

# Test Report

## Personal Fall Arrest Equipment ANSI Z359.13-2013 Energy Absorbing Lanyards

**Report no:** 2.23.01.09

**Customer:** Frontline Fall Protection Inc.  
2303 NW 84th Ave.  
Miami  
Florida 33122  
U.S.A

**Manufacturer:** Frontline Fall Protection Inc.  
as advised by the Customer

**Customer orders/  
Dates received:** T/1000 (11 March 2022)  
T/1034 (2 August 2022)

**Model:** LIS31S

**Dates of tests:** 28 Mar. 2022 to 11 May 2022 and 9 Jan. 2023

**Signed:**



Steven Sum, Laboratory Manager

**Issued:** 22 October 2022

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**Conditions**

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Specimens will be disposed of four weeks from the date of this report, unless otherwise instructed.

Opinions, comments and interpretations expressed in this report are shown in italics.

Copies of INSPEC interpretations referenced in this report are available upon request.

Tests marked  are not included in our ANAB Scope of Accreditation.

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**Summary of assessment \***

<b>Clause</b>	<b>Requirement</b>	<b>Assessment (See Key)</b>
3.1.5	Deployment Indicator	<b>Pass</b>
3.1.6	Activation force	<b>Pass</b>
3.2	Energy absorber	<b>Ltd</b>
3.2.1	Material	<b>NAs</b>
3.2.2	Terminations	<b>Ltd</b>
3.2.3	Connectors	<b>Ltd</b>
3.2.4	Dynamic performance – ambient dry	<b>Pass</b>
3.2.5	Dynamic performance – ambient wet	<b>Pass</b>
	Dynamic performance – cold dry	<b>Pass</b>
	Dynamic performance – hot dry	<b>Pass</b>
3.2.6	Static strength	<b>Pass</b>
3.2.7	Static test for wrap-around lanyards (3600 lbf – abraded)	
3.2.8	Static test for wrap-around lanyards (5000 lbf – unabraded)	
3.2.9	Static test for Y-lanyards	
3.2.10.1	Dynamic test for Y-lanyards (Single connection)	
3.2.10.2	Dynamic test for Y-lanyards (Dual connection)	
3.2.10.3	Dynamic test for Y-lanyards (Hip connection)	
5.1 / 5.2	Marking	<b>Ltd</b>
5.3 / 5.4	Instructions	<b>Ltd</b>

**Key**

	Shading shows the clauses requested. Any other clauses were not requested.
Pass	Requirement satisfied.
Ltd	Testing requested was insufficient completely to verify compliance with the clause. Refer to the “Result details” section for more information.
Fail	Requirement not satisfied. Refer to the “Result details” section for more information.
NAs	Assessment not carried out.
NAp	Requirement not applicable.
NT	Requested but not tested due to early termination following failure.

\* Assessment relates only to those specimens which were tested and are the subject of this report.

**Submission details**

<b>Product</b>	<b>Quantity</b>	<b>Date received</b>	<b>INSPEC specimen no. (2K041+)</b>
Energy absorbing lanyard, model LIS31S	06	16 March 2022	01 to 06

**Procedures**

The specimens detailed within the submission above were used for the tests covered by this report.

Testing was performed in accordance with ANSI Z359.13-2013 unless otherwise specified below. Reference should be made to the standard when reading this report.

Unless stated otherwise, specimens were tested in the condition as received by INSPEC.

Testing was performed at INSPEC's laboratory in Kunshan, China.

**Result details****3.1.5 Deployment Indicator**

Subsequent to the testing of specimen 2K04102 against 3.2.4, it became obvious that the energy absorber had been activated. **Pass**

**3.1.6 Activation force**

Specimen 2K04101 was assessed.

The specimen showed no sign of activation when subjected to the 450 pounds static force. **Pass**

The permanent elongation of the specimen 2K04101, following the test, was 0.39 inches. This is less than the maximum 2 inches permitted. **Pass**

**3.2 Personal Energy Absorbing Lanyard Component**

Specimen 2K04102 was assessed.

The specimen incorporated a Personal Energy Absorber Component which satisfied this standard. **Ltd**

**3.2.1 Materials**

Specimen 2K04102 was assessed.

Webbing was used on the construction of the energy absorbing lanyard.

The materials used in the construction of this energy absorbing lanyard, and their characteristics, were not assessed. Manufacturer to certify. **NAs**

**3.2.2 Terminations**

Specimen 2K04102 was assessed.

The energy absorbing lanyard was constructed of webbing. The end terminations satisfied 3.2.2.2, as appropriate (see below). **Ltd**

### 3.2.2.2 Webbing terminations

Specimen 2K04102 was assessed.

- |    |   |             |
|----|---|-------------|
| a) | Lock stitches sewn on all stitched eye termination straps were not assessed. Manufacturer to certify.                         | <b>NAs</b>  |
| b) | The material and characteristics of thread used was not assessed. Manufacturer to certify.                                    | <b>NAs</b>  |
|    | Threads used for sewing the webbing were orange colour. This contrasted with the black colour of the webbing.                 | <b>Pass</b> |
| c) | Webbings were protected from concentrated wear at all interfaces with load bearing connector elements. Wear pieces were used. | <b>Pass</b> |
| e) | The ends of the webbing were hot-cut so as to prevent unravelling.  | <b>Pass</b> |

### 3.2.3 Connectors

Specimen 2K04102 was assessed.

It included two integrally attached connectors (snaphook). **Pass**

Testing of the connectors was not requested. **NAs**

### 3.2.4 Dynamic performance test - Ambient dry condition

Specimen 2K04102 was assessed.

During the dynamic performance test, the average arrest force was 754 pounds. **Pass**  
This value is less than the maximum 900 pounds permitted.  
See Annex 1 for the plot of force versus time.

During the dynamic performance test, the maximum arrest force was 980 pounds. **Pass**  
This value is less than the maximum 1,800 pounds permitted.  
See Annex 1 for the plot of force versus time.

During the dynamic performance test, the deployment distance was 41.1 inches. **Pass**  
This value is less than the maximum 48 inches permitted.

### 3.2.5 Dynamic performance test - Ambient wet condition

Specimen 2K04103 was assessed.

During the dynamic performance test, the average arrest force was 858 pounds. **Pass**  
This value is less than the maximum 1,125 pounds permitted.  
See Annex 1 for the plot of force versus time.

During the dynamic performance test, the maximum arrest force was 1116 pounds. **Pass**  
This value is less than the maximum 1,800 pounds permitted.  
See Annex 1 for the plot of force versus time.

During the dynamic performance test, the deployment distance was 37.2 inches. **Pass**  
This value is less than the maximum 48 inches permitted.

### 3.2.5 Dynamic performance test - Cold dry condition

Specimen 2K04104 was assessed.

During the dynamic performance test, the average arrest force was 868 pounds. **Pass**  
This value is less than the maximum 1,125 pounds permitted.  
See Annex 1 for the plot of force versus time.

During the dynamic performance test, the maximum arrest force was 1118 pounds. **Pass**  
This value is less than the maximum 1,800 pounds permitted.  
See Annex 1 for the plot of force versus time.

During the dynamic performance test, the deployment distance was 35.6 inches. **Pass**  
This value is less than the maximum 48 inches permitted.

### 3.2.5 Dynamic performance test - Hot dry condition

Specimen 2K04105 was assessed.

During the dynamic performance test, the average arrest force was 800 pounds. **Pass**  
This value is less than the maximum 1,125 pounds permitted.  
See Annex 1 for the plot of force versus time.

During the dynamic performance test, the maximum arrest force was 1182 pounds. **Pass**  
This value is less than the maximum 1,800 pounds permitted.  
See Annex 1 for the plot of force versus time.

During the dynamic performance test, the deployment distance was 42.5 inches. **Pass**  
This value is less than the maximum 48 inches permitted.

### 3.2.6 Static strength

Specimen 2K04102 was assessed.

The specimens withstood the tensile tests of 5,000 pounds applied for 1-minute without breaking. **Pass**

## 5.1 General Marking Requirements

- 5.1.1** Markings shall be in English. **Pass**
- 5.1.2** The legibility and attachment of required markings shall endure for the life of the component, subsystem or system being marked was not assessed. **NAs**
- Marking labels were provided electronically and used for assessment.*
- When pressure sensitive labels are used, they shall comply with the applicable provision of reference 8.5.1. This requirement was not assessed. Manufacturer to certify. **NAs**
- 5.1.3** Equipment shall be marked with the following:
- part number and model designation; [LIS31S] **Pass**
  - year of manufacture; **Pass**
  - manufacturer's name or logo; [FRONTLINE] **Pass**
  - capacity rating; [130-310 lbs] **Pass**
  - serial number; **Pass**
  - standard number; [ANSI Z359.13-2013] **Pass**
  - warning to follow the manufacturer's instructions included with the equipment at time of shipment from the manufacturer. **Pass**

## 5.2 Specific Marking Requirements

- 5.2.1** Energy absorbing lanyards shall be marked to identify:
- the fiber used in the material of construction; [Polyester] **Pass**
  - the length; [6 ft FF] **Pass**
  - the need to avoid contact with sharp edges and abrasive surfaces; **Pass**
  - the need to make only compatible connections; **Pass**
  - the maximum elongation; [48 inches] **Pass**
  - restriction, if any, on the types of components, subsystems, or systems with which the energy absorber is designed to be used; [Nil] **NAp**
  - the average arrest force, maximum free fall distance and capacity of the energy absorber on a separate label identical in size, color and content as figure 16a and 16b of the standard; [only contents were assessed] **Ltd**
  - 6 ft FF personal energy absorbers shall be in black print on a contrasting white background; **Pass**
  - 12 ft FF personal energy absorbers shall be in white print on a contrasting black background; **NAp**

### 5.3 General Instruction Requirements

**5.3.1** Instructions shall be provided to the user, printed in English, and affixed to the equipment at the time of shipment from the manufacturer. **Ltd**

*User Instructions in English were provided electronically and used for assessment.*

- 5.3.2** Instructions shall contain the following information:
- a statement that the manufacturer's instructions shall be provided to users; **Pass**
  - manufacturer's name, address, and telephone number; **Pass**
  - manufacturer's part number and model designation for the equipment; **Pass**
  - intended use and purpose of the equipment; **Pass**
  - proper method of use and limitation on use of the equipment; **Pass**
  - illustrations showing locations of markings on the equipment; **Pass**
  - reproduction of printed information on all markings; **Pass**
  - inspection procedures required to assure the equipment is in serviceable condition and operating correctly; **Pass**
  - anchorage requirements; **Pass**
  - an illustration of how to calculate free fall distances; **Pass**
  - criteria for discarding equipment which fails inspection; **Pass**
  - procedures for cleaning, maintenance, and storage; **Pass**
  - reference to the ANSI/ASSE Z359.13, *Personal Energy Absorbers and Energy Absorbing Lanyards*, standard and applicable regulations governing occupational safety. **Pass**
- 5.3.3** Instructions shall require that only the equipment manufacturer, or persons or entities authorized in writing by the manufacturer, shall make repairs to equipment. **Pass**
- 5.3.4** Instructions shall require the user to remove equipment from field service if it has been subjected to the forces of arresting a fall. **Pass**

### 5.4 Specific Instruction Requirements

- 5.4.1** In addition to general instruction the requirements, written instructions for personal energy absorbers shall include:
- the material used in the personal energy absorber construction; **Pass**
  - the need to make only compatible connections and limitations of compatibility; **Pass**
  - proper method of coupling the personal energy absorber to adjacent components of the system; **Pass**
  - the maximum arrest force of the personal energy absorber when dynamically tested in accordance with the requirements of this standard; **Pass**
  - the maximum elongation of the personal energy absorber when dynamically tested in accordance with the requirements of this standard. **Pass**
  - a reference chart that indicates the deployment distance of the personal energy absorber according to the user weight and free fall distance; **NAs**
  - a statement that indicates information necessary in designing fall protection systems shall be made available from the manufacturer. **Pass**
  - Manufacturers may provide designers of fall protection systems a representative graph(s) of the time history plot of the loading from a drop test. **NAs**

**Estimates of the uncertainty of measurement**

Clause	Test	Uncertainty	
3.1.5	Deployment indicator	See Note 1	
3.1.6	Activation force	See Note 1	
	Permanent elongation	±5.1%	
3.2	Personal Energy Absorber Component, if fitted	See report	
3.2.1	Materials	Not applicable	
3.2.2	Terminations	Not applicable	
3.2.3	Connectors	See report	
3.2.4	Dynamic performance – ambient dry	Force	±3.0%
		Deployment distance	±1 mm
3.2.5	Dynamic performance – various conditions	Force	±3.0%
		Deployment distance	±1mm
3.2.6	Static strength – single lanyard	See Note 1	
	Static strength – slippage	±2.1%	
3.2.7	Abrasion and Static strength - Wrap-around energy absorbing lanyards only	See Note 1	
3.2.8	Static strength - Wrap-around energy absorbing lanyards only	See Note 1	
3.2.9	Static strength - Y-lanyards only	See Note 1	
3.2.10.1	Dynamic test, Y-lanyards only - Single connection	Force	±3.0%
		Deployment distance	±1 mm
3.2.10.2	Dynamic test, Y-lanyards only - Dual connection	Force	±3.0%
3.2.10.3	Dynamic test, Y-lanyards only - Hip connection	See Note 1	
5.1 / 5.2	Marking	Not applicable	
5.3 / 5.4	Information	Not applicable	

Note 1. The acceptance criterion for this test is a straightforward “Pass/Fail”, rather than a numerical value. Consequently, as there is no value to be reported, uncertainty has not been reported either.

Note 2. The uncertainty value is based on a standard uncertainty multiplied by a coverage factor  $k = 2$ , which provides for a confidence level of approximately 95%. Values expressed as a percentage (%) are relative.

Note 3. It should be noted that the above values have not been taken into account when making assessments against the pass/fail criteria.

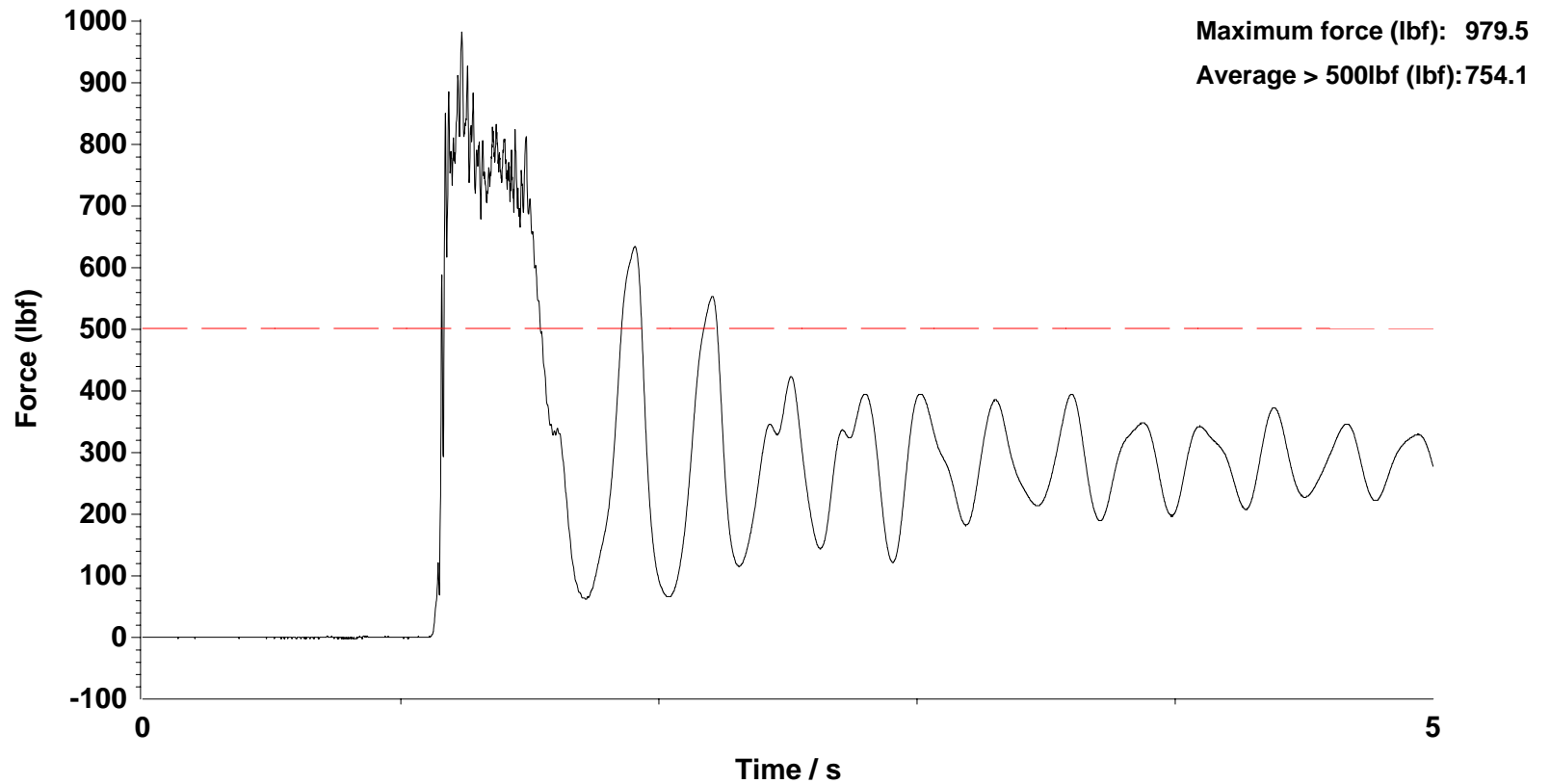
# ANNEX

This Annex comprises two sections.

1. Plots of arrest force versus time. (4 pages)
2. Photograph of the products tested. (1 page)

INSPEC Technical Services

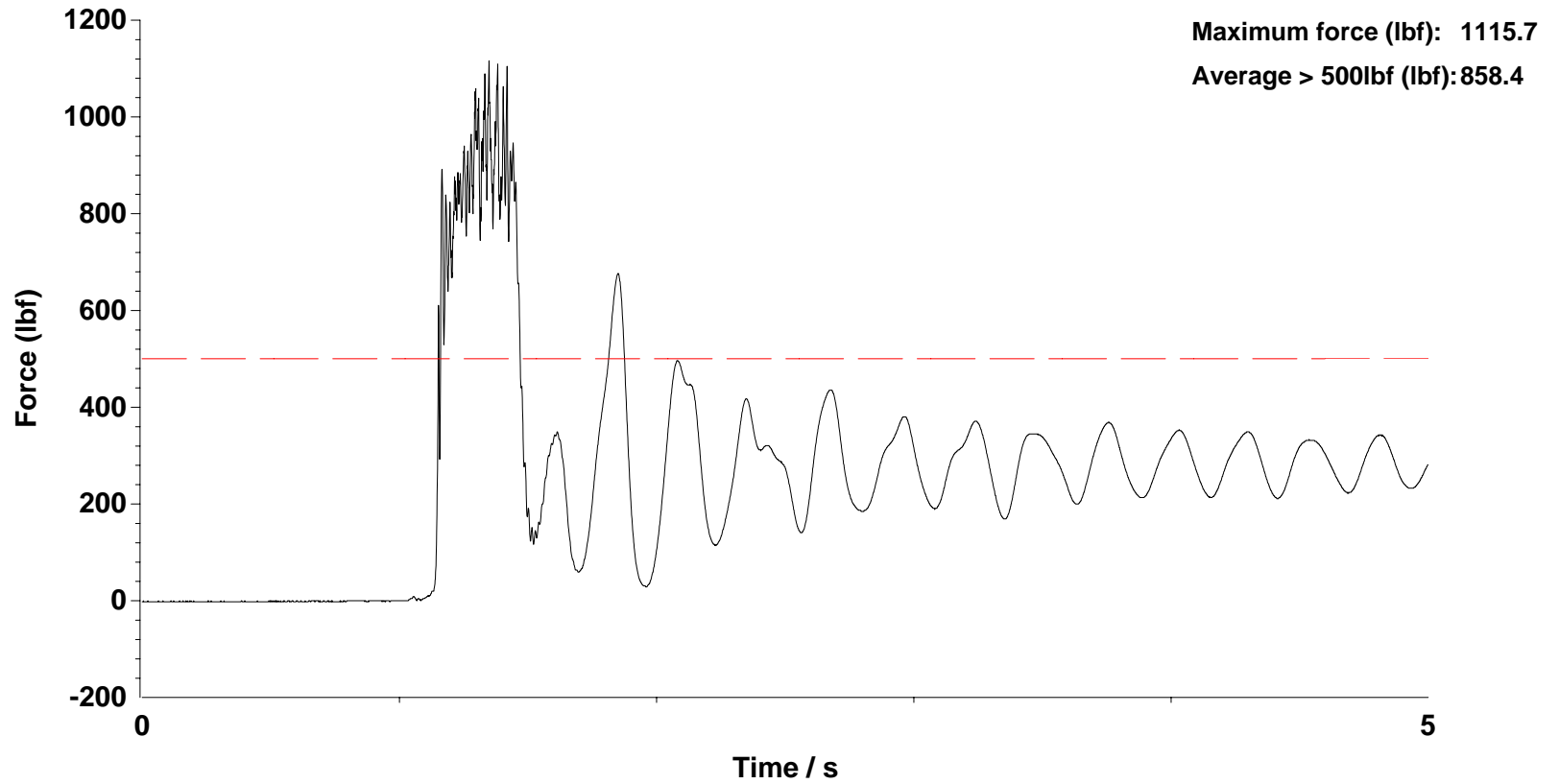
Technician: LJ  
Standard: ANSI Z359.13:2013 Energy absorbing lanyard  
Sample / File name: 2K04102  
Drop item: Drop weight, U.S - 128 kg  
Orientation/Attachment Point: Centre eyebolt  
Time and Date of Test: 16:01 31/03/22



Results do not achieve full ANAB status until a formal test report has been issued.

INSPEC Technical Services

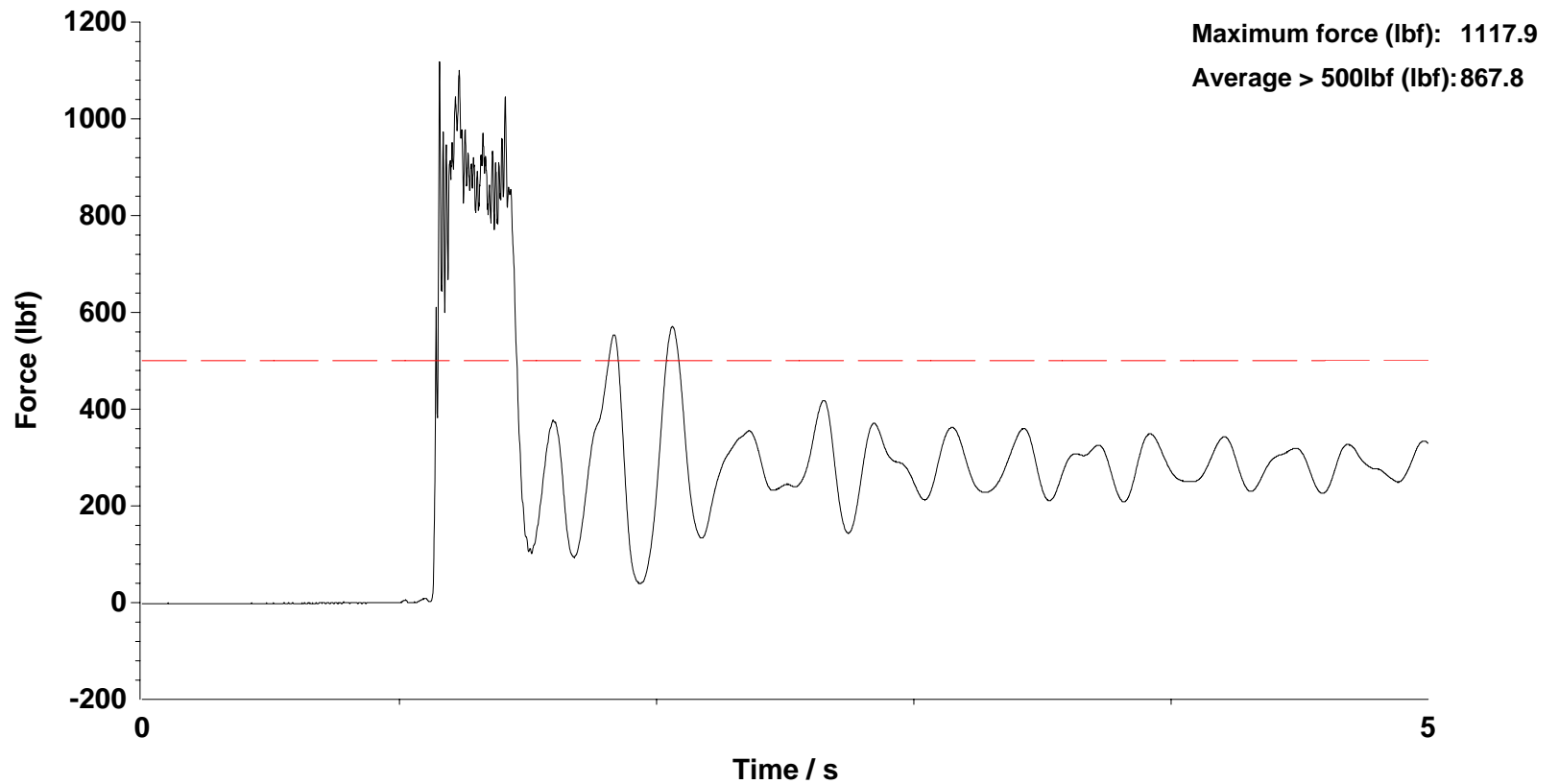
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Standard: ANSI Z359.13:2013 Energy absorbing lanyard  
Sample / File name: 2K04103  
Drop item: Drop weight, U.S - 128 kg  
Orientation/Attachment Point: Centre eyebolt  
Time and Date of Test: 16:11 31/03/22



Results do not achieve full ANAB status until a formal test report has been issued.

INSPEC Technical Services

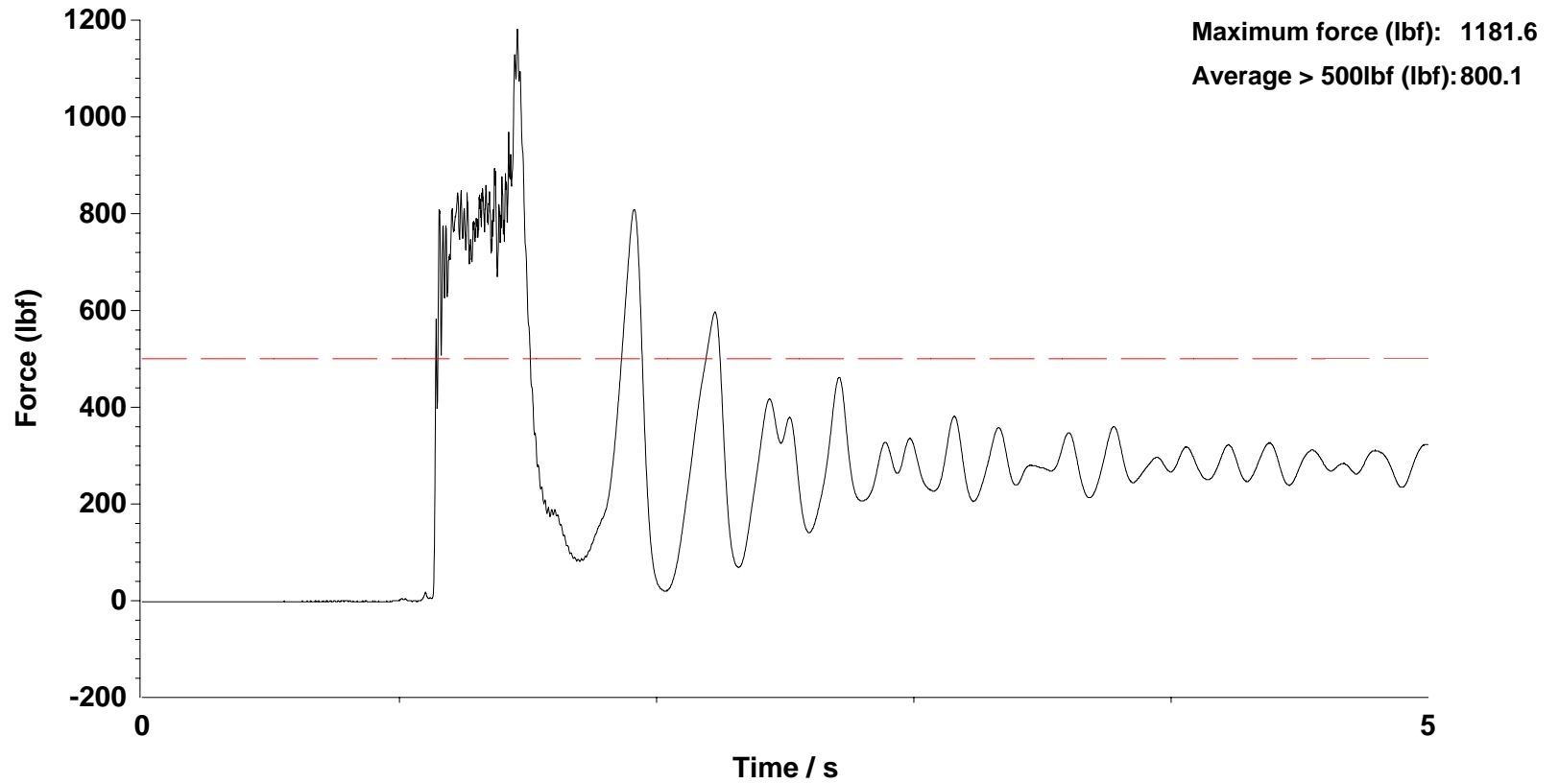
Technician: LJ  
Standard: ANSI Z359.13:2013 Energy absorbing lanyard  
Sample / File name: 2K04104  
Drop item: Drop weight, U.S - 128 kg  
Orientation/Attachment Point: Centre eyebolt  
Time and Date of Test: 16:20 31/03/22



Results do not achieve full ANAB status until a formal test report has been issued.

INSPEC Technical Services

Technician: LJ  
Standard: ANSI Z359.13:2013 Energy absorbing lanyard  
Sample / File name: 2K04105  
Drop item: Drop weight, U.S - 128 kg  
Orientation/Attachment Point: Centre eyebolt  
Time and Date of Test: 16:27 31/03/22



Results do not achieve full ANAB status until a formal test report has been issued.

Frontline Fall Protection Inc. –  
Energy absorbing lanyard, model LIS31S

