness is defined as no more than a 10% drop in energy absorption between representative material specimens conditioned at 30 degrees F (-34 degrees C) and +130 degrees F (+54 degrees C) undergoing a recognised impact test. The manufacturer may provide published data for fracture toughness at these temperatures as evidence that adequate toughness is maintained. Metallic components that have been tested and certified as meeting ANSI/ASSE Z359.12, are deemed to comply with 3.1.3.2	A declaration has been provided by the manufacturer dated the 1st June 2022 that states that the product tested fulfils the requirements of 3.1.3.2.1	N/A	PASS

ANSI Z359.18 – 2017 CLAUSE / TEST	ANSI Z359.18 – 2017 REQUIREMENT	RESULT / COMMENT	UoM	PASS / FAIL
3.1 Design Requirements - 3.1.3 Metallic Materials (continued)	3.1.3.2.2 For Type D anchorage connectors, the manufacturer shall clearly label the anchorage connector with a minimum service temperature of -10 degrees F (-23 degrees C) if load-bearing parts are made of the following materials: Aluminium: All Alloys acceptable Steel: Commonly used Chrome-moly alloys, ASTM 4130-4140. Low alloy high strength structural steels, ASTM A572, A588, A709 and A992 Stainless steel: All SAE Grade 300 series stainless steels. Hardenable SAE Grade 400 series stainless steels. This includes alloys, 410, 416, 422, 440C. Precipitation hardening stainless steel, 17-4 If load-bearing parts are made of any other materials, the manufacturer shall clearly label the lower temperature limit to 10 degrees F	Not applicable – anchorage connector is type A	N/A	N/A
	3.1.3.2.3 Where a Type D anchorage connector is allowed to be used in temperatures below -10 degrees F (-23 degrees C), a qualified person shall verify the anchorage connector will perform as specified per the manufacturer's instructions. Materials analysis or testing data shall be provided upon request	Not applicable – anchorage connector s type A		N/A
	3.1.3.3 Hardware finishes shall be clean and free of scale, rust and deposits of foreign matter other than applied protective coatings	Hardware finishes are clean and free from scale, rust and deposits of foreign matter		PASS

ANSI Z359.18 – 2017 CLAUSE / TEST	ANSI Z359.18 – 2017 REQUIREMENT	RESULT / COMMENT	UoM	PASS / FAIL
3.1 Design Requirements - 3.1.3 Metallic Materials (continued)	3.1.3.4 When steel components are welded, the welding shall meet ANSI/AWS D1.1. When aluminium components are welded, the welding shall meet ANSI/AWS D1.2 When stainless steel components are welded, the welding shall meet ANSI/AWS D1.6 3.1.3.5 The manufacturer shall provide or specify fasteners for connecting an anchorage connector to an anchorage in its intended application. The manufacturer shall supply complete specifications for fasteners in user's instructions	A declaration has been provided by the manufacturer dated the 1st June 2022 that states that the product tested fulfils the requirements of 3.1.3.4 Fixings have been specified for use by the manufacturer, and instructions have been provided for installation (see 'Testing' for details of fixings and installation)	N/A	PASS PASS
3.1 Design Requirements – 3.1.4 Textiles and Other Synthetic Materials	3.1.4.1 Textiles shall not contain natural fibers Components shall be made from pure, non-recycled synthetic material, having the strength, aging, abrasion and heat resistance characteristics equivalent or superior to polyamide or polyester. Synthetic materials other than those stated herein are permitted only when it can be demonstrated by testing that all requirements of this standard are met and, additionally, that the durability, reliability and other properties pertinent to the intended uses have been evaluated and determined suitable by testing. Mark any restrictions on the use of such materials on the anchorage connector	Not applicable – no textile components	N/A	N/A

ANSI Z359.18 – 2017 CLAUSE / TEST	ANSI Z359.18 – 2017 REQUIREMENT	RESULT / COMMENT	UoM	PASS / FAIL
3.1 Design Requirements – 3.1.4 Textiles and Other Synthetic Materials (continued)	3.1.4.2 if a subsystem uses stitching for connection of load-bearing components, the equipment manufacturer shall produce the stitching and cutting and meet the following requirements: a) Use lock stitching b) Secure the ends 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 thread colour or shade shall contrast with that of the webbing to facilitate visual inspection	Not applicable – no textile components	N/A	N/A
3.1 Design Requirements – 3.1.5 Other Requirements	3.1.5.1 Other load bearing materials used in anchorage connectors shall meet the performance requirements of this standard 3.1.5.2 Integrally connected components to which another standard in the ANSI Z359 series exists, shall meet the requirements of that standard	Plastic inserts are present in the base socket to stabilise the davit arm. See clauses 3.2.1 – 3.2.3 for test results Connection D-ring is present at top of davit column – Not assessed	N/A	PASS Not assessed

ANSI Z359.18 – 2017 CLAUSE / TEST	ANSI Z359.18 – 2017 REQUIREMENT	RESULT / COMMENT	UoM	PASS / FAIL
3.2 Performance Requirements – 3.2.1 Static Strength Requirements	Type A & T – The anchorage connector shall be capable of resisting a static load of at least 5,000 pounds (22.2kN). The anchorage connector may deform provided that, where operable gates are used, the deformation shall not create a separation of more than 1/8 inch (3mm) between the gate and the body Type D – The anchorage connector shall be capable of resisting a static load of the greater of 1.5 times the maximum arrest force in the dynamic strength test and 2,700 pounds (12.0kN), but not greater than 5,000 pounds (22.2kN). The anchorage connector may deform provided that, where operable gates are used, the deformation shall not create a separation of more than 1/8 inch (3mm) between the gate and the body	Sample 1 Anchorage Type: A Static load required: 5,000 pounds / 22.2kN Force held for 3 minutes without failure	± 0.54%	PASS
		Sample 2 Anchorage Type: A Static load required: 5,000 pounds / 22.2kN Force held for 3 minutes without failure		
		Sample 3 Anchorage Type: A Static load required: 5,000 pounds / 22.2kN Force held for 3 minutes without failure		
3.2 Performance Requirements – 3.2.2 Dynamic Strength Requirements	Type A, T & D – The anchorage connector shall successfully arrest the test weight. The anchorage connector may deform provided that, where operable gates are used, the deformation shall not create a separation of more than 1/8 inch (3mm) between the gate and the body	Sample 1 128kg test mass held Peak arrest force: 22.5kN	± 0.18%	PASS
		Sample 2 128kg test mass held Peak arrest force: 21.1kN		
		Sample 3 128kg test mass held Peak arrest force: 22.9kN		

ANSI Z359.18 – 2017 CLAUSE / TEST	ANSI Z359.18 – 2017 REQUIREMENT	RESULT / COMMENT	UoM	PASS / FAIL
3.2 Performance Requirements – 3.2.3 Residual Strength Requirements	Type A, T & D – The anchorage connector shall successfully arrest the drop of the test weight and maintain the test weight in suspension for at least 1 minute. The anchorage connector may deform provided that, where operable gates are used, the deformation shall not create a separation of more than 1/8 inch (3mm) between the gate and the body	Sample 1 128kg test mass held. Following test mass left suspended for 1 minute without failure Sample 2 128kg test mass held. Following test mass left suspended for 1 minute without failure Sample 3 128kg test mass held. Following test mass left suspended for 1 minute without failure	± 0.98%	PASS
3.2 Performance Requirements – 3.2.4 Serviceability Load Requirements	Type A – There is no serviceability load requirement for Type A anchorage connectors Type T and D – Any cracking, breaking or permanent deformation of load bearing parts of the anchorage connector visible to the unaided eye shall constitute test failure	Not applicable – anchorage connector is type A	Type T ± 0.417% Type D ± 1.07%	N/A

ANSI Z359.18 – 2017 CLAUSE / TEST	ANSI Z359.18 – 2017 REQUIREMENT	RESULT / COMMENT	UoM	PASS / FAIL
3.2 Performance Requirements – 3.2.5 Corrosion Test Requirements	Type A & Type D anchorage connectors that include ferrous metal load-bearing components made of materials other than stainless steel or hot-dipped galvanised steel shall pass the 48 hour corrosion test. The presence of red rust, visible to the unaided eye, or other evidence of corrosion of the base metal shall constitute failure of the salt spray test. Post-test presence of white scale on hardware surface is permitted. Components that have had salt spray testing in accordance with another Z359 standard need not be tested for corrosion under this standard Type T anchorage connectors that include ferrous metal load-bearing components made of materials other than stainless steel or hot-dipped galvanised steel shall pass the 500 hour corrosion test. The presence of red rust, visible to the unaided eye, or other evidence of corrosion of the base metal shall constitute failure of the salt spray test. Post-test presence of white scale on hardware surface is permitted	Corrosion test in accordance with ASTM B117-18 – 24 hours Neutral Salt Spray, followed by 1 hour drying, followed by a further 24 hours exposure Temperature: 35°C Fall out rate: 1.26ml/hr pH of test solution: 6.70 Specific gravity of test solution: 1.034 Socket – Sample 1 – No evidence of red rust or corrosion Sample 2 – No evidence of red rust or corrosion Sample 3 – No evidence of red rust or corrosion See note 2 Davit arm – Sample 1 – No evidence of red rust or corrosion Sample 2 – No evidence of red rust or corrosion Sample 3 – No evidence of red rust or corrosion See note 3	See table 2	PASS

ADDITIONAL INFORMATION / NOTES

Table 2 – Additional uncertainty of measurement information

CLAUSE	TEST / COMPONENT	UoM
3.2.5 Corrosion test requirements	Temperature	± 0.855 (°C)
	Fall-out rate of collected solution	± 2.1 (%)
	Specific gravity of collected solution	± 0.001 (g/ml)
	pH value of collected solution	± 0.046
	Angle of sample mounting (if applicable)	± 0.059 (°)

Note 1 – 'UoM' denotes estimated Uncertainty of Measurement for stated test results. This uncertainty value is based on a standard uncertainty multiplied by a coverage factor k = 2, which provides for a confidence level of approximately 95%

Note 2 – Testing carried out under job reference SPC0329806 /2215

Note 3 – Testing carried out under job reference SPC0314874 /2124

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