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ANSI/ASSE Z359.18 Safety Requirements for Anchorage Connectors

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Respectfully Submitted,

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INTRODUCTION

This report presents the results of dynamic drop testing, static load testing, and corrosion testing conducted on anchor samples submitted by Gridmesh Anchor Pty Ltd. Testing was completed on April, 4, 2020.

OBJECTIVE

The scope of work was limited to performing dynamic drop testing and static load testing on samples of Gridmesh Anchors (GMA) and providing a report of the results. The anchorage connector has been tested according to ANSI/ASSE Z359.18 and in compliance with the requirements of ANSI/ASSE Z359.7.

SUMMARY OF RESULTS

Test Unit	Static Strength Test	Dynamic Strength Test	Residual Dynamic Strength Test	Corrosion Test
1	PASS			
2		PASS	PASS	
3				PASS

Table 1: Summary of Results

See Test Results section for individual sample data.

SAMPLE IDENTIFICATION

Submitted by	Gridmesh Anchor Pty Ltd
Devices	Fall Prevention Anchors
Model/Part Numbers	Model GA01
Sample Description	Gridmesh Anchor (GMA)
Test Unit Serial Numbers	**1:** Base: GA00243, Beam: AB00453 (DOM: 050118) **2:** Base: GA00265, Beam: AB00069 (DOM: 050118) **3:** Base: GA00264, Beam: AB00006 (DOM: 050118)

Table 2: Sample Identification

The results of this test apply only to the units identified in this Engineering Report by device identifier and model / part number, or serial number.

TEST METHOD

4.2.1.1 Static Strength Test for Type A Anchorage connectors

Perform the test as follows:

a. A new anchorage connector may be used for each test
b. The test force shall be 5,000 pounds (22.2kN) +50/-0 pounds (+0.22/-0kN). Apply these forces in accordance with the requirements of 4.1.2.
c. Install the anchorage connector on the test anchorage in accordance with the requirements of 4.1.2. The GMA was installed across to steel supports with an edge to edge dimension of 1.10 meters. The GMA was positioned so that the sling connector was 0.15 meters from the edge of the nearest steel support.
d. Apply the load to the anchorage connector in the critical direction of loading permitted by the manufacturer's user instructions.
e. Apply the load at a rate not greater than 2 inches (51mm) per minute. Maintain the load above 5,000 pounds (22.2kN) for at least 3 minutes.
f. Release the load.
g. Evaluate the test results per 3.2.1.1

3.2.1.1 Static Strength Requirements

When tested in accordance with 4.2.1.1, 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.

4.2.2.1.4 Dynamic Strength Test Procedure

A new test lanyard may be used for each dynamic strength test, as directed by the manufacturer. Perform the dynamic strength test as follows:

a. Install the anchorage connector, conditioned according to applicable requirements of this section, on the test anchorage in accordance with the requirements of 4.1.2. The GMA was installed across to steel supports with an edge to edge dimension of 1.10 meters. The GMA was positioned so that the sling connector was 0.15 meters from the edge of the nearest steel support.
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, as applicable.
c. Connect the other end of the test lanyard to the test weight with a mass of 282 +/- 2 pounds (129 +/- 1 kg).
d. Raise the test weight to achieve a free-fall distance of 3, +0.1/-0, ft (0.9, +0.03/-0, m).
e. Release the test weight by means of the quick-release mechanism.
f. Evaluate the test results per 3.2.2.1.

TEST METHOD (continued)

3.2.2.1 Dynamic Strength Requirements

When tested in accordance with 4.2.2.1, 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.

4.2.3.1 Residual Dynamic Strength Test

The residual strength test shall consist of a repetition of the test as specified in 4.2.2.1, using the same anchorage connector without further conditioning and the same test lanyard. The anchorage connector must support the test weight an additional one minute after the residual dynamic drop. Evaluate the test results per 3.2.3.1.

3.2.3.1 Residual Strength Requirements

When tested in accordance with 4.2.3.1, 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.

4.2.5 Corrosion Test

4.2.5.1 Type A and Type D Anchorage Connectors

a. Subject the anchorage connector to a salt spray in accordance with ASTM B117, with an initial exposure of 24 hours followed by one hour drying and a further 24 hours exposure. If needed, disassemble anchorage connectors that are too large to fit into the salt spray chamber and test only the ferrous components.
b. Evaluate test results per 3.2.5.1.

3.2.5.1 Corrosion Test Requirements

Type A and Type D anchorage connectors that include ferrous metal load-bearing components made of materials other than stainless steel or hot-dipped galvanized steel shall pass the corrosion test in 4.2.5.1. 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.

TEST EQUIPMENT

Description	Asset #	Calibration Date	Calibration Due Date
Load Cell	MM110-005	25-JUL-2019	25-JUL-2020
Strain Indicator	PT-167-001	24-MAR-2020	24-MAR-2021
Scale	PT-165-037	16-AUG-2019	16-AUG-2020
Strain Indicator	PT-165-022	25-FEB-2020	25-FEB-2021
String Transducer	PT-162-082	08-JAN-2020	08-JAN-2021
Calibrated Tape Measure	PT-167-158	19-SEP-2019	19-SEP-2024
Stopwatch	PT-161-016	04-SEP-2019	04-SEP-2020
Dial Indicator	PT-162-072	07-JAN-2020	07-JAN-2021
Salt Spray Chamber (pressure gauge and temperature probes)	PT-165-034.1, .2, .3 & .4	03-MAR-2020	03-MAR-2021

Table 3: Calibrated Test Equipment

Static Tensile Test Equipment shall pull at a uniform rate of not greater than 2 inches (51mm) per minute and shall measure force with an accuracy +/- 3% of the specified load. Static test equipment consisted of the following:

a. Hydraulic cylinder
b. Load cell
c. Reaction Frame

Dynamic test equipment:

a) A rigid test weight was used with a mass of 282 +/- 2 pounds (129 +/-1 kg).
b) The test weights were made in a way that they would not interfere with the vertical fall.
c) Drop test structure with sufficient height and lateral clearance within the drop zone beneath the test anchorage or anchorage connector on the structure to perform the drop tests required by this standard without members of the structure or its base interfering with or obstructing the drops during testing.
d) The permitted maximum elastic deformation of the test anchorage and test anchorage connector at the point of attachment of the test specimen shall be 0.04 inch (1.0mm) when subjected to a load of 4,500 pounds (20kN) in the anticipated direction of loading.
e) Quick release mechanism

Salt Spray to perform ASTM B117.

TEST RESULTS

The following is a list of specimens and dynamic test results:

Static Strength Test Results:

Test Unit	Max Load Achieved (lbf)	Results	Notes
1	5075	PASS	Continual deformation of beam during 3 minute hold

Table 4: Static Test Results

Dynamic Strength Test Results:

Test Unit	Test Weight	Drop Height	Results	Notes
2	282 lbs	3 ft	PASS	No visible deformation

Table 5: Dynamic Test Results

Residual Dynamic Strength Test Results:

Test Unit	Test Weight	Drop Height	Results	Notes
2	282 lbs	3 ft	PASS	No visible deformation

Table 6: Residual Dynamic Strength Test Results

Corrosion Test Results:

Test Unit	Test Description	Results	Notes
3	Salt Spay	PASS	No visible red rust or evidence of corrosion.

Table 7: Corrosion Test Results

PHOTOGRAPHS

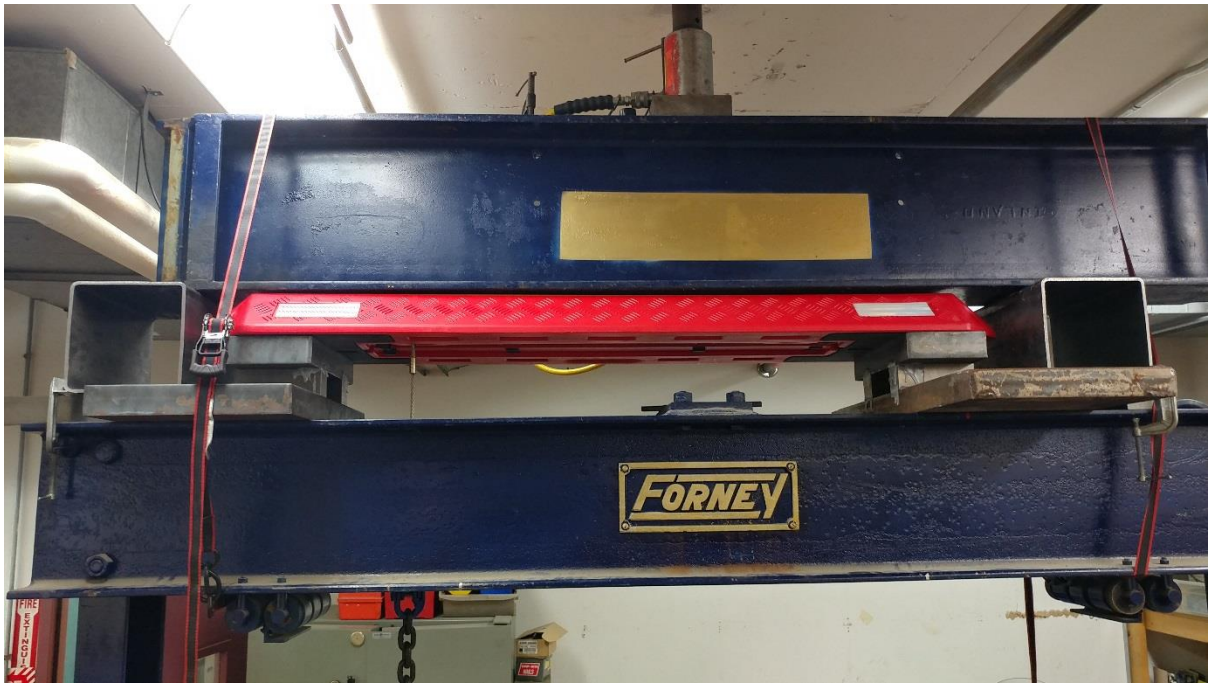

Figure 1: 4.2.1.1 Static Strength Test Setup

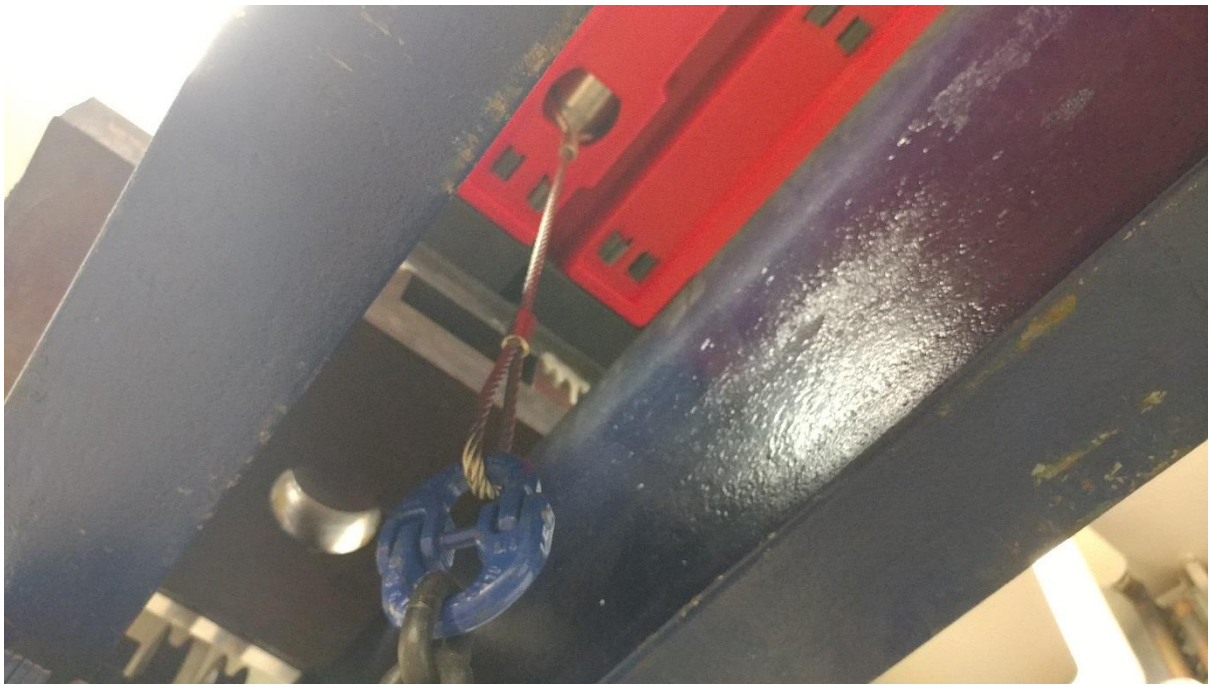

Figure 2: 4.2.1.1 Static Strength Test Setup

PHOTOGRAPHS (continued)

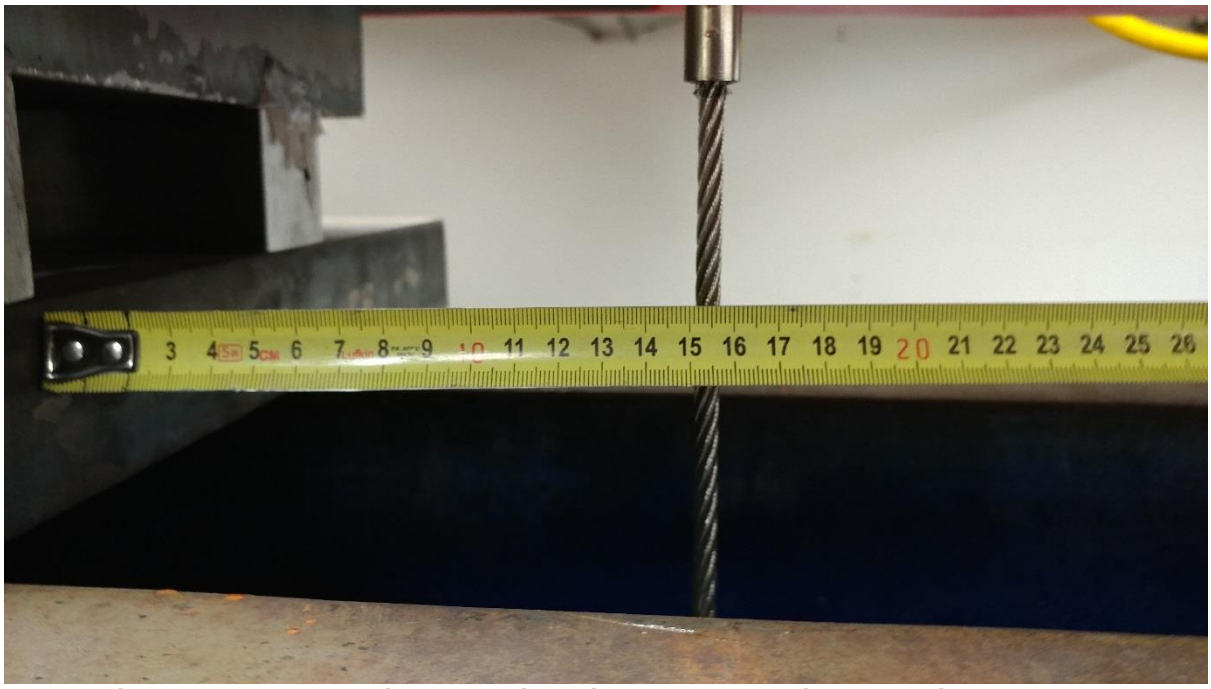

Figure 3: 4.2.1.1 Static Strength and 4.2.2.1 Dynamic Strength Test Setup (distance from edge of steel support to sling)

Figure 4: 4.2.1.1 Static Strength and 4.2.2.1 Dynamic Strength Test Setup (distance between steel supports)

PHOTOGRAPHS (continued)

Figure 5: Test Unit under Static Load Testing

Figure 6: Test Unit after Static Strength Testing

PHOTOGRAPHS (continued)

Figure 7: 4.2.2.1 Dynamic Strength Test Setup

Figure 8: 4.2.2.1 Dynamic Strength Test Setup

PHOTOGRAPHS (continued)

Figure 9: Test Unit after Dynamic Strength Testing

Figure 10: Test Unit after Dynamic Strength Testing

PHOTOGRAPHS (continued)

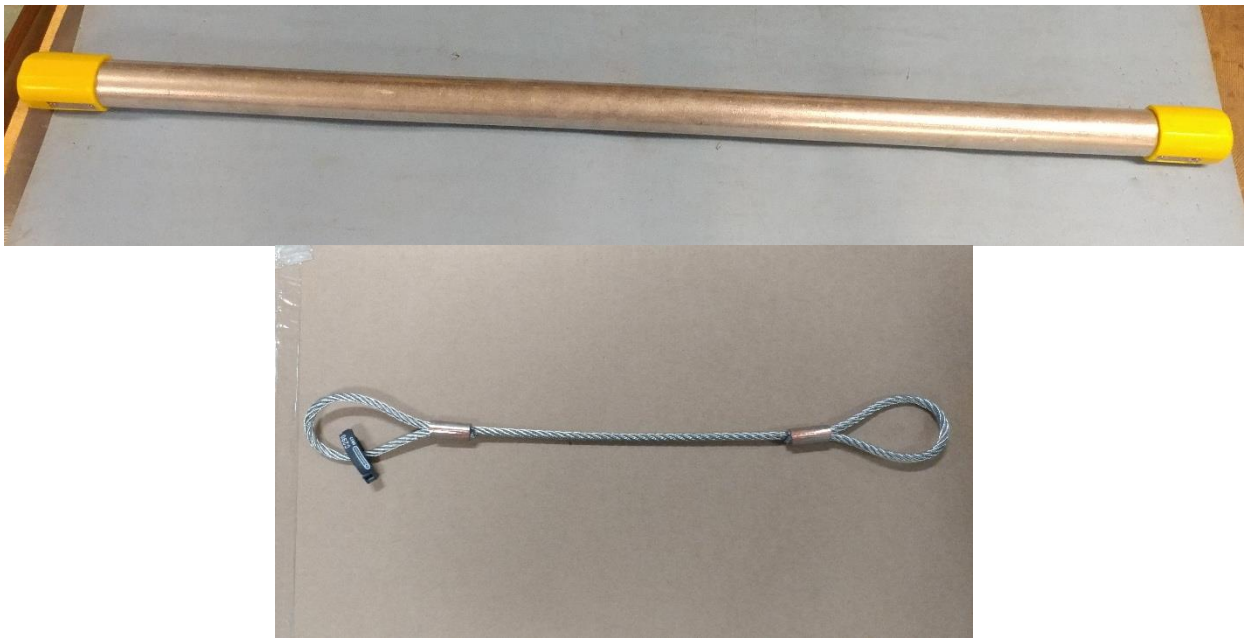

Figure 11: Test Unit before 4.2.5.1 Corrosion Testing

Figure 12: Test Unit after 4.2.5.1 Corrosion Testing

PHOTOGRAPHS (continued)

Figure 13: Test Unit 1 Identification Information

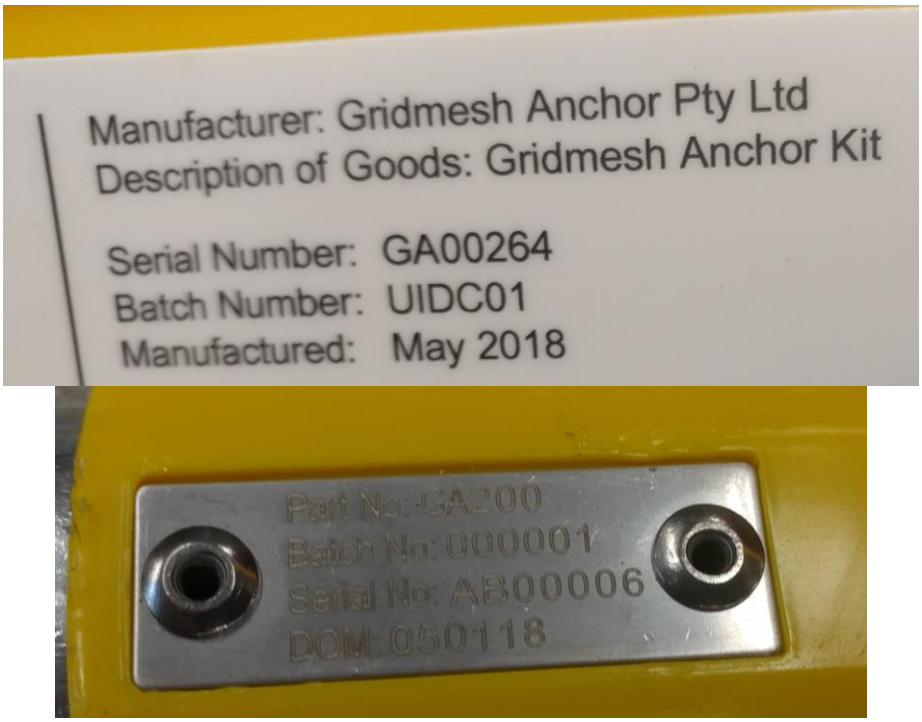

Figure 14: Test Unit 2 Identification Information

PHOTOGRAPHS (continued)

Figure 15: Test Unit 3 Identification Information