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Test Report

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

Report no: 2.20.12.35

Client: Frontline Fall Protection Inc.
2023 NW 84th Ave
Miami
Florida 33122
U.S.A

Manufacturer: Frontline Fall Protection Inc.

Client order: T/0807

Order received: 8 September 2020

Model: LIS61S P

Dates of tests: 19 March 2020 to 21 May 2020 and 8 December 2020

Signed: 

Issued: 8 December 2020

Steven Sum, Laboratory Manager

Conditions

This report may be reproduced and distributed to your clients, provided that it is reproduced and distributed in full.

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*

Clause	Requirement	Assessment (See Key)
3.1.5	Deployment indicator	Pass
3.1.6	Activation force	Pass
3.2	Energy absorber	Ltd
3.2.1	Material	NAs
3.2.2	Terminations	Ltd
3.2.3	Connectors	
3.2.4	Dynamic performance – ambient dry	Pass
3.2.5	Dynamic performance – ambient wet	Pass
	Dynamic performance – cold dry	Pass
	Dynamic performance – hot dry	Pass
3.2.6	Static strength	Pass
3.2.7	Static test for wrap-around lanyards (3600 lbf - abraded)	
3.2.8	Static test for wrap-around lanyards (5000 lbf)	
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	Ltd
5.3 / 5.4	Instructions	Ltd

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

Product	Quantity	Dates received	INSPEC specimen no.
6 ft Free Fall Twin leg energy absorbing lanyard, model 1858020Y	21	16 October 2018	2F15001 to 2F15021
6 ft Free Fall Energy absorbing lanyard, model 1858020	01		2F14902
6 ft Free Fall Energy absorbing lanyard, model LIS61S P	02	20 January 2020	2H03801 to 2H03802

Procedures

The specimens detailed within the submissions 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.

The client made the following declaration:

Model 1858020 is a single leg variant of model 1858020Y

Models LIS61S P and 1858020 are identical except they are fitted with different connectors.

To avoid duplicate testing, performance testing results from model 1858020Y and 1858020 were shared across to model LIS61S P.

Result details

3.1.5 Deployment indicator

Subsequent to the testing of specimen 2F15013 against 3.2.10.1, it became obvious that the energy absorber had been activated. Pass

3.1.6 Activation force

Specimens 2F15001 to 2F15003 were assessed.

It showed no sign of activation when subjected to the 450 pounds static force.

The permanent elongation of the specimens, following the tests were:

2F15001 - 0.51 inches.	Pass
2F15002 - 0.47 inches	Pass
2F15003 - 0.39 inches	Pass

These are less than the maximum 2 inches permitted.

3.2 Personal Energy Absorbing Lanyard Component

Specimen 2F14902 was assessed.

The specimen had an energy absorbing ability that satisfied the design and testing requirements of this standard. Pass

3.2.1 Materials

Specimen 2F14902 was assessed.

Tubular 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 2F14902 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 2F14902 was assessed.

a) Lock stitches sewn on all stitched eye termination straps were not assessed. Manufacturer to certify. NAs

b) The material and characteristics of thread used was not assessed. Manufacturer to certify. NAs

Threads used for sewing the lanyard were red colour. This contrasted with the black colour of the webbing. Pass

c) Webbings were protected from concentrated wear at interfaces with load-bearing connector elements. The method used was looped webbing. Pass

d) The ends of the webbing were hot-cut so as to prevent unravelling. Pass

3.2.4 Dynamic performance test - Ambient dry condition

Specimens 2F15013 to 2F15015 were assessed.

During the dynamic performance tests, the average arrest force were:

2F15013 - 809 pounds. Pass
2F15014 - 802 pounds. Pass
2F15015 - 805 pounds. Pass

These values are less than the maximum 900 pounds permitted.
See Annex 1 for the plot of force versus time.

During the dynamic performance tests, the maximum arrest force were:

2F15013 - 898 pounds. Pass
2F15014 - 890 pounds. Pass
2F15015 - 887 pounds. Pass

These values are less than the maximum 1,800 pounds permitted.
See Annex 1 for the plot of force versus time.

During the dynamic performance tests, the deployment distance were:

2F15013 – 36.8 inches. Pass
2F15014 – 36.2 inches. Pass
2F15015 – 37.0 inches. Pass

These values are less than the maximum 48 inches permitted.

3.2.5 Dynamic performance test - Ambient wet condition

Specimens 2F15004 to 2F15006 were assessed.

During the dynamic performance tests, the average arrest force were:

2F15004 - 865 pounds. Pass
2F15005 - 848 pounds. Pass
2F15006 - 833 pounds. Pass

These values are less than the maximum 1,125 pounds permitted.
See Annex 1 for the plot of force versus time.

During the dynamic performance tests, the maximum arrest force were:

2F15004 - 1043 pounds. Pass
2F15005 - 1024 pounds. Pass
2F15006 - 982 pounds. Pass

These values are less than the maximum 1,800 pounds permitted.
See Annex 1 for the plot of force versus time.

During the dynamic performance tests, the deployment distance were:

2F15004 - 36.2 inches. Pass
2F15005 - 34.4 inches. Pass
2F15006 - 34.1 inches. Pass

These values are less than the maximum 48 inches permitted.

3.2.5 Dynamic performance test - Cold dry condition

Specimens 2F15007 to 2F15009 were assessed.

During the dynamic performance tests, the average arrest force were:

2F15007 - 895 pounds.	Pass
2F15008 - 919 pounds.	Pass
2F15009 - 915 pounds.	Pass

These values are less than the maximum 1,125 pounds permitted.
See Annex 1 for the plot of force versus time.

During the dynamic performance tests, the maximum arrest force were:

2F15007 - 1002 pounds.	Pass
2F15008 - 995 pounds.	Pass
2F15009 - 995 pounds.	Pass

These values are less than the maximum 1,800 pounds permitted.
See Annex 1 for the plot of force versus time.

During the dynamic performance tests, the deployment distance were:

2F15007 – 29.3 inches.	Pass
2F15008 – 29.9 inches.	Pass
2F15009 – 30.7 inches.	Pass

These values are less than the maximum 48 inches permitted.

3.2.5 Dynamic performance test - Hot dry condition

Specimens 2F15010 to 2F15012 were assessed.

During the dynamic performance tests, the average arrest force were:

2F15010 - 780 pounds.	Pass
2F15011 - 773 pounds.	Pass
2F15012 - 775 pounds.	Pass

These values are less than the maximum 1,125 pounds permitted.
See Annex 1 for the plot of force versus time.

During the dynamic performance tests, the maximum arrest force were:

2F15010 - 883 pounds.	Pass
2F15011 - 846 pounds.	Pass
2F15012 - 879 pounds.	Pass

These values are less than the maximum 1,800 pounds permitted.
See Annex 1 for the plot of force versus time.

During the dynamic performance tests, the deployment distance were:

2F15010 – 40.2 inches.	Pass
2F15011 – 40.2 inches.	Pass
2F15012 – 38.2 inches.	Pass

These values are less than the maximum 48 inches permitted.

3.2.6 Static strength

Specimens 2F15013 to 2F15015 were assessed.

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

5.1 / 5.2 Marking

Markings were provided electronically and used for assessment. The detailed results of the assessment are given below.

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
	The legibility and attachment of required markings endured the duration of the testing performed.	
	Markings were printed on labels that were stitched on to the lanyard.	
	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; [LIS61S P]	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]	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;	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; *[Only contents were assessed]*	Ltd
	· 12 ft FF personal energy absorbers shall be in white print on a contrasting black background;;	NAp
5.2.2	· In addition to 5.2.1, Y-lanyards that fail the Dynamic Hip Test detailed in 3.2.10, must include a warning label on both connecting ends of the lanyard specifically directing users how to safely store the unused leg of the lanyard.	NAp

5.3 / 5.4 Instructions

Instructions were provided electronically and used for assessment. The detailed results of the assessment are given below.

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.	NAs
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 falls 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
3.1.1	Classifications		-
3.1.2	Material		-
3.1.3	Terminations		-
3.1.4	Connectors		-
3.1.5	Deployment indicator		See Note 1
3.1.6	Activation force		See Note 1
	Permanent elongation		0.40%
3.1.7	Static strength		See Note 1
3.1.8	Dynamic performance – ambient dry	Force	1.7%
		Deployment distance	1mm
3.1.9	Dynamic performance – various conditions	Force	1.7%
		Deployment distance	1mm
3.2	Personal Energy Absorber Component, if fitted		See report
3.2.1	Materials		-
3.2.2	Terminations		-
3.2.3	Connectors		See report
3.2.4	Dynamic performance – ambient dry	Force	± 3.0%
		Deployment distance	± 1mm
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	± 1mm
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		-
5.3 / 5.4	Information		-

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.

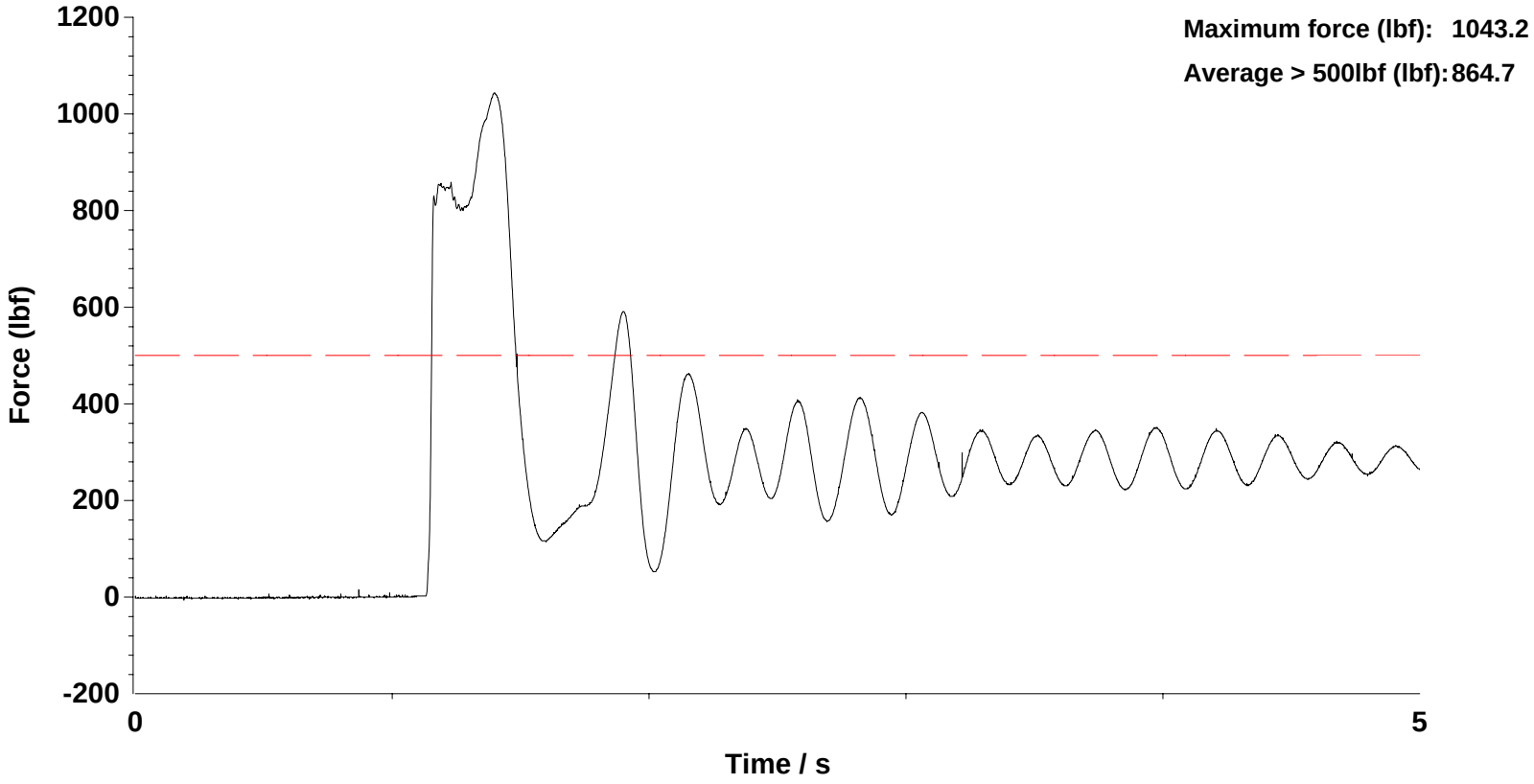
1. Plots of arrest force versus time. (12 pages)

2. Photograph of the product tested. (1 page)

END OF REPORT

INSPEC Technical Services

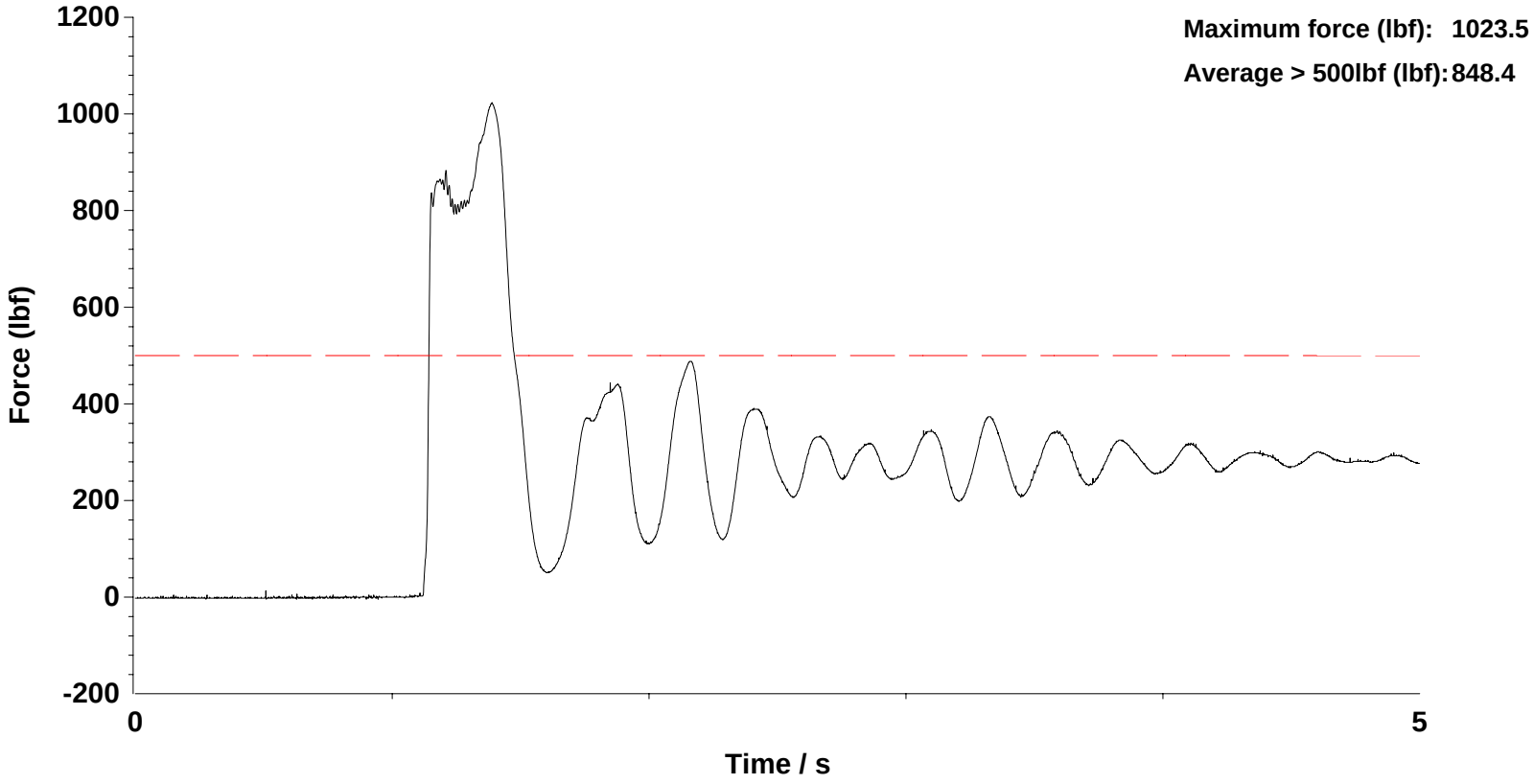
Technician:	SS
Standard	ANSI Z359.13:2013 EA Lanyard
Sample / File name:	2F15004
Drop item	Drop weight, US-128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	19:01 06/11/18



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

INSPEC Technical Services

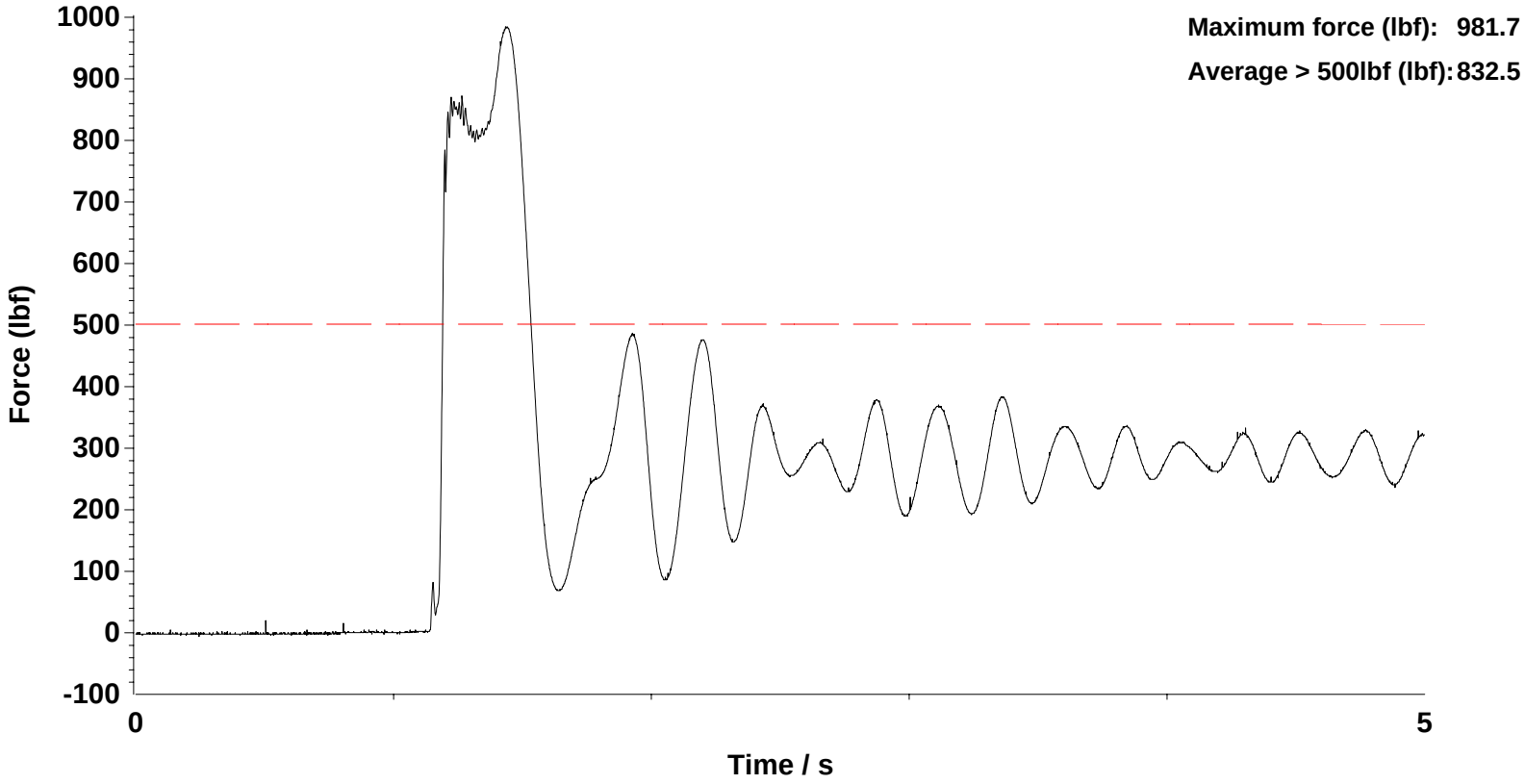
Technician:	SS
Standard	ANSI Z359.13:2013 EA Lanyard
Sample / File name:	2F15005
Drop item	Drop weight, US-128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	19:08 06/11/18



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

INSPEC Technical Services

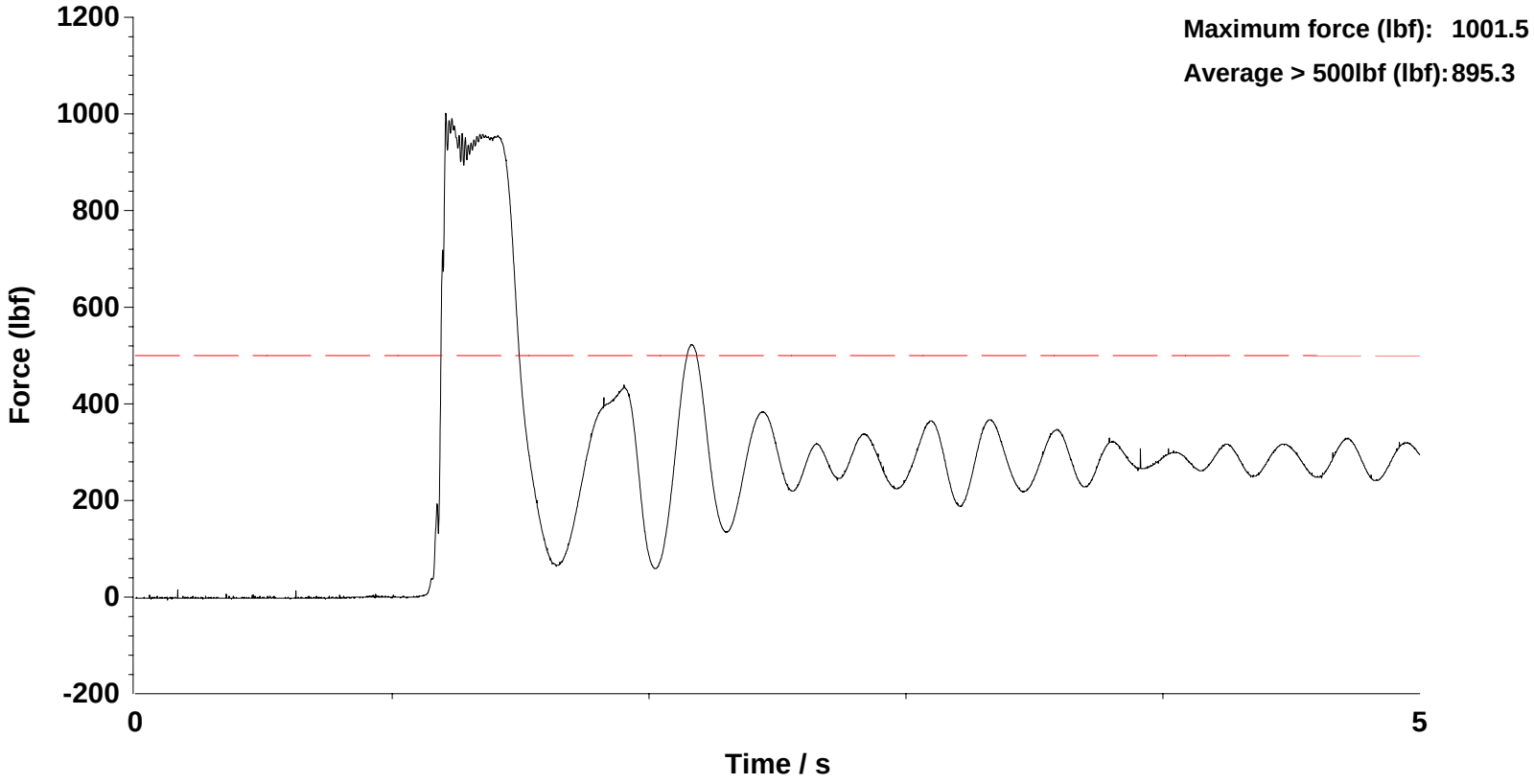
Technician:	SS
Standard	ANSI Z359.13:2013 EA Lanyard
Sample / File name:	2F15006
Drop item	Drop weight, US-128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	19:14 06/11/18



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

INSPEC Technical Services

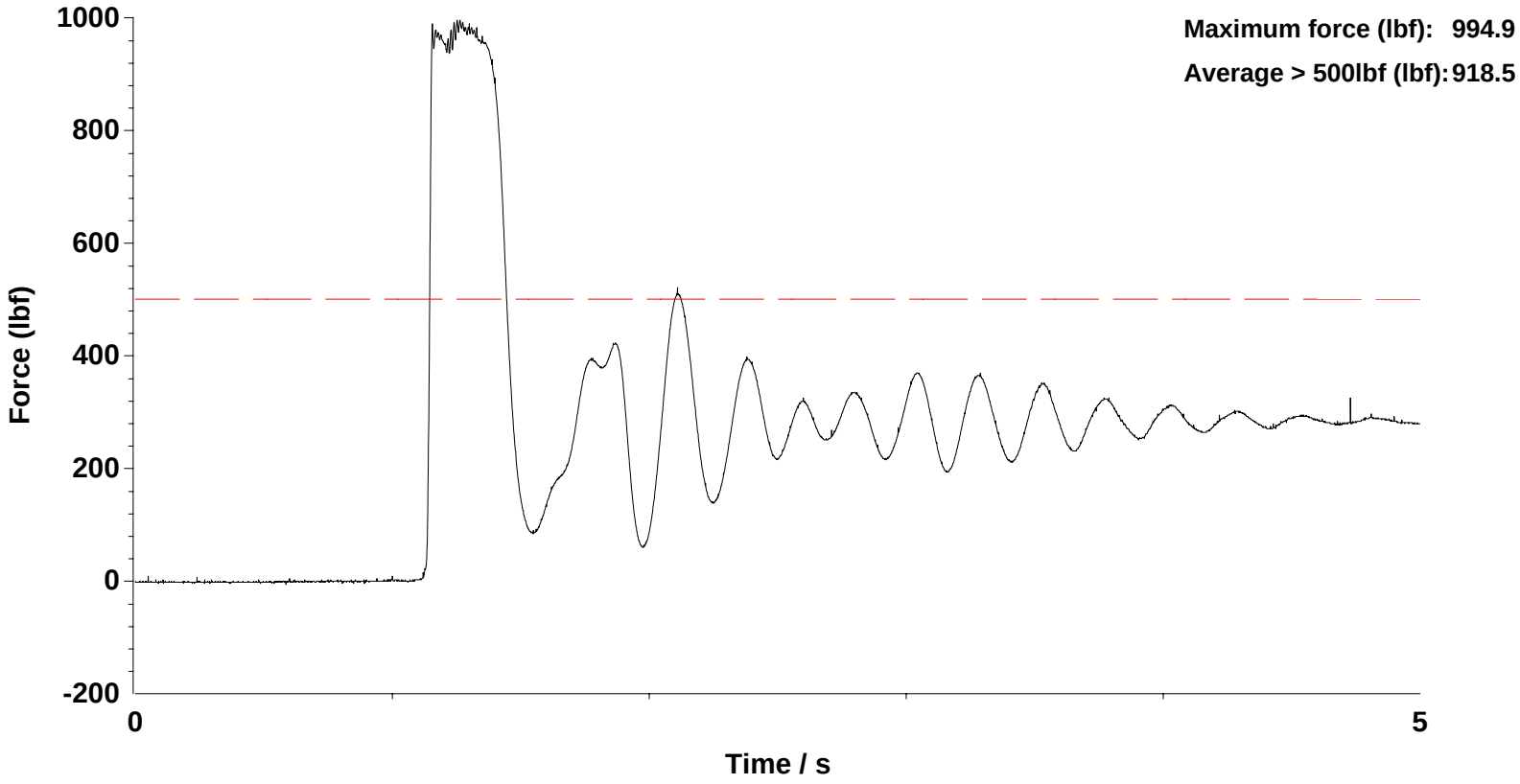
Technician:	SS
Standard	ANSI Z359.13:2013 EA Lanyard
Sample / File name:	2F15007
Drop item	Drop weight, US-128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	18:21 06/11/18



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

INSPEC Technical Services

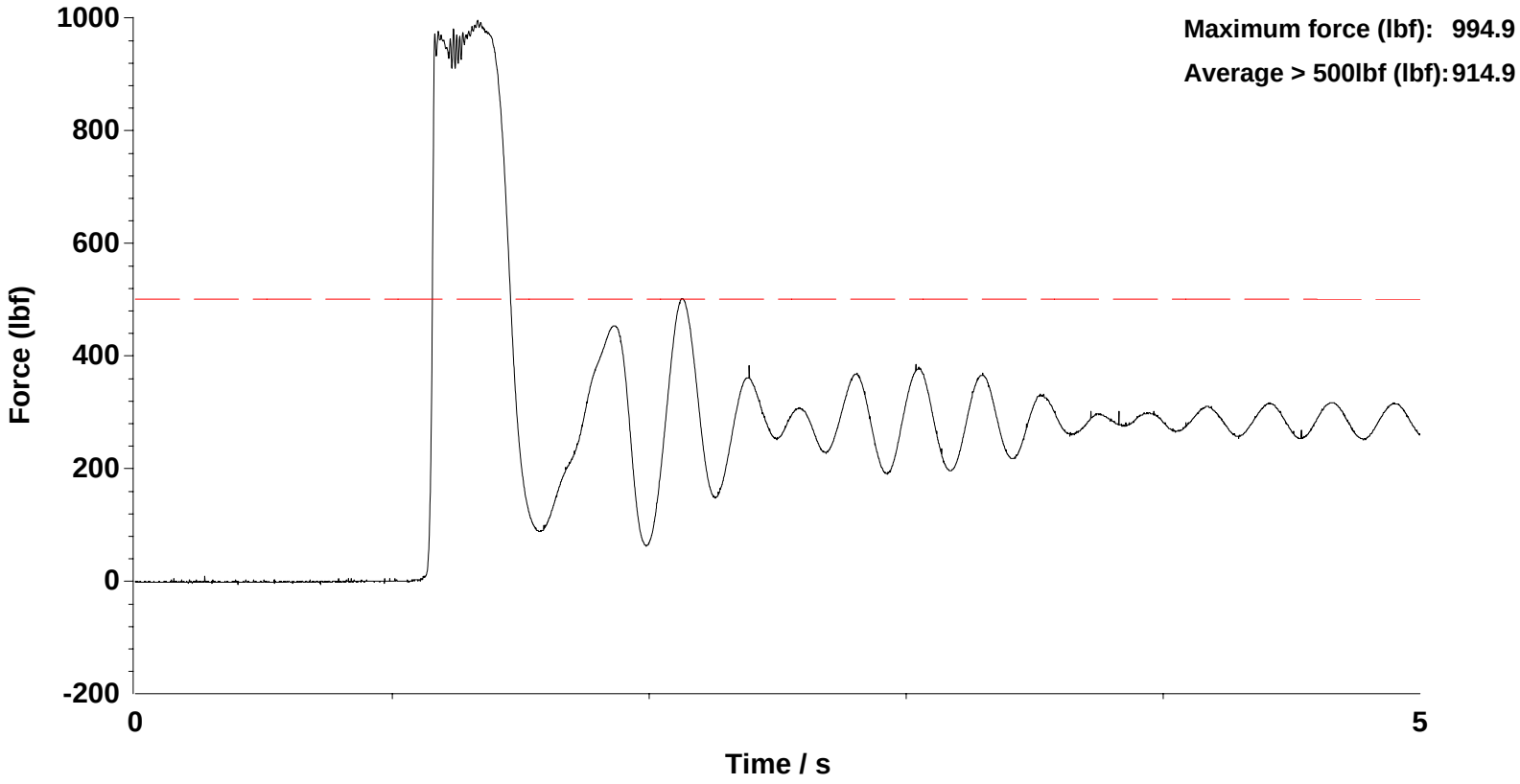
Technician:	SS
Standard	ANSI Z359.13:2013 EA Lanyard
Sample / File name:	2F15008
Drop item	Drop weight, US-128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	18:27 06/11/18



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

INSPEC Technical Services

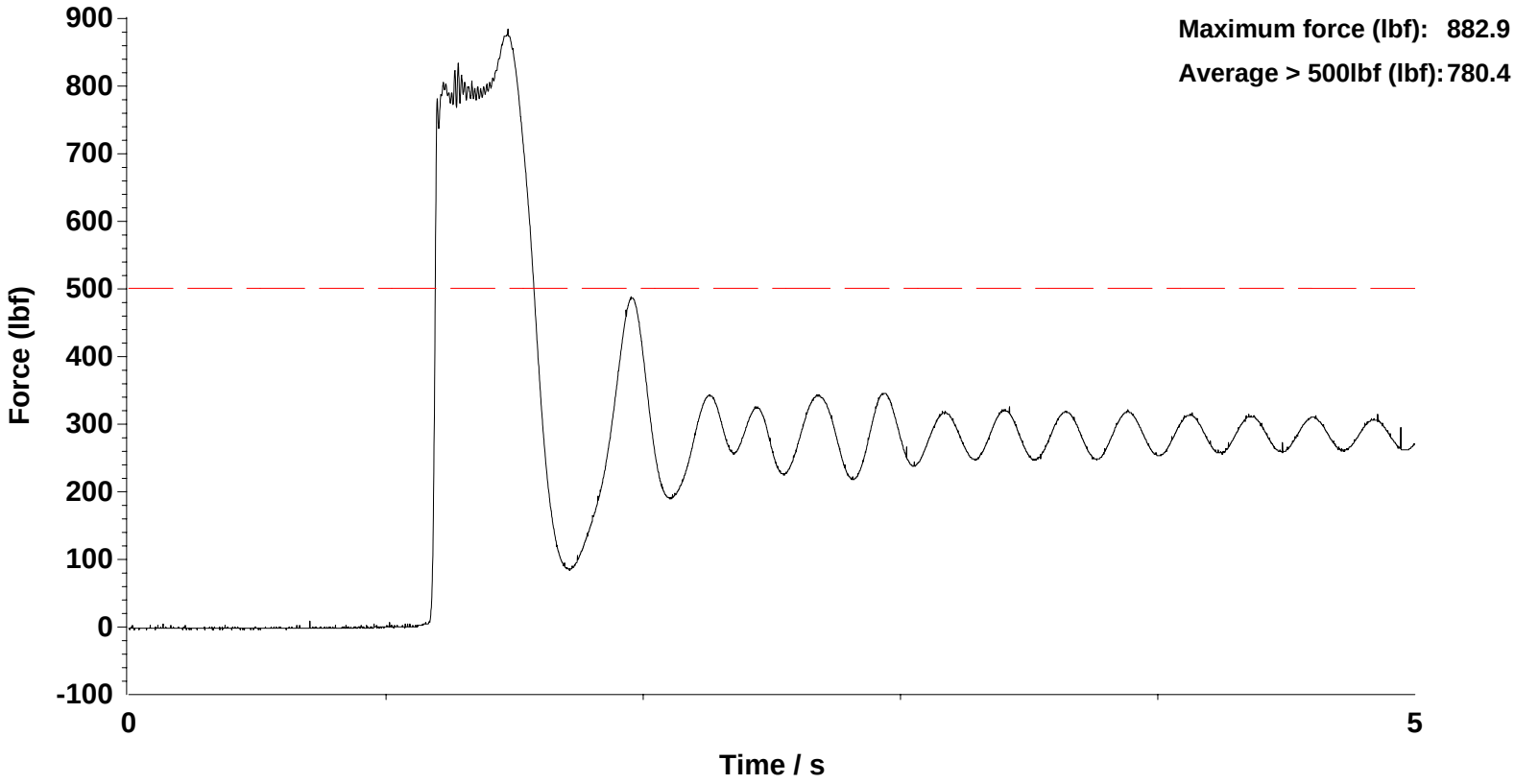
Technician:	SS
Standard	ANSI Z359.13:2013 EA Lanyard
Sample / File name:	2F15009
Drop item	Drop weight, US-128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	18:34 06/11/18



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

INSPEC Technical Services

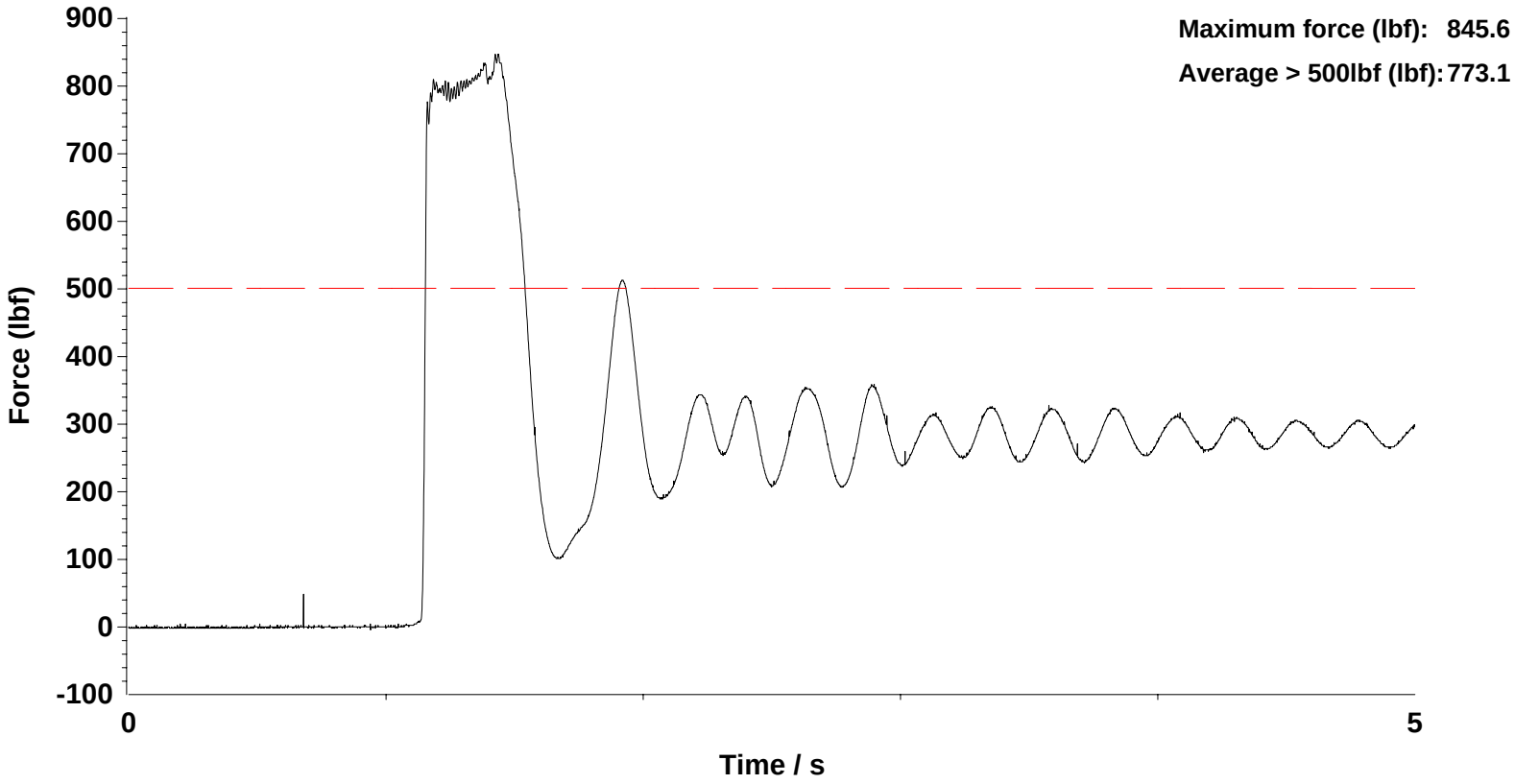
Technician:	SS
Standard	ANSI Z359.13:2013 EA Lanyard
Sample / File name:	2F15010
Drop item	Drop weight, US-128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	18:40 06/11/18



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

INSPEC Technical Services

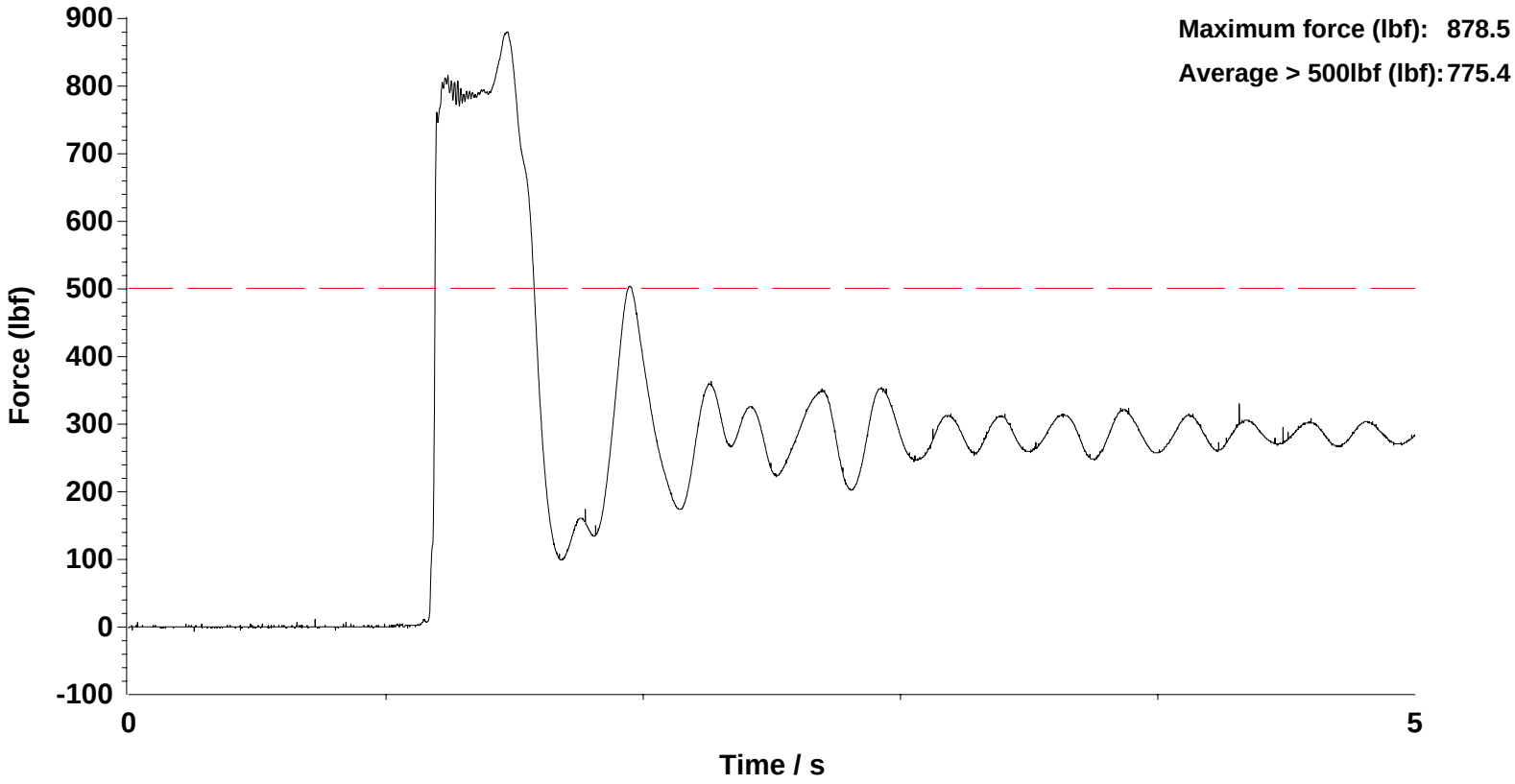
Technician:	SS
Standard	ANSI Z359.13:2013 EA Lanyard
Sample / File name:	2F15011
Drop item	Drop weight, US-128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	18:48 06/11/18



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

INSPEC Technical Services

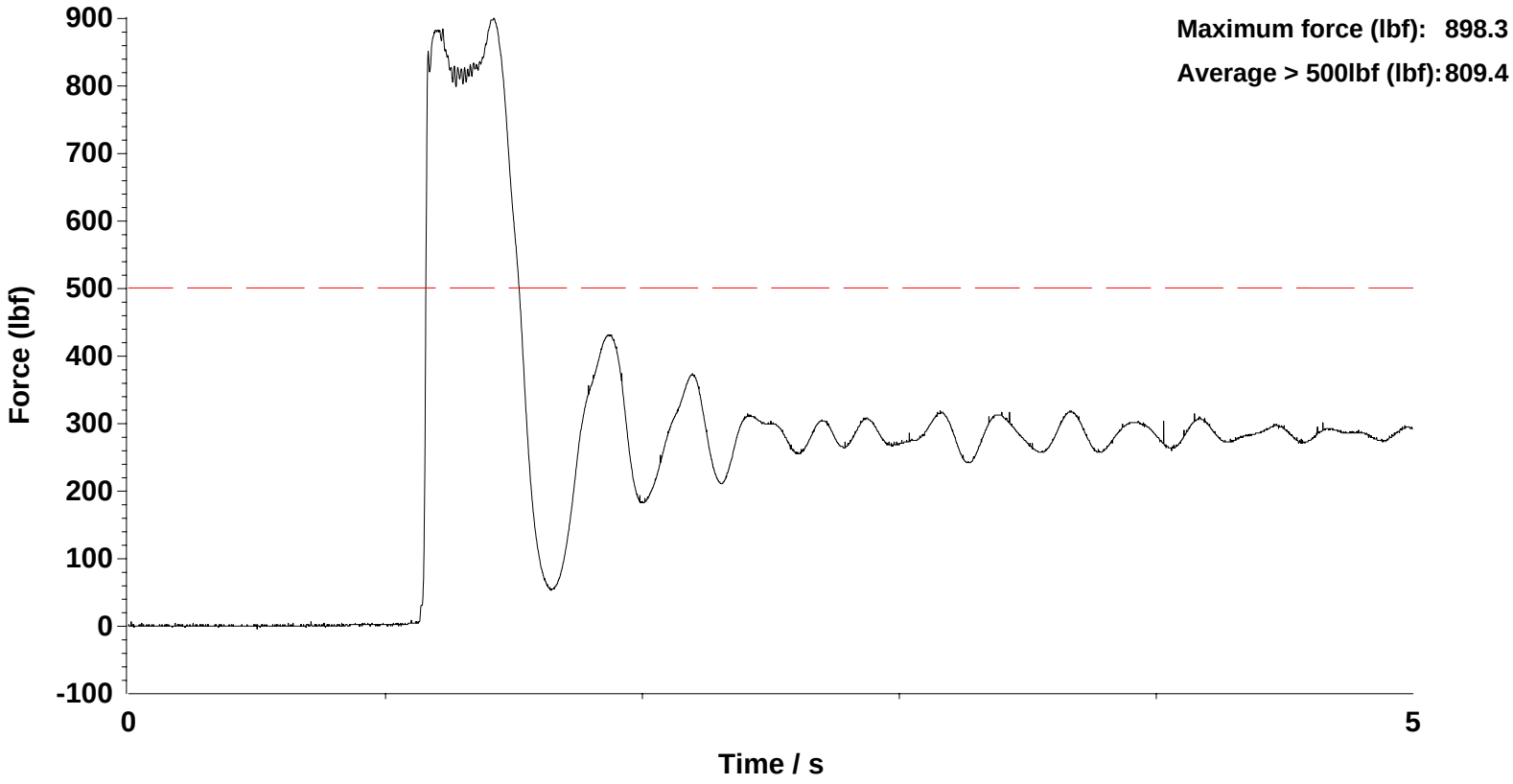
Technician:	SS
Standard	ANSI Z359.13:2013 EA Lanyard
Sample / File name:	2F15012
Drop item	Drop weight, US-128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	18:54 06/11/18



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

INSPEC Technical Services

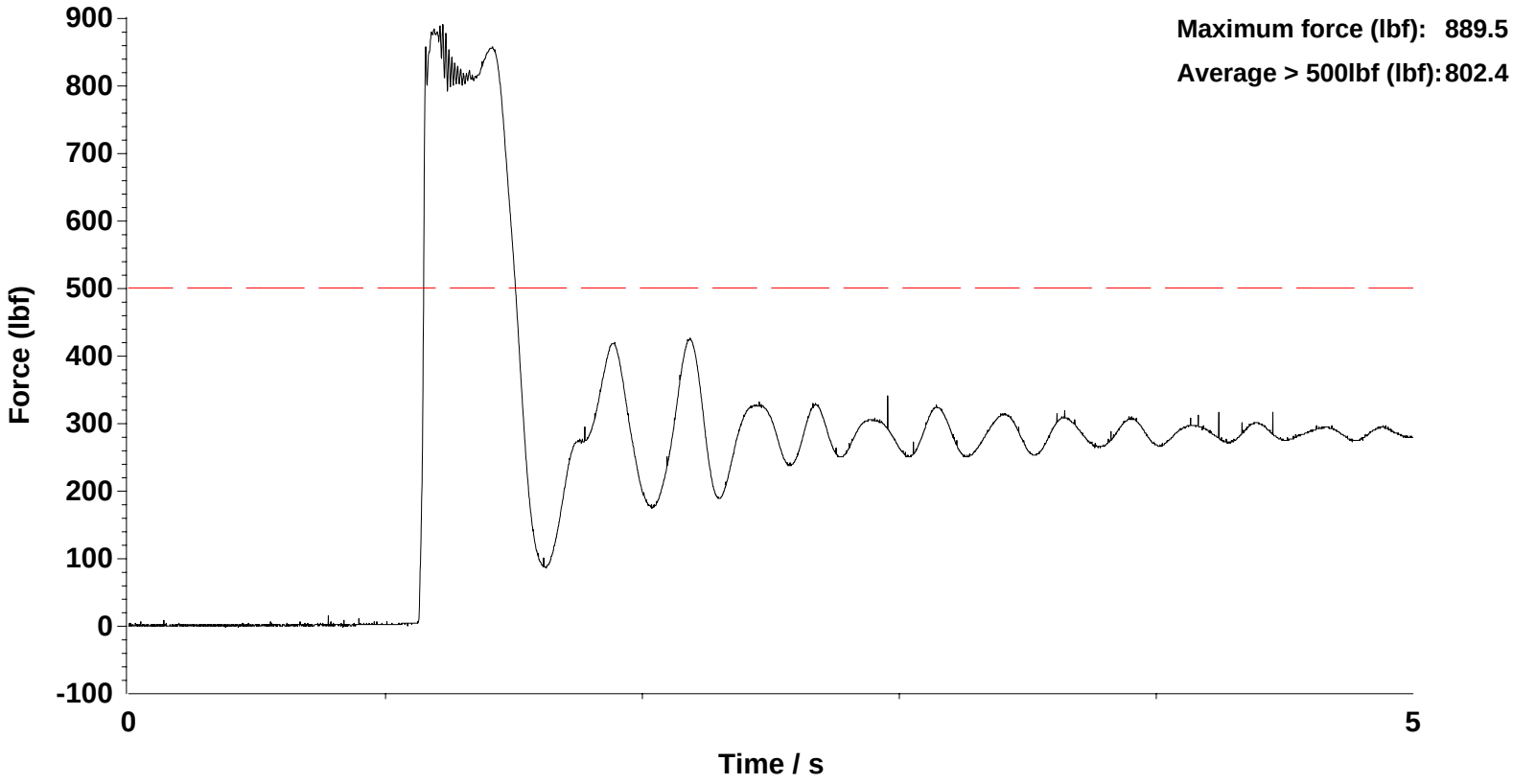
Technician:	SS
Standard	ANSI Z359.13:2013 EA Lanyard
Sample / File name:	2F15013
Drop item	Drop weight, US-128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	17:31 06/11/18



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

INSPEC Technical Services

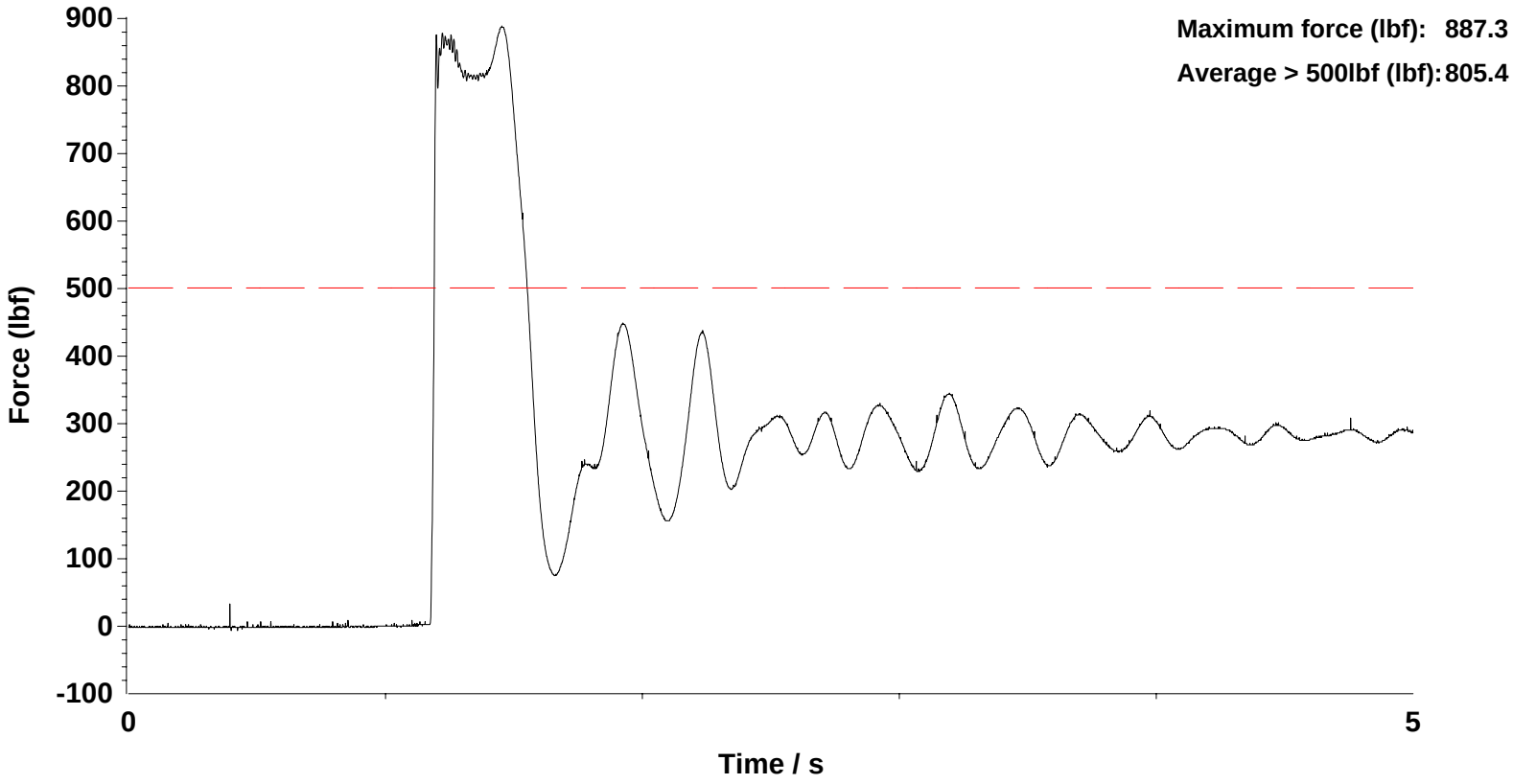
Technician:	SS
Standard	ANSI Z359.13:2013 EA Lanyard
Sample / File name:	2F15014
Drop item	Drop weight, US-128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	17:39 06/11/18



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

INSPEC Technical Services

Technician:	SS
Standard	ANSI Z359.13:2013 EA Lanyard
Sample / File name:	2F15015
Drop item	Drop weight, US-128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	17:46 06/11/18



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

Frontline Fall Protection Inc. –
6 ft Free Fall Energy absorbing lanyard, model LIS61S P

Photograph provided by manufacturer 8 December 2020