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Test Report

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

Report no:	2.21.05.14
Client:	Frontline Fall Protection Inc. 2023 NW 84th Ave Miami Florida 33122 U.S.A.
Manufacturer:	Frontline Fall Protection Inc.
Client orders and dates received:	T/0541A (10 January 2019) T/0585 (28 March 2019) T/0849 (18 January 2021)
Model:	LPO62SADJ
Dates of tests:	29 January 2019 to 29 July 2019, and 19 May 2021

Signed: 

Issued: 19 May 2021

Steven Sum, Laboratory Manager

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*

Clause	Requirement	Assessment (See Key)	
	Submissions	**01**	**02**
3.1.6	Activation force	Pass	
3.2	Energy absorber	Pass	
3.2.1	Material	NAs	
3.2.2	Terminations	Ltd	
3.2.3	Connectors	NAs	
3.2.4	Dynamic performance – ambient dry		
3.2.5	Dynamic performance – ambient wet	Pass	
	Dynamic performance – cold dry	Pass	
	Dynamic performance – hot dry	Pass	
3.2.6	Static strength		
3.2.7	Static test for wrap-around lanyards (3600 lbf – abraded)		Pass
3.2.8	Static test for wrap-around lanyards (5000 lbf – unabraded)		Pass
3.2.9	Static test for Y-lanyards		Pass
3.2.10.1	Dynamic test for Y-lanyards (Single connection)	Pass	
3.2.10.2	Dynamic test for Y-lanyards (Dual connection)	Pass	
3.2.10.3	Dynamic test for Y-lanyards (Hip connection)	Pass	
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 01

Product	**Quantity**	**Date received**	**INSPEC specimen no.** (2G003+)
Energy absorber, model RGSU58	03	2 December 2018	01 to 03
Energy absorbing lanyard, model LPO62SADJ	22		04 to 25

Submission details 02

Product	**Quantity**	**Date received**	**INSPEC specimen no.** (2G003+)
Energy absorbing lanyard, model LPO62SADJ	12	5 June 2019	26 to 37

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.

Result details

3.1.6 Activation force

Specimens 2G00301, 2G00302 and 2G00303 were assessed.

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

The permanent elongation of the specimen 2G00301, following the test, was 0.39 inches. This is less than the maximum 2 inches permitted. Pass

The permanent elongation of the specimen 2G00302, following the test, was 0.39 inches. This is less than the maximum 2 inches permitted. Pass

The permanent elongation of the specimen 2G00303, following the test, was 0.59 inches. This is less than the maximum 2 inches permitted. Pass

3.2 Personal Energy Absorbing Lanyard Component

Specimen 2G00304 was assessed.

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

3.2.1 Materials

Specimen 2G00322 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 2G00322 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 2G00322 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

c) Webbings were protected from concentrated wear at all interfaces with load-bearing connector elements. Pass

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

3.2.3 Connectors

Specimen 2G00322 was assessed.

It incorporated three integrally attached connectors.

Testing of the connectors was not requested. NAs

3.2.5 Dynamic performance test - Ambient wet condition (average arrest force)

Specimens 2G00304, 2G00305 and 2G00306 were assessed.

During the dynamic performance tests, the average arrest force of the specimens were recorded as follows:

Specimen 2G00304 was 868 pounds. Pass
Specimen 2G00305 was 798 pounds. Pass
Specimen 2G00306 was 861 pounds. Pass

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

3.2.5 Dynamic performance test - Ambient wet condition (maximum arrest force)

Specimens 2G00304, 2G00305 and 2G00306 were assessed.

During the dynamic performance tests, the maximum arrest force of the specimens were recorded as follows:

Specimen 2G00304 was 1280 pounds. Pass
Specimen 2G00305 was 1118 pounds. Pass
Specimen 2G00306 was 1204 pounds. Pass

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

3.2.5 Dynamic performance test - Ambient wet condition (deployment distance)

Specimens 2G00304, 2G00305 and 2G00306 were assessed.

During the dynamic performance tests, the deployment distance of the specimens were recorded as follows:

Specimen 2G00304 was 37.8 inches. Pass
Specimen 2G00305 was 35.6 inches. Pass
Specimen 2G00306 was 36.4 inches. Pass

These values are less than the maximum 48 inches permitted.

3.2.5 Dynamic performance test – Cold dry condition (average arrest force)

Specimens 2G00310, 2G00311 and 2G00312 were assessed.

During the dynamic performance tests, the average arrest force of the specimens were recorded as follows:

Specimen 2G00310 was 855 pounds.	Pass
Specimen 2G00311 was 872 pounds.	Pass
Specimen 2G00312 was 873 pounds.	Pass

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

3.2.5 Dynamic performance test - Cold dry condition (maximum arrest force)

Specimens 2G00310, 2G00311 and 2G00312 were assessed.

During the dynamic performance tests, the maximum arrest force of the specimens were recorded as follows:

Specimen 2G00310 was 1043 pounds.	Pass
Specimen 2G00311 was 1076 pounds.	Pass
Specimen 2G00312 was 1010 pounds.	Pass

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

3.2.5 Dynamic performance test - Cold dry condition (deployment distance)

Specimens 2G00310, 2G00311 and 2G00312 were assessed.

During the dynamic performance tests, the deployment distance of the specimens were recorded as follows:

Specimen 2G00310 was 37.0 inches.	Pass
Specimen 2G00311 was 34.1 inches.	Pass
Specimen 2G00312 was 34.6 inches.	Pass

These values are less than the maximum 48 inches permitted.

3.2.5 Dynamic performance test - Hot dry condition (average arrest force)

Specimens 2G00307, 2G00308 and 2G00309 were assessed.

During the dynamic performance tests, the average arrest force of the specimens were recorded as follows:

Specimen 2G00307 was 803 pounds.	Pass
Specimen 2G00308 was 835 pounds.	Pass
Specimen 2G00309 was 807 pounds.	Pass

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

3.2.5 Dynamic performance test - Hot dry condition (maximum arrest force)

Specimens 2G00307, 2G00308 and 2G00309 were assessed.

During the dynamic performance tests, the maximum arrest force of the specimens were recorded as follows:

Specimen 2G00307 was 1019 pounds.	Pass
Specimen 2G00308 was 1217 pounds.	Pass
Specimen 2G00309 was 1138 pounds.	Pass

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

3.2.5 Dynamic performance test - Hot dry condition (deployment distance)

Specimens 2G00307, 2G00308 and 2G00309 were assessed.

During the dynamic performance tests, the deployment distance of the specimens were recorded as follows:

Specimen 2G00307 was 41.1 inches.	Pass
Specimen 2G00308 was 40.7 inches.	Pass
Specimen 2G00309 was 41.1 inches.	Pass

These values are less than the maximum 48 inches permitted.

3.2.7 Abrasion and Static strength - Wrap-around energy absorbing lanyards only

Specimens 2G00332, 2G00333 and 2G00334 were assessed.

The specimens withstood the tensile test of 3,600 pounds applied for 1 minute without breaking respectively, after the abrasion conditioning. Pass

3.2.8 Static strength - Wrap-around energy absorbing lanyards only

Specimens 2G00335, 2G00336 and 2G00337 were assessed.

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

3.2.9 Static strength – Y-lanyards only

Specimens 2G00326 to 2G00328 were assessed.

Leg A withstood the tensile test of 5,000 pounds applied for 1 minute without breaking respectively. Pass

Specimens 2G00329 to 2G00331 were assessed.

Legs A and B withstood the tensile test of 5,000 pounds applied for 1 minute without breaking respectively. Pass

3.2.10.1 Dynamic test, Y-lanyards only – Single connection (average arrest force)

Specimens 2G00313 to 2G00315 were assessed.

During the dynamic performance tests, the average arrest force of the specimens were recorded as follows:

Specimen 2G00313 was 820 pounds. Pass
Specimen 2G00314 was 833 pounds. Pass
Specimen 2G00315 was 822 pounds. Pass

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

3.2.10.1 Dynamic test, Y-lanyards only – Single connection (maximum arrest force)

Specimens 2G00313 to 2G00315 were assessed.

During the dynamic performance tests, the maximum arrest force of the specimens were recorded as follows:

Specimen 2G00313 was 999 pounds. Pass
Specimen 2G00314 was 1074 pounds. Pass
Specimen 2G00315 was 1092 pounds. Pass

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

3.2.10.1 Dynamic test, Y-lanyards only – Single connection (deployment distance)

Specimens 2G00313 to 2G00315 were assessed.

During the dynamic performance tests, the deployment distance of the specimens were recorded as follows:

Specimen 2G00313 was 39.8 inches. Pass
Specimen 2G00314 was 39.8 inches. Pass
Specimen 2G00315 was 39.6 inches. Pass

These values are less than the maximum 48 inches permitted.

3.2.10.2 Dynamic test, Y-lanyards only - Dual connection

Specimens 2G00316 to 2G00318 were assessed.

During the dynamic performance tests, the maximum arrest force of the specimens were recorded as follows:

Specimen 2G00316 was 1063 pounds.	Pass
Specimen 2G00317 was 1052 pounds.	Pass
Specimen 2G00318 was 1008 pounds.	Pass

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

3.2.10.3 Dynamic test, Y-lanyards only - Hip connection

Specimens 2G00319 to 2G00321 were assessed.

During the dynamic tests, all nylon keepers attached to the specimens were broken.

The energy absorbing lanyards did include a warning label on each leg according to clause 5.2.2. 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 assessments.	
	When pressure sensitive labels are used, they shall comply with the applicable provision of reference 8.5.1.	NAs
5.1.3	Equipment shall be marked with the following:	
	· part number and model designation; “LPO62SADJ”	Pass
	· year of manufacture;	Pass
	· manufacturer’s name or logo; “FRONTLINE”	Pass
	· capacity rating; “130-310 lbs”	Pass
	· serial number;	Pass
	· standard number; “ANSI/ASSE Z359.13”	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”	Pass
	· restriction, if any, on the types of components, subsystems, or systems with which the energy absorber is designed to be used;	Pass
	· 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;	Ltd
	· 6 ft FF personal energy absorbers shall be in black print on a contrasting white background;	NAs
	· 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.	Pass

5.3 General Instruction Requirements

The instructions to users have been assessed as detail below, with reference only to the relevant requirements of the Standard.

INSPEC Technical Services has not assessed these instructions with respect to claims made by the manufacturer outside of these requirements, and therefore accepts no responsibility for the legitimacy of any such claims.

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 supplied electronically in English were 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 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		See Note 1
3.1.2	Material		See Note 1
3.1.3	Terminations		See Note 1
3.1.4	Connectors		See report
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		See Note 1
3.2.2	Terminations		See Note 1
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		See Note 1
5.3 / 5.4	Information		See Note 1

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.

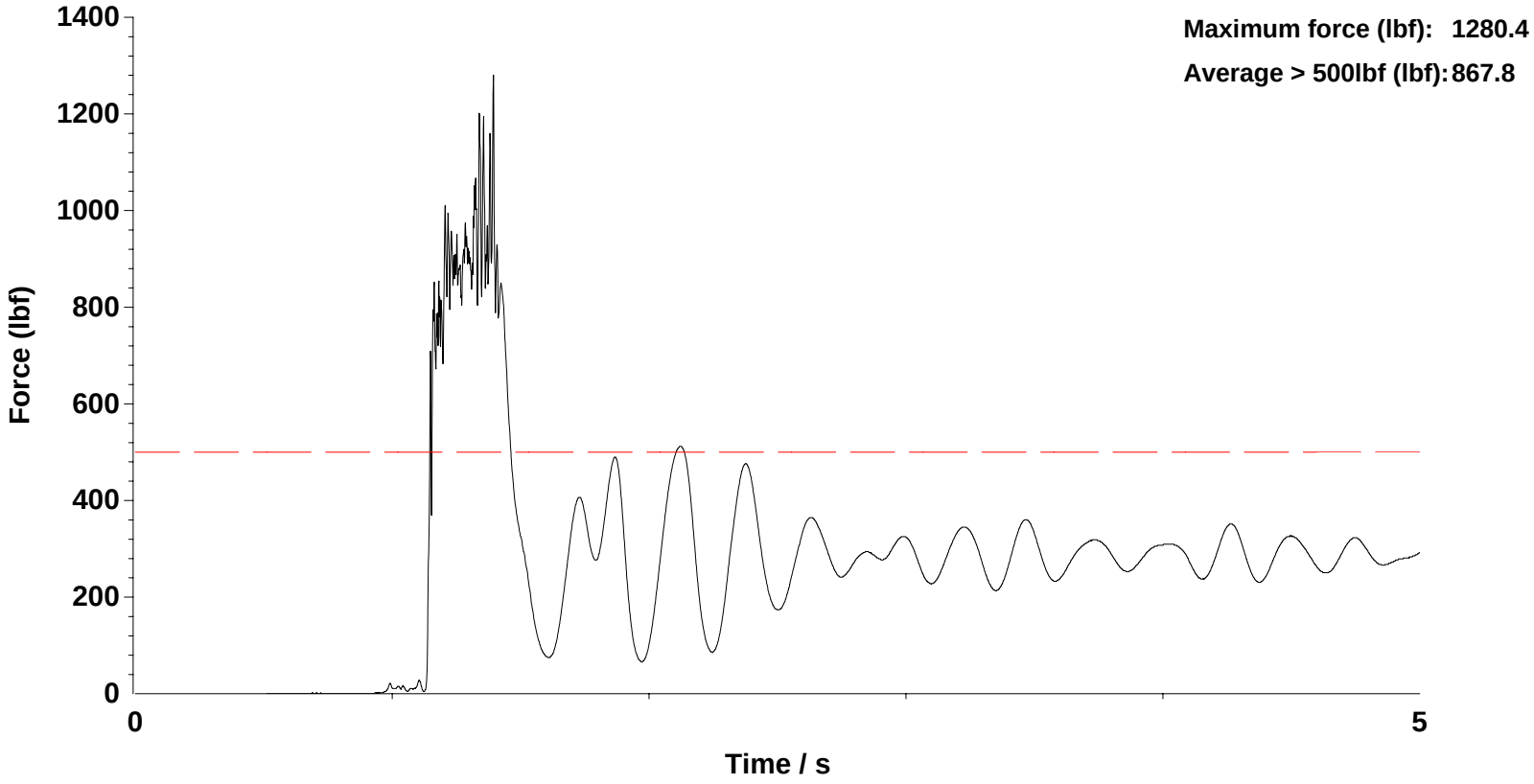
1. Plots of arrest force versus time. (15 pages)

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

END OF REPORT

INSPEC Technical Services

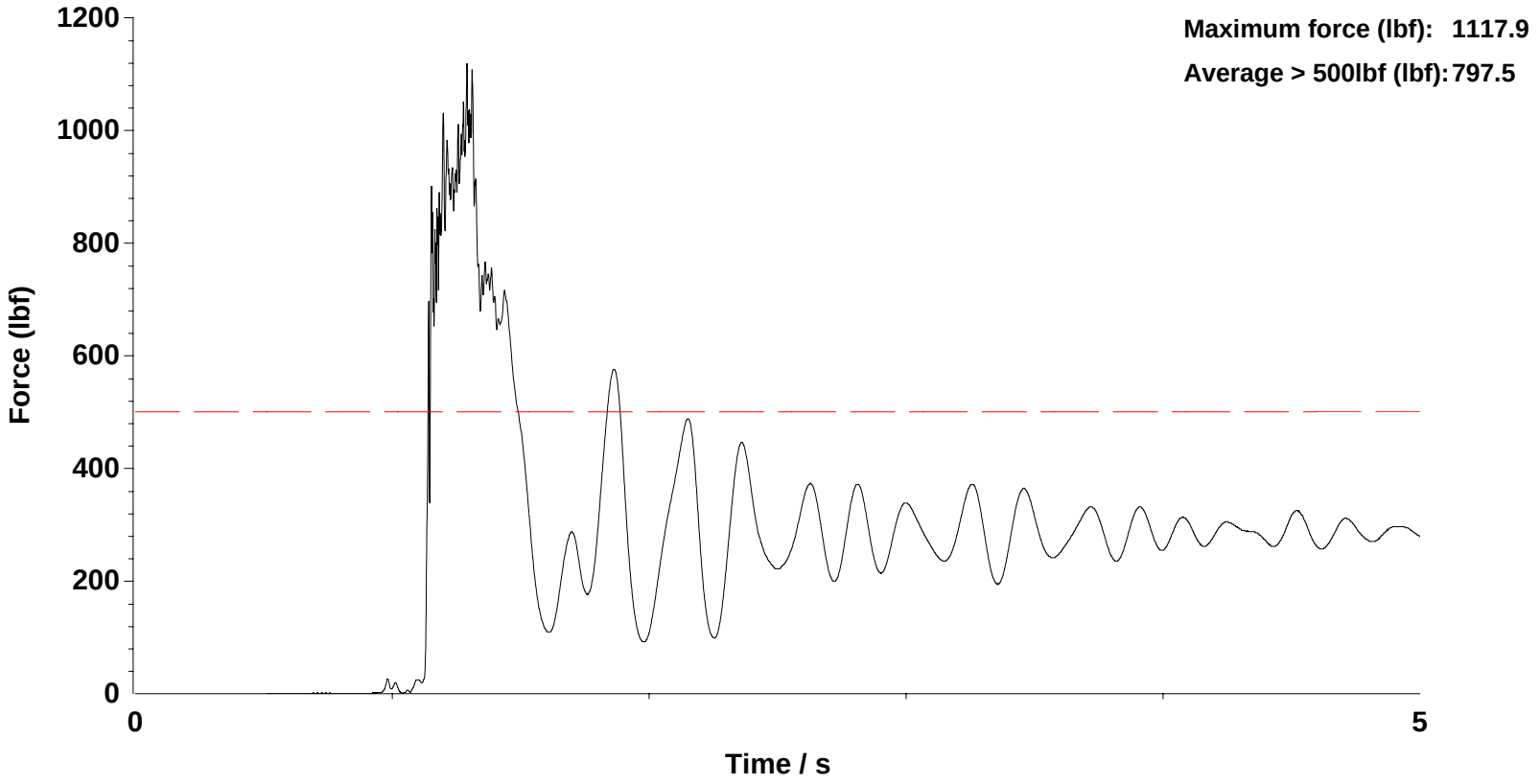
Technician:	SS
Standard	ANSI Z359.13:2013 EAL
Sample / File name:	2G00304
Drop item	Drop weight, US - 128 KG
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	18:20 29/01/19



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

INSPEC Technical Services

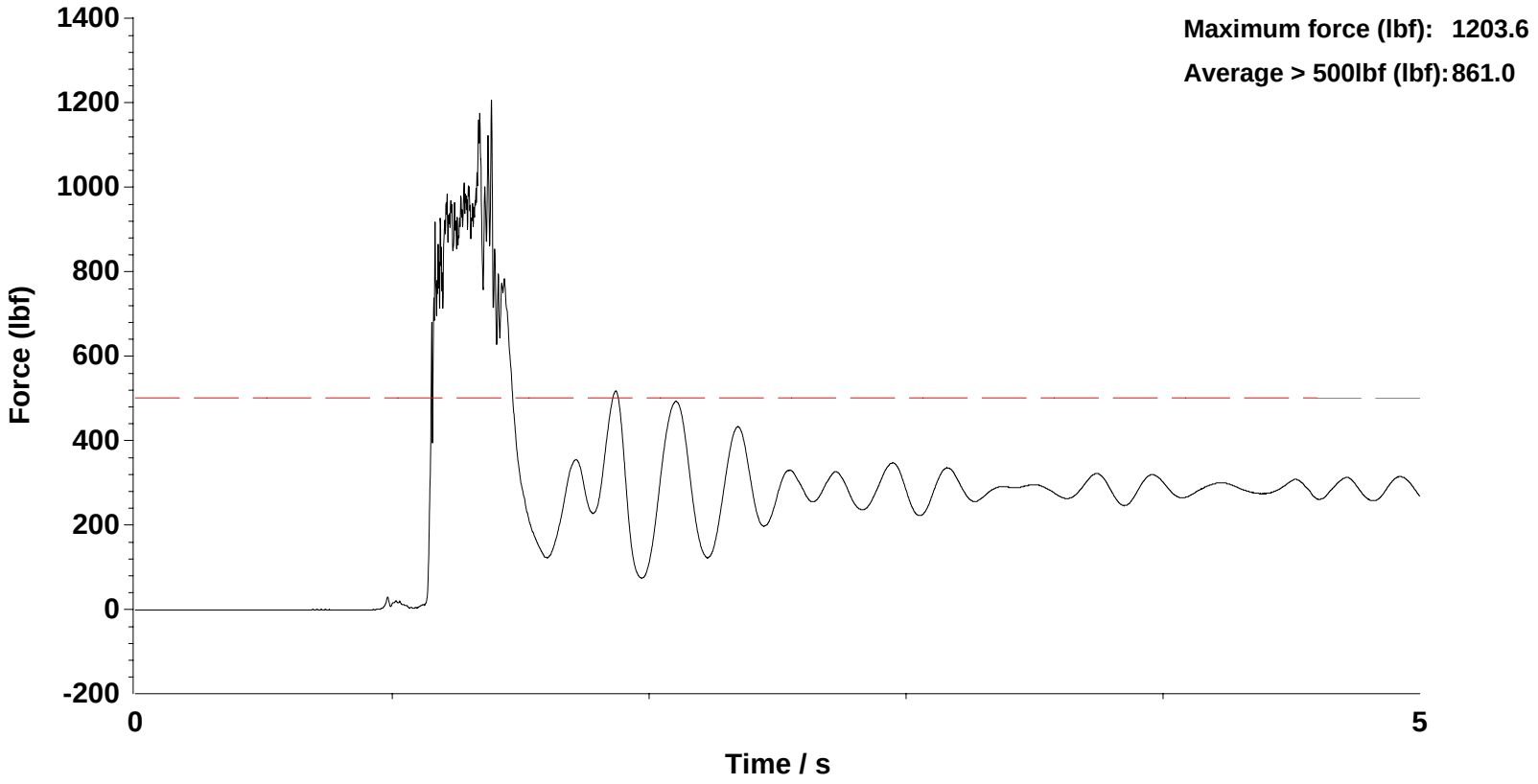
Technician:	SS
Standard	ANSI Z359.13:2013 EAL
Sample / File name:	2G00305
Drop item	Drop weight, US - 128 KG
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	18:26 29/01/19



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 EAL
Sample / File name:	2G00306
Drop item	Drop weight, US - 128 KG
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	18:33 29/01/19



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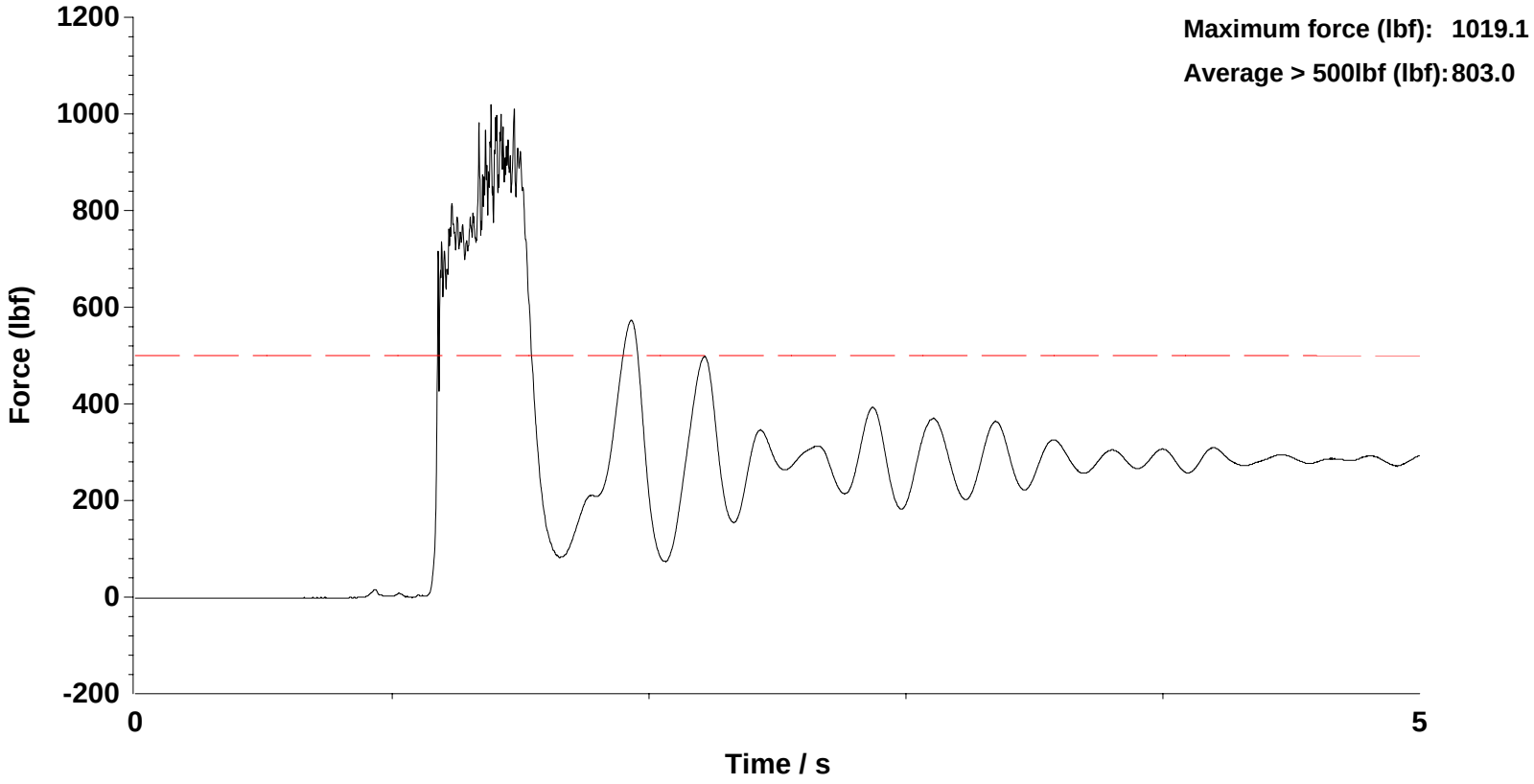
Technician:	SS
Standard	ANSI Z359.13:2013 EAL
Sample / File name:	2G00307
Drop item	Drop weight, US - 128 KG
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	17:37 29/01/19



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

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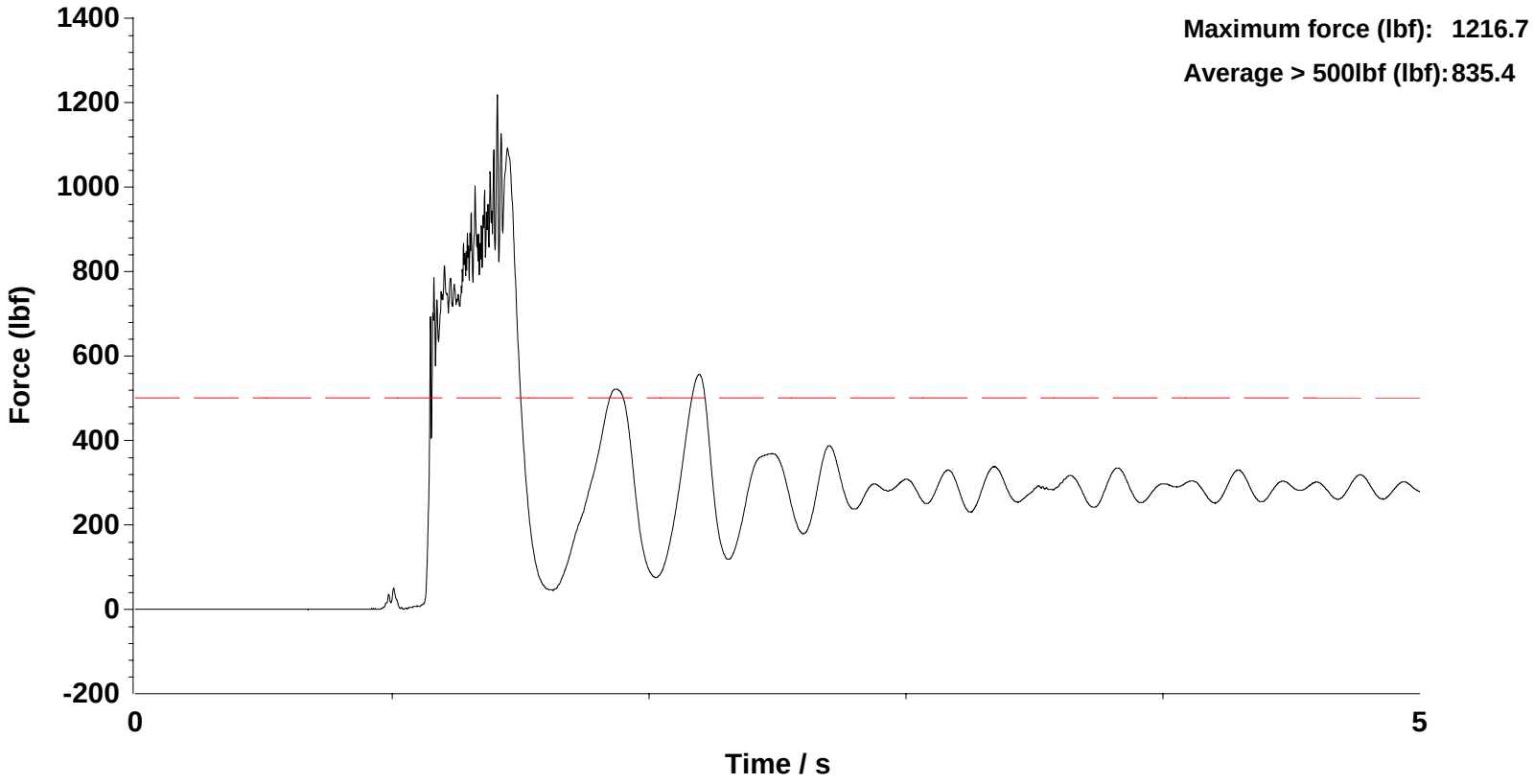
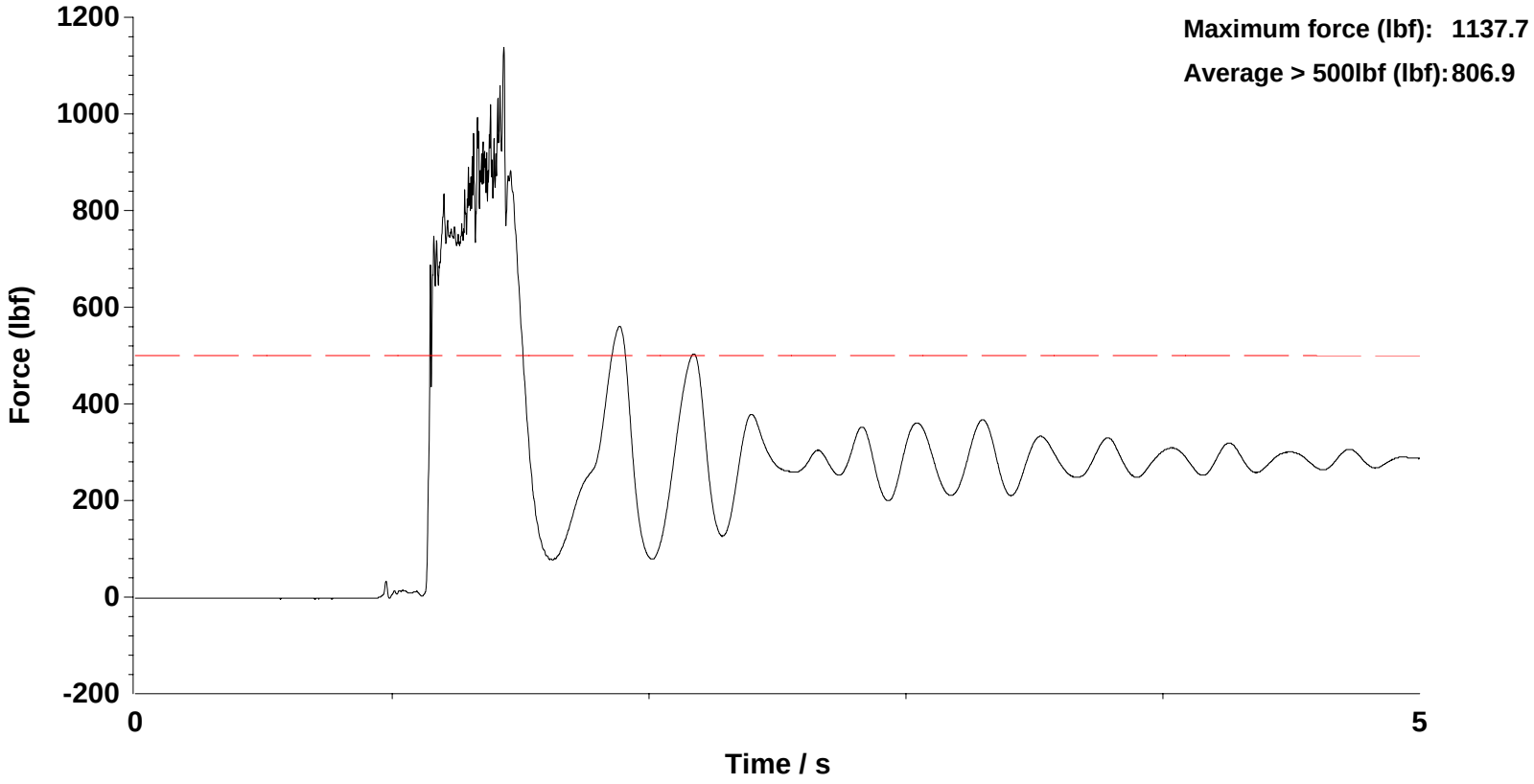
Technician:	SS
Standard	ANSI Z359.13:2013 EAL
Sample / File name:	2G00308
Drop item	Drop weight, US - 128 KG
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	17:42 29/01/19



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 EAL
Sample / File name:	2G00309
Drop item	Drop weight, US - 128 KG
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	17:47 29/01/19



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

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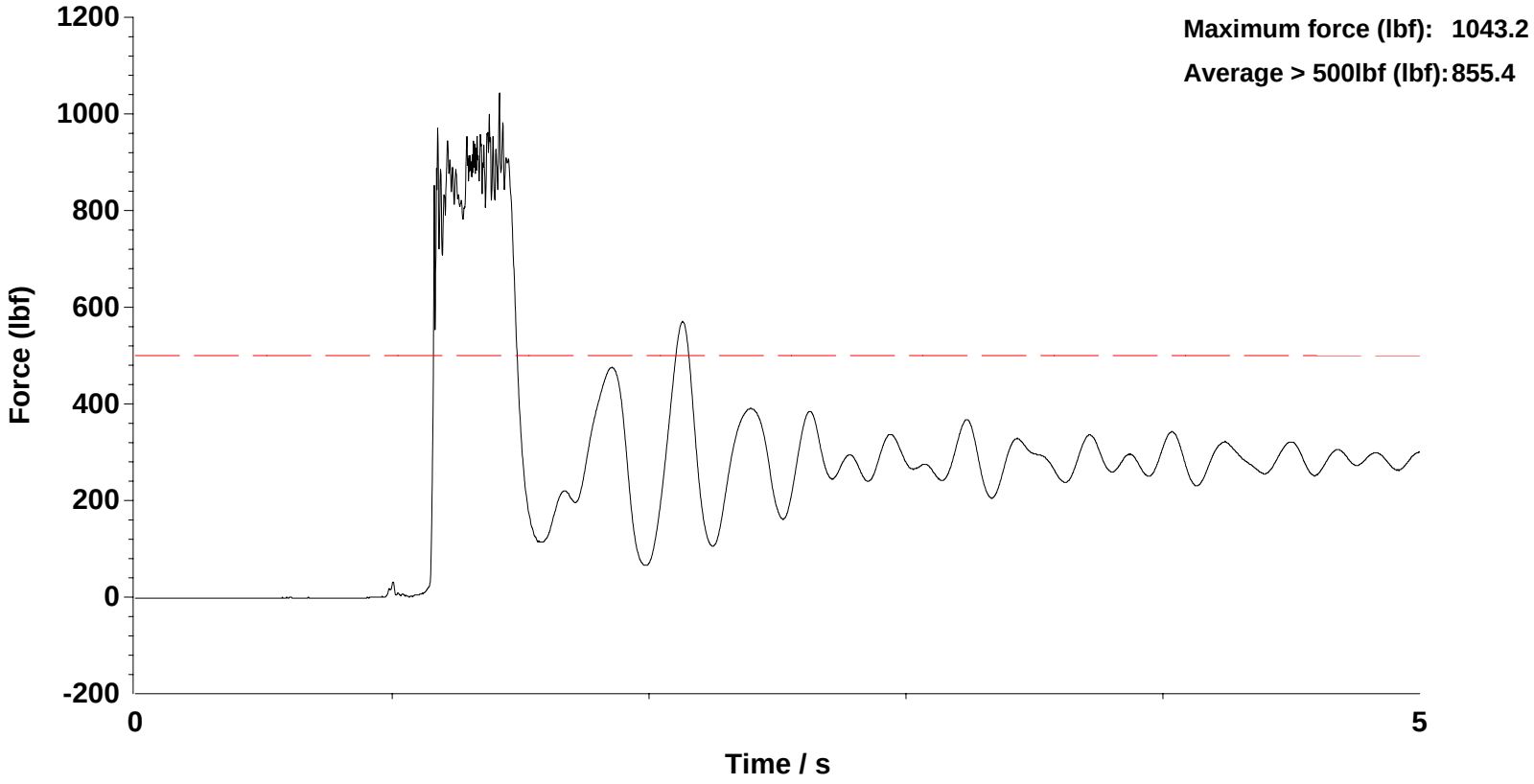
Technician:	SS
Standard	ANSI Z359.13:2013 EAL
Sample / File name:	2G00310
Drop item	Drop weight, US - 128 KG
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	17:15 29/01/19



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

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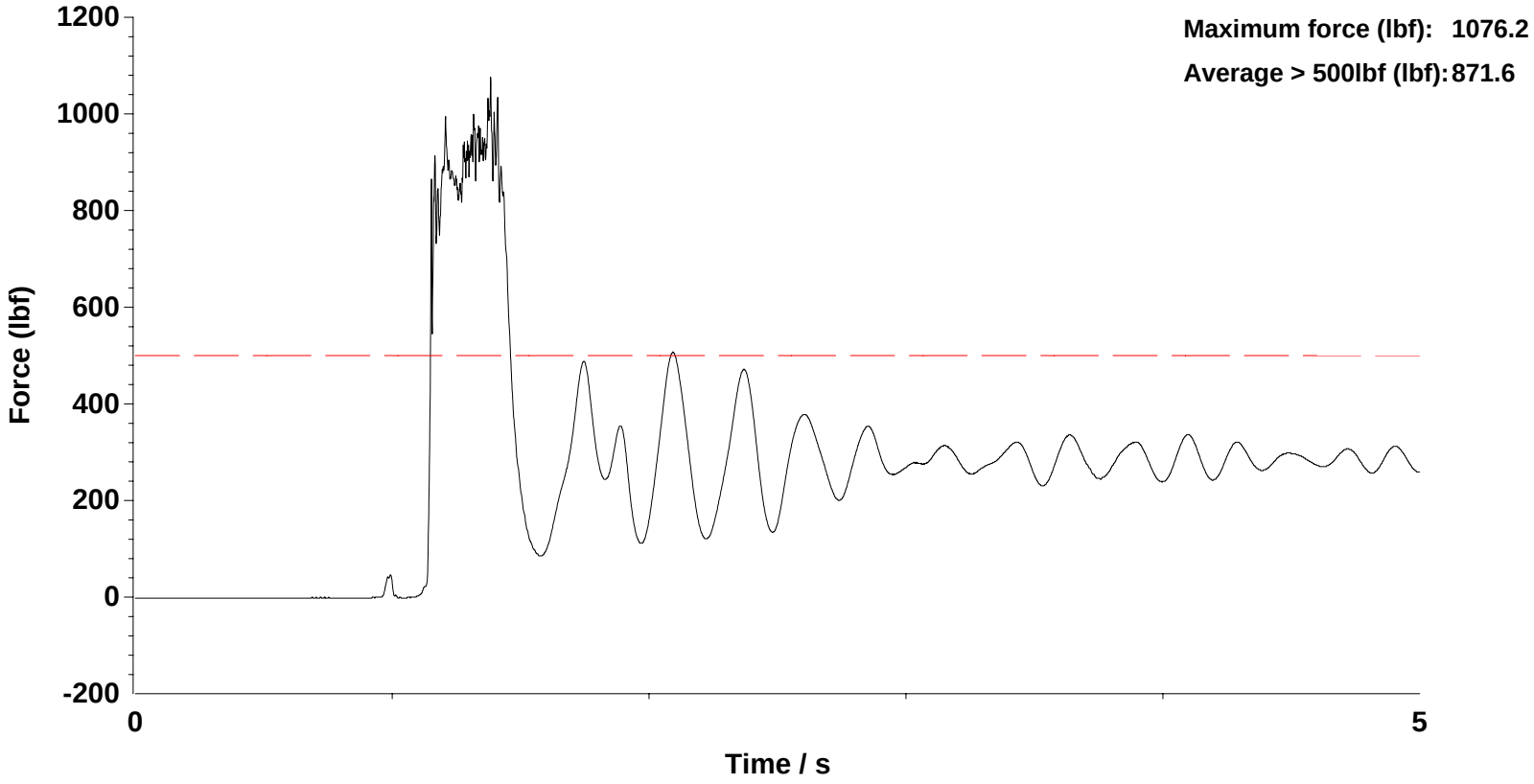
Technician:	SS
Standard	ANSI Z359.13:2013 EAL
Sample / File name:	2G00311
Drop item	Drop weight, US - 128 KG
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	17:24 29/01/19



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

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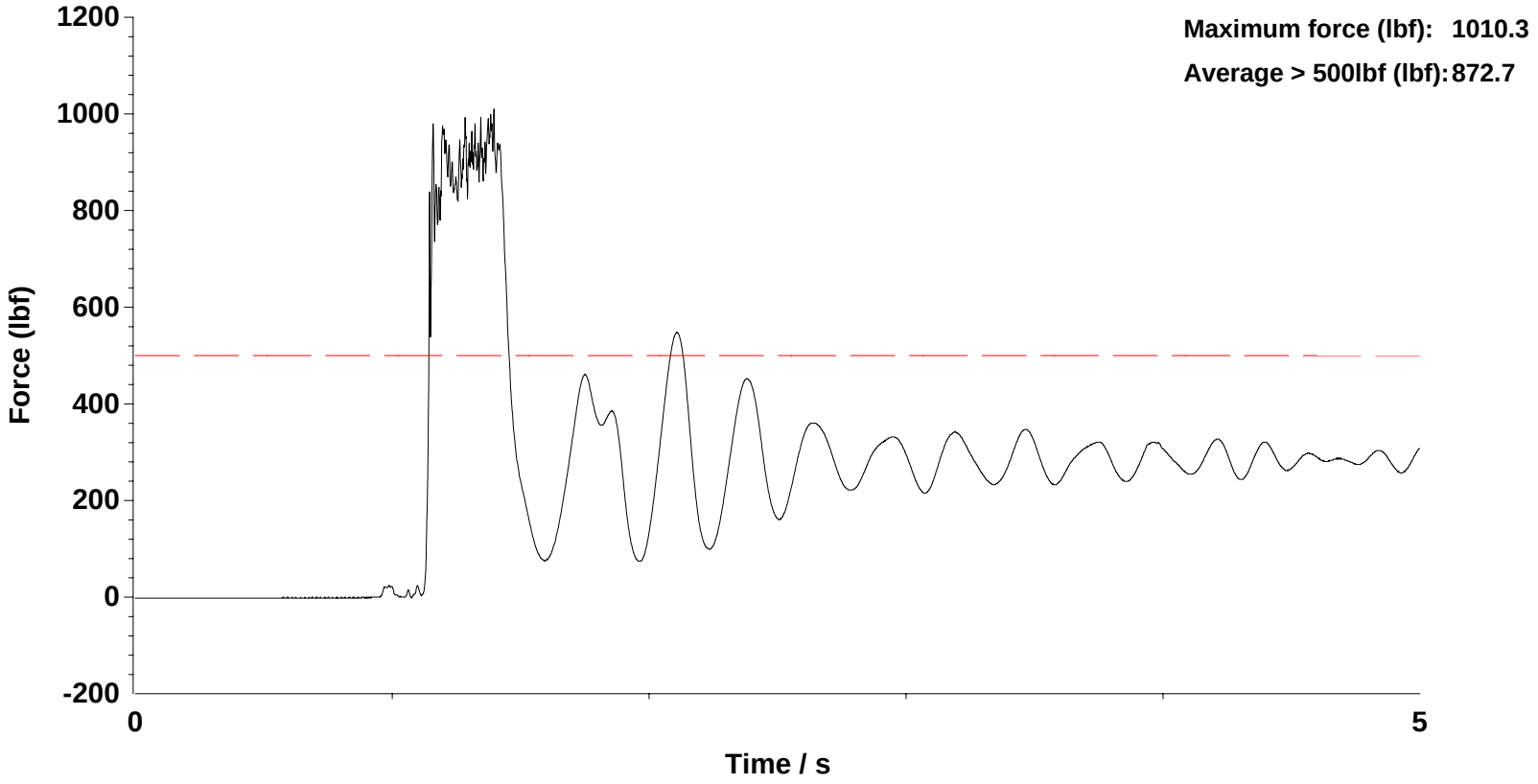
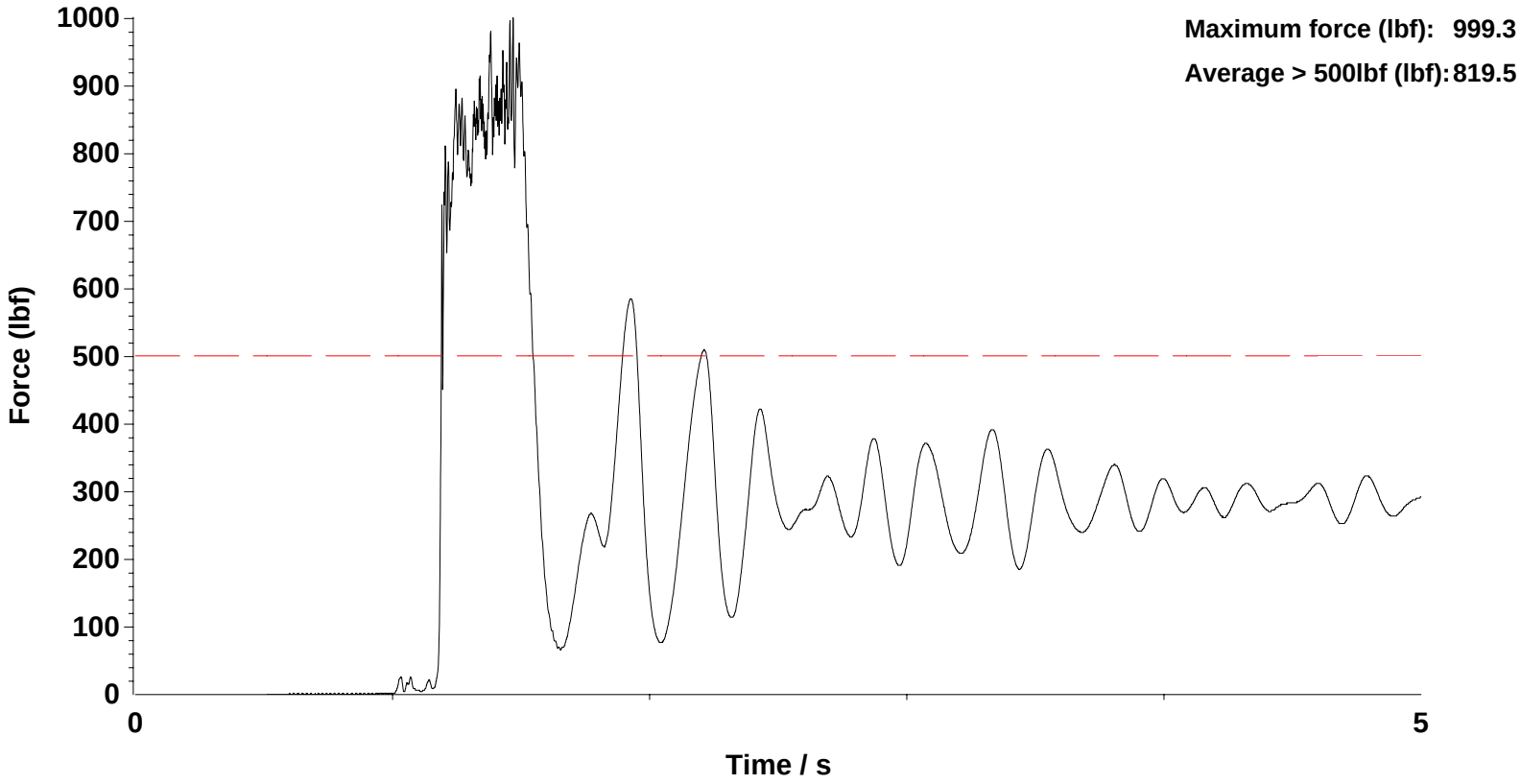
Technician:	SS
Standard	ANSI Z359.13:2013 EAL
Sample / File name:	2G00312
Drop item	Drop weight, US - 128 KG
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	17:30 29/01/19



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

INSPEC Technical Services

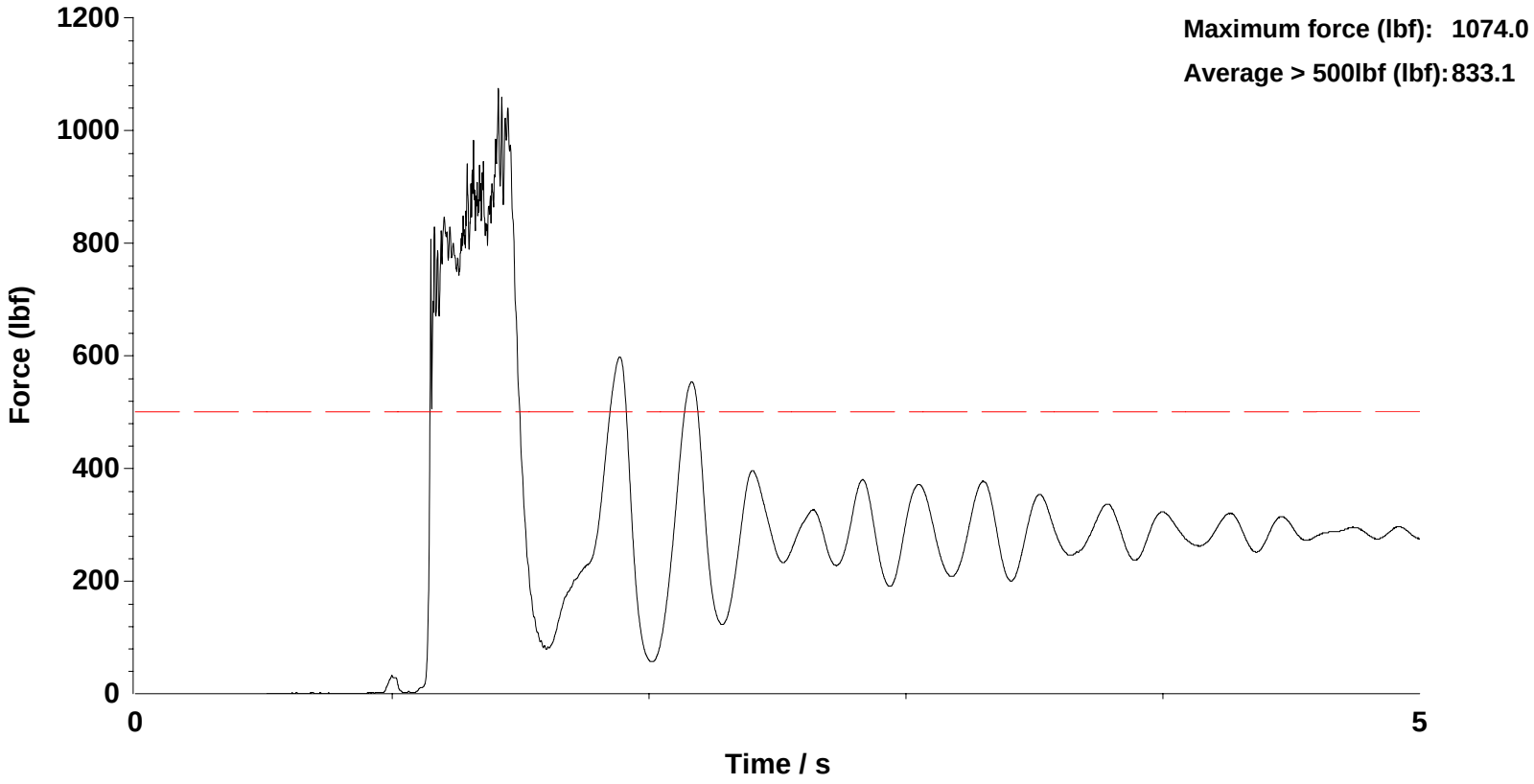
Technician:	SS
Standard	ANSI Z359.13:2013 EAL
Sample / File name:	2G00313
Drop item	Drop weight, US - 128 KG
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	17:52 29/01/19



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

INSPEC Technical Services

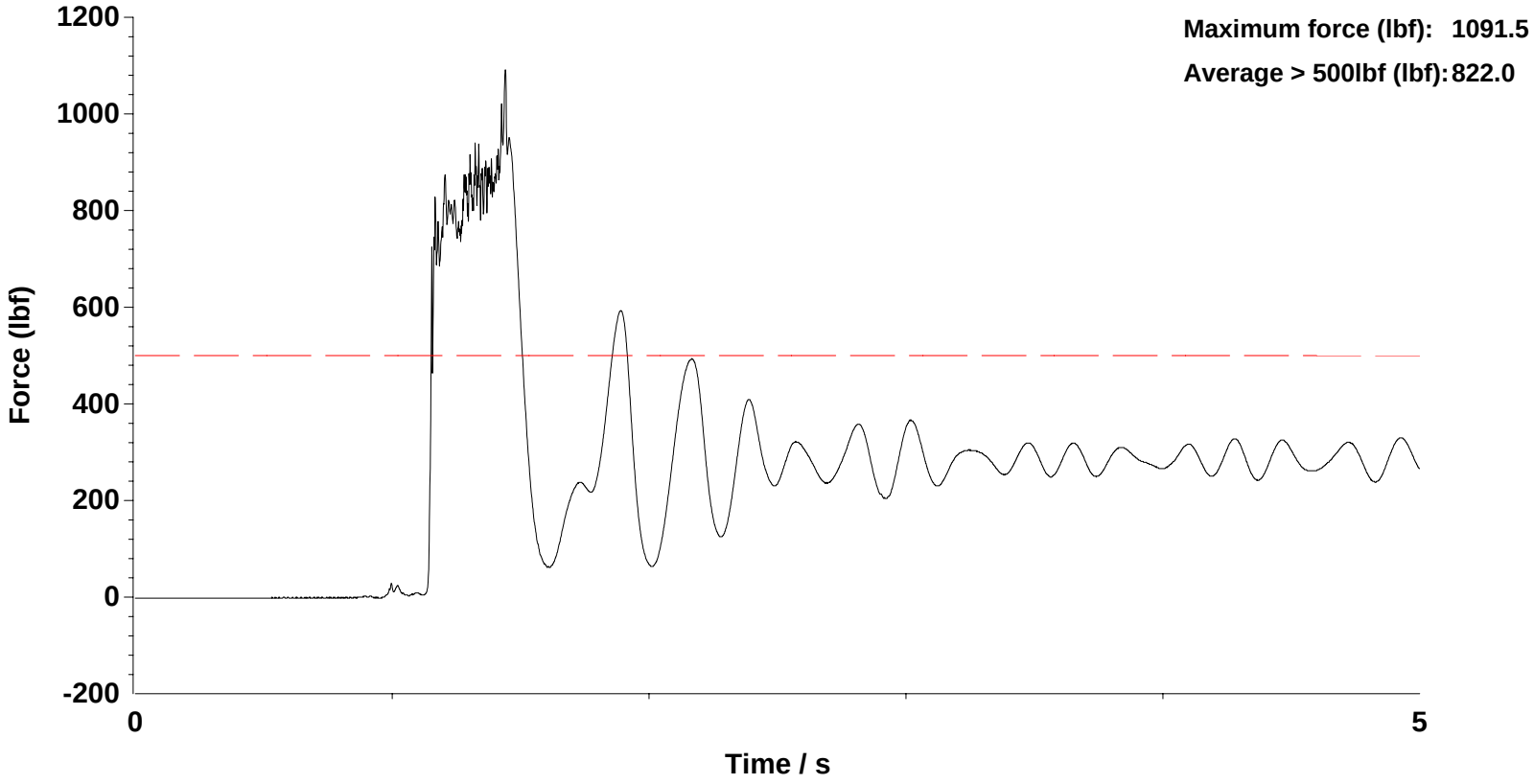
Technician:	SS
Standard	ANSI Z359.13:2013 EAL
Sample / File name:	2G00314
Drop item	Drop weight, US - 128 KG
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	17:56 29/01/19



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

INSPEC Technical Services

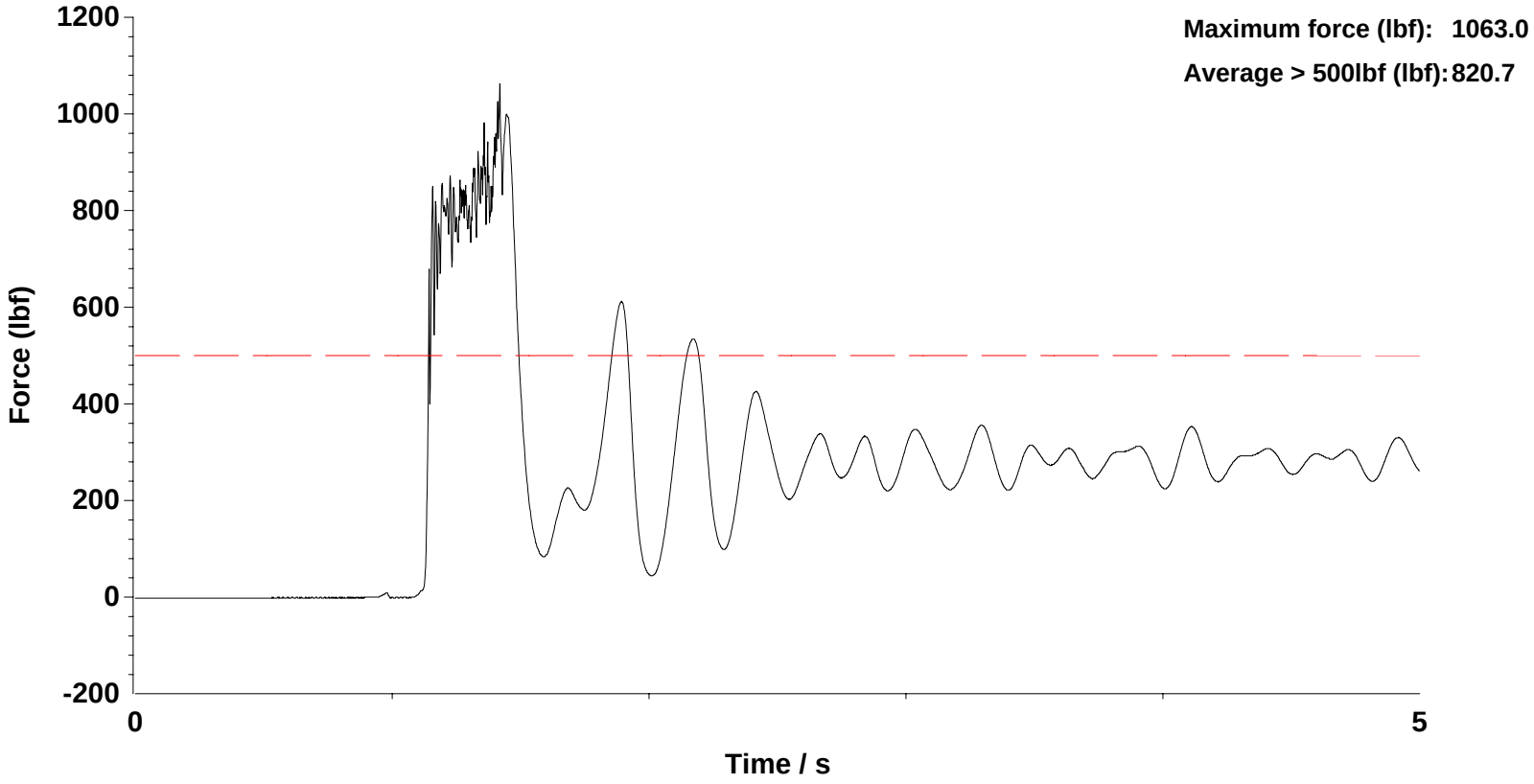
Technician:	SS
Standard	ANSI Z359.13:2013 EAL
Sample / File name:	2G00315
Drop item	Drop weight, US - 128 KG
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	18:01 29/01/19



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

INSPEC Technical Services

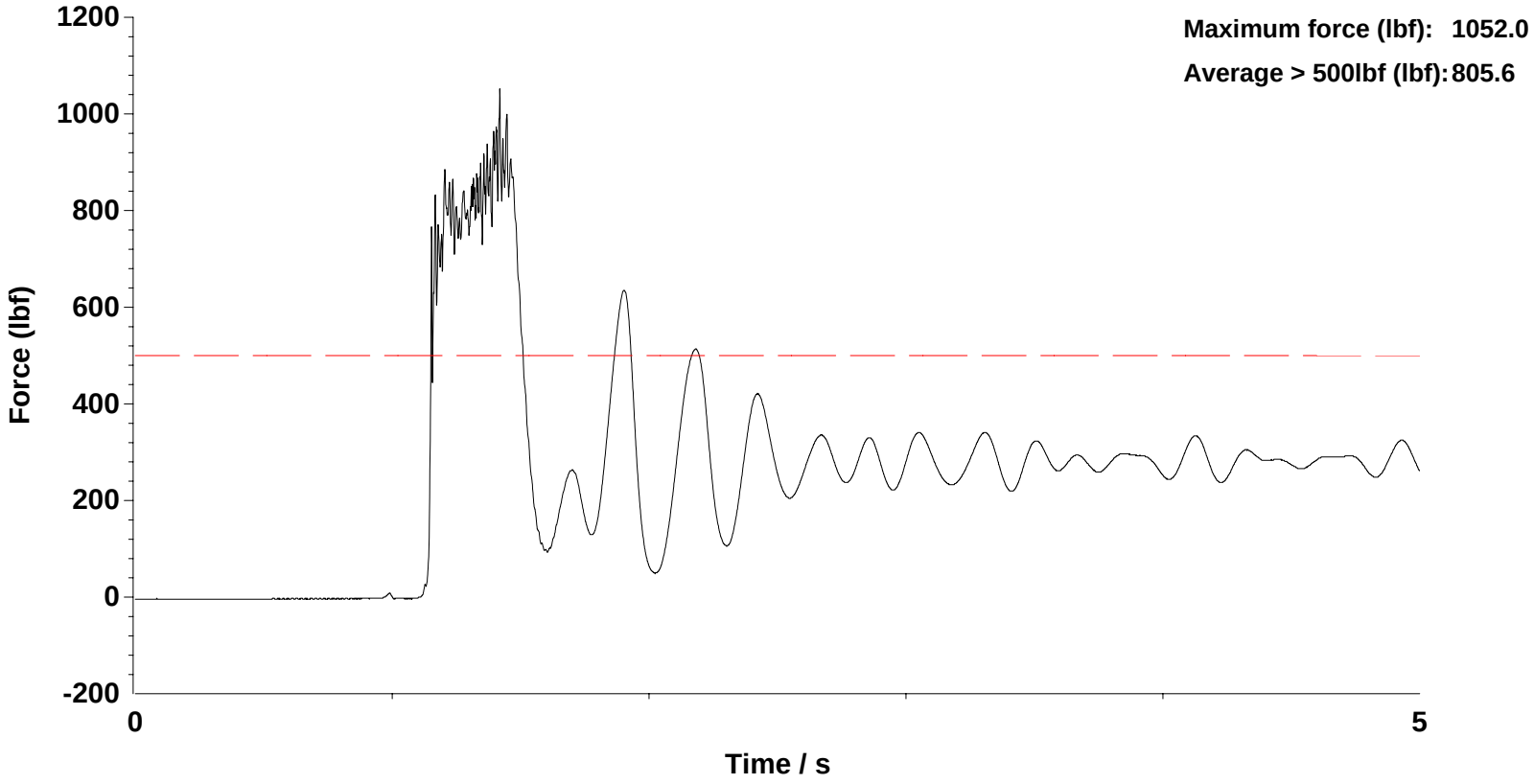
Technician:	SS
Standard	ANSI Z359.13:2013 EAL
Sample / File name:	2G00316
Drop item	Drop weight, US - 128 KG
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	18:05 29/01/19



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

INSPEC Technical Services

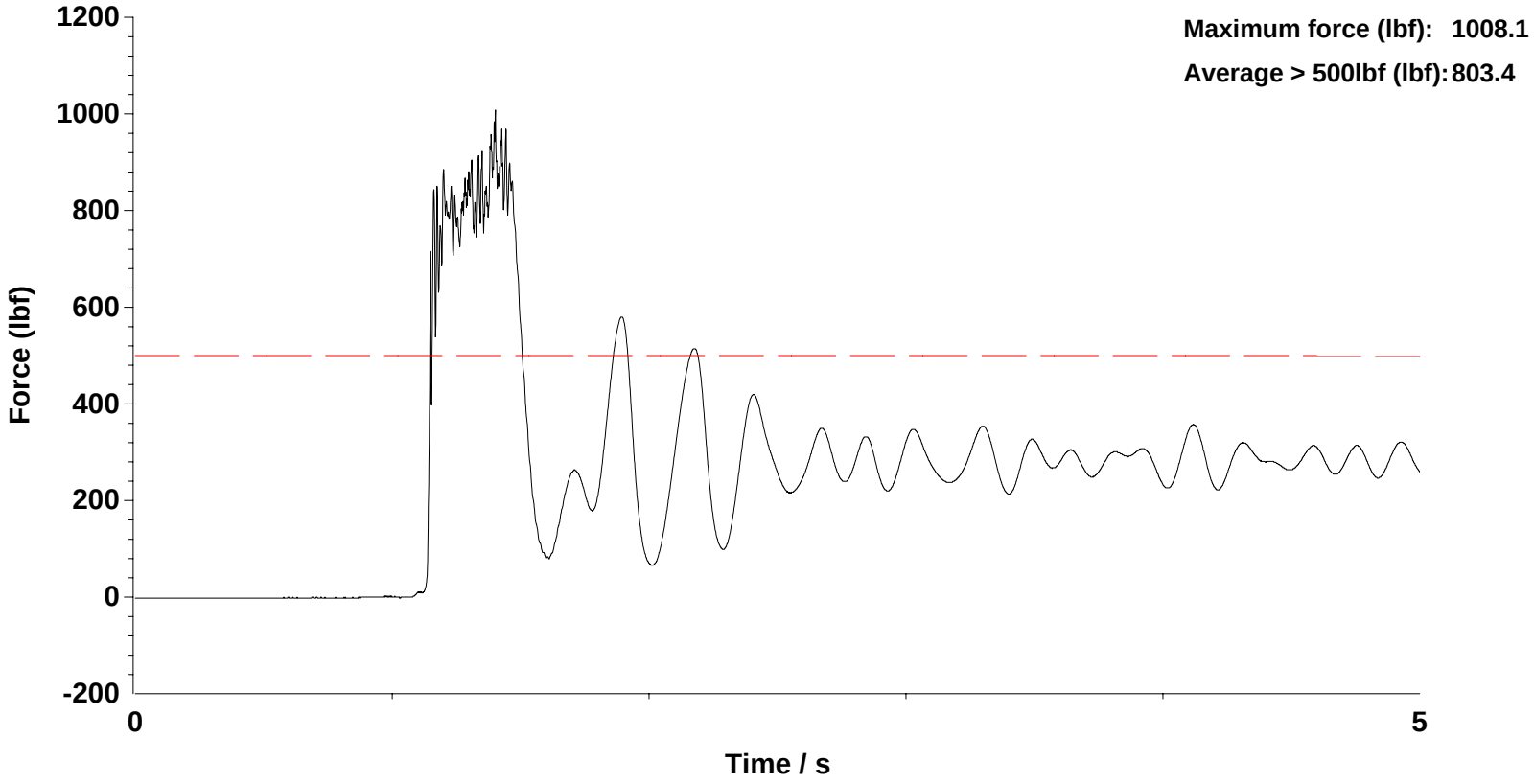
Technician:	SS
Standard	ANSI Z359.13:2013 EAL
Sample / File name:	2G00317
Drop item	Drop weight, US - 128 KG
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	18:10 29/01/19



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 EAL
Sample / File name:	2G00318
Drop item	Drop weight, US - 128 KG
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	18:14 29/01/19



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

Frontline Fall Protection Inc. – Energy absorbing lanyard, model LPO62SADJ

Photograph provided by manufacturer 19 May 2021