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Test Report

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

Report no: 2.17.06.06

Client:

CONFIDENCIAL

Manufacturer:

8 May 2017

Client order:

Date received:

CONFIDENCIAL

Model:

Dates of tests:

8 June 2017 to 16 June 2017

Signed: 

Issued: 26 June 2017

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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http://inspec-international.com/ToB.pdf

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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	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)	
3.2.8	Static test for wrap-around lanyards (5000 lbf – unabraded)	
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

Product	Quantity	Dates received	INSPEC specimen no.
Energy absorbing lanyard, model **CONFIDENCIAL**	18	28 December 2016	**CONFIDENCIAL**
Twin-legged energy absorbing lanyard, model **CONFIDENCIAL**	09	2 June 2017	**CONFIDENCIAL**

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.

5.3 / 5.4 User Instructions were supplied electronically and used for assessment.

The manufacturer declared:

Twin legged energy absorbing lanyard **CONFIDENCIAL** uses the same shock pack as energy absorbing lanyard **CONFIDENCIAL**

Energy absorbing lanyard **CONFIDENCIAL** was tested and reported in Inspec Test Report 2.17.02.04.

To avoid duplicate testing, the following results from the above test report were incorporated into this report.

3.1.6 Activation force

3.2.5 Dynamic performance (conditioning tests)

Result details

3.1.5 Deployment indicator

Subsequent to the testing of specimens **CONFIDENCIAL** against 3.2.10.1, it became obvious that the energy absorbers had been activated. Pass

3.1.6 Activation force

Specimens **CONFIDENCIAL** were assessed.

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

The permanent elongation of the specimen **CONFIDENCIAL** , following the test, was 0.98 inches. This is less than the maximum 2 inches permitted. Pass

The permanent elongation of the specimen **CONFIDENCIAL** , following the test, was 0.91 inches. This is less than the maximum 2 inches permitted. Pass

The permanent elongation of the specimen **CONFIDENCIAL**, following the test, was 0.91 inches. This is less than the maximum 2 inches permitted. Pass

3.2 Personal Energy Absorbing Lanyard Component

Specimens **CONFIDENCIAL** were assessed.

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

3.2.1 Materials

Specimen **CONFIDENCIAL** 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 **CONFIDENCIAL** 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 **CONFIDENCIAL**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 webbing were white colour. This contrasted with the orange colour of the webbing. Pass

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

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

3.2.3 Connectors

Specimen **CONFIDENCIAL** was assessed.

It incorporated three integrally attached connectors (these were snaphooks).

Testing of the connectors was not requested. NAs

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

Specimens **CONFIDENCIAL** were assessed.

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

Specimen		was 913 pounds.	Pass
Specimen	**CONFIDENCIAL**	was 901 pounds.	Pass
Specimen		was 910 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 **CONFIDENCIAL** were assessed.

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

Specimen		was 1280 pounds.	Pass
Specimen	**CONFIDENCIAL**	was 1226 pounds.	Pass
Specimen		was 1340 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 **CONFIDENCIAL** were assessed.

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

Specimen	**CONFIDENCIAL**	was 32.8 inches.	Pass
Specimen		was 33.7 inches.	Pass
Specimen		was 33.3 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 **CONFIDENCIAL** were assessed.

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

Specimen	**CONFIDENCIAL**	was 920 pounds.	Pass
Specimen		was 908 pounds.	Pass
Specimen		was 907 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 **CONFIDENCIAL** were assessed.

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

Specimen	**CONFIDENCIAL**	was 1371 pounds.	Pass
Specimen		was 1280 pounds.	Pass
Specimen		was 1311 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 **CONFIDENCIAL** were assessed.

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

Specimen	**CONFIDENCIAL**	was 33.5 inches.	Pass
Specimen		was 33.6 inches.	Pass
Specimen		was 33.5 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 **CONFIDENCIAL** were assessed.

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

Specimen	was 819 pounds.		Pass
Specimen **CONFIDENCIAL**	was 828 pounds.		Pass
Specimen	was 801 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 **CONFIDENCIAL** were assessed.

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

Specimen	was 1239 pounds.		Pass
Specimen **CONFIDENCIAL**	was 1175 pounds.		Pass
Specimen	was 1199 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 **CONFIDENCIAL** were assessed.

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

Specimen	was 39.7 inches.		Pass
Specimen **CONFIDENCIAL**	was 39.3 inches.		Pass
Specimen	was 41.9 inches.		Pass

These values are less than the maximum 48 inches permitted.

3.2.9 Static strength – Y-lanyards only

Specimens **CONFIDENCIAL** were assessed.

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

Specimens **CONFIDENCIAL** were assessed.

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

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

Specimens were assessed.

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

Specimen	was 822 pounds.		Pass
Specimen **CONFIDENCIAL**	was 801 pounds.		Pass
Specimen	was 823 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 – Single connection (maximum arrest force)

Specimens **CONFIDENCIAL** were assessed.

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

Specimen	was 1232 pounds.		Pass
Specimen **CONFIDENCIAL**	was 1406 pounds.		Pass
Specimen	was 1302 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 – Single connection (deployment distance)

Specimens **CONFIDENCIAL** were assessed.

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

Specimen	was 43.4 inches.		Pass
Specimen **CONFIDENCIAL**	was 41.9 inches.		Pass
Specimen	was 43.0 inches.		Pass

These values are less than the maximum 48 inches permitted.

3.2.10.2 Dynamic test, Y-lanyards - Dual connection

Specimens were assessed.
During the dynamic performance test, the maximum arrest force of the specimens were recorded as follows:

Specimen	was 1204 pounds.		Pass
Specimen **CONFIDENCIAL**	was 1364 pounds.		Pass
Specimen	was 1478 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 were assessed.

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

All energy absorbing lanyards did include a warning label on each leg according to clause 5.2.2. Pass

5.1 / 5.2 Marking

Specimen was assessed. The detailed results of the assessment are given on page 11 of this report. Ltd

5.3 / 5.4 Instructions

The detailed results of the assessment are given from page 12 to page 13 of this report. Ltd

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
	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	Except for connectors, as set forth in Section 5.2.1, equipment shall be marked with the following:	
	· part number and model designation;	Pass
	· year of manufacture; “2017/05”	Pass
	· manufacturer’s name or logo;	Pass
	· capacity rating; “130-310 lbs”	Pass
	· serial number; “0021”	Pass
	· standard number; “ANSI/ASSE 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; “PE”	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;	Pass
	· 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
5.2.2	· 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. *User instructions were supplied electronically in English and used for assessment.*	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;	Pass
· 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		*
3.1.6	Activation force		*
	Permanent elongation		0.33%
3.1.7	Static strength		*
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

Estimates of the uncertainty of measurement

Clause	Test			Uncertainty
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

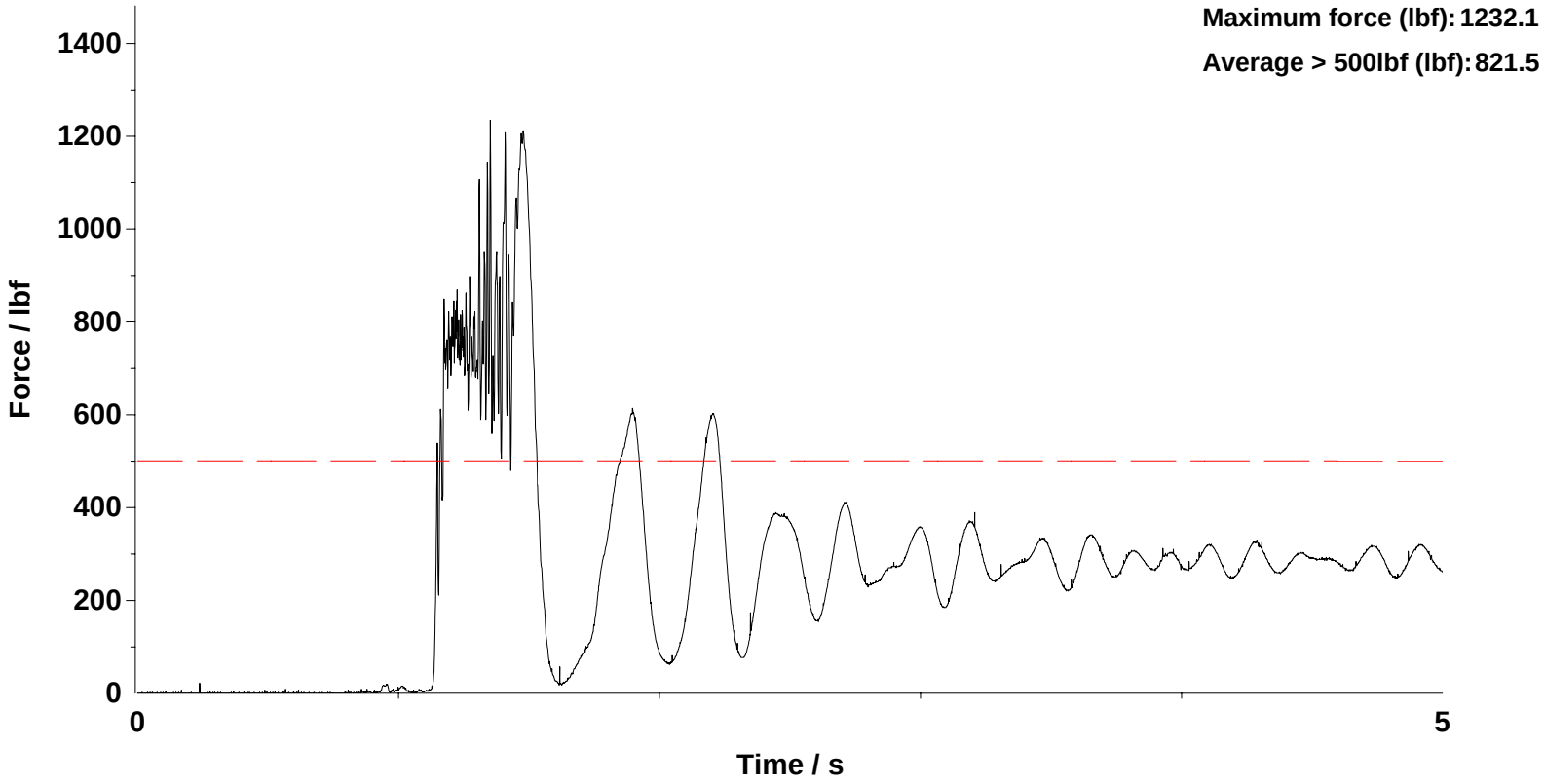
This Annex comprises two sections.

1. Plot of arrest force versus time. (6 pages)

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

INSPEC Technical Services

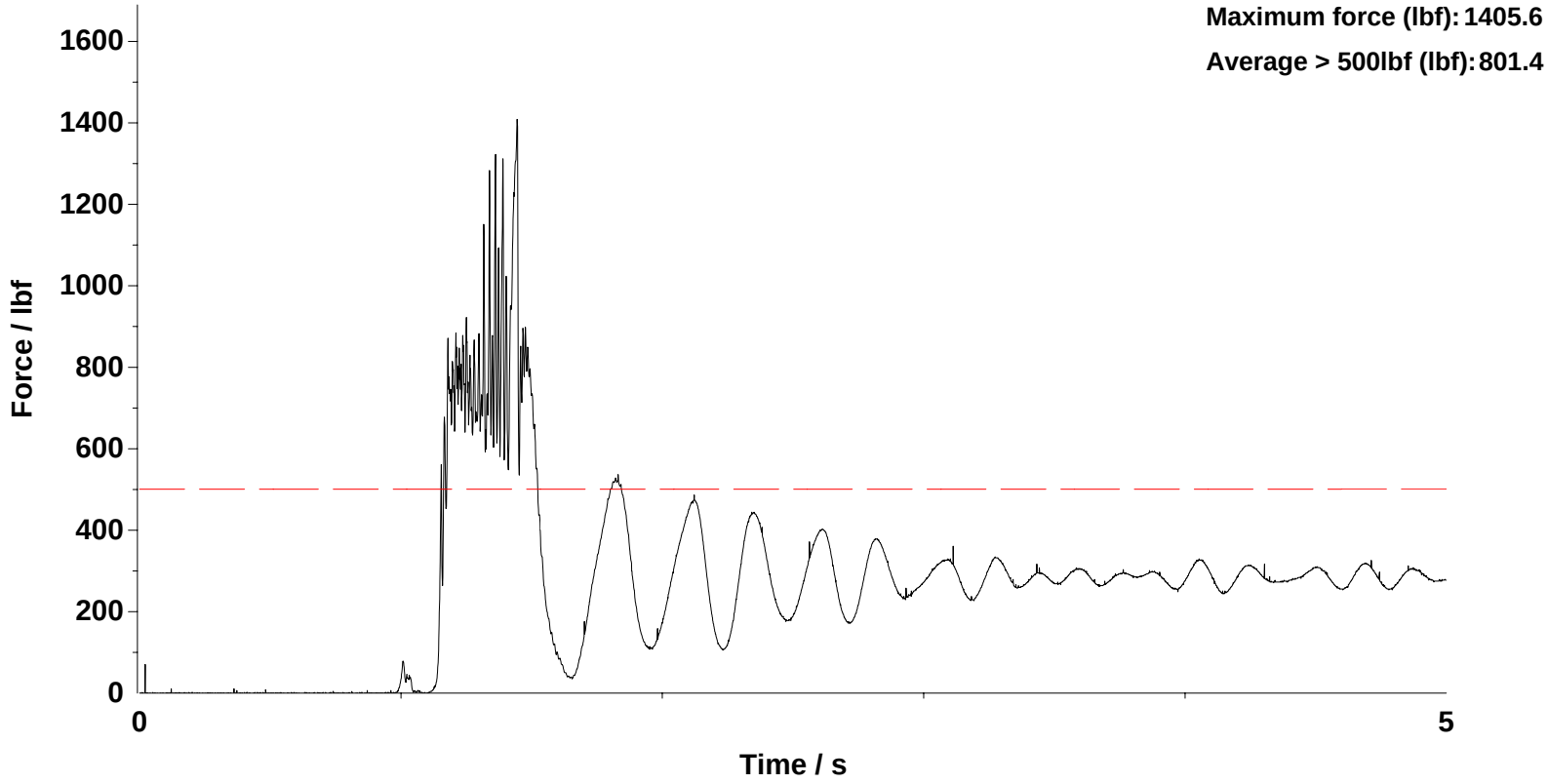
Technician:	Lu
Standard	ANSI Z359.13:2013 Energy absorbing lanyard
Sample / File name:	**CONFIDENCIAL**
Drop item	Drop weight, US - 128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	10:30 09/06/17



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

INSPEC Technical Services

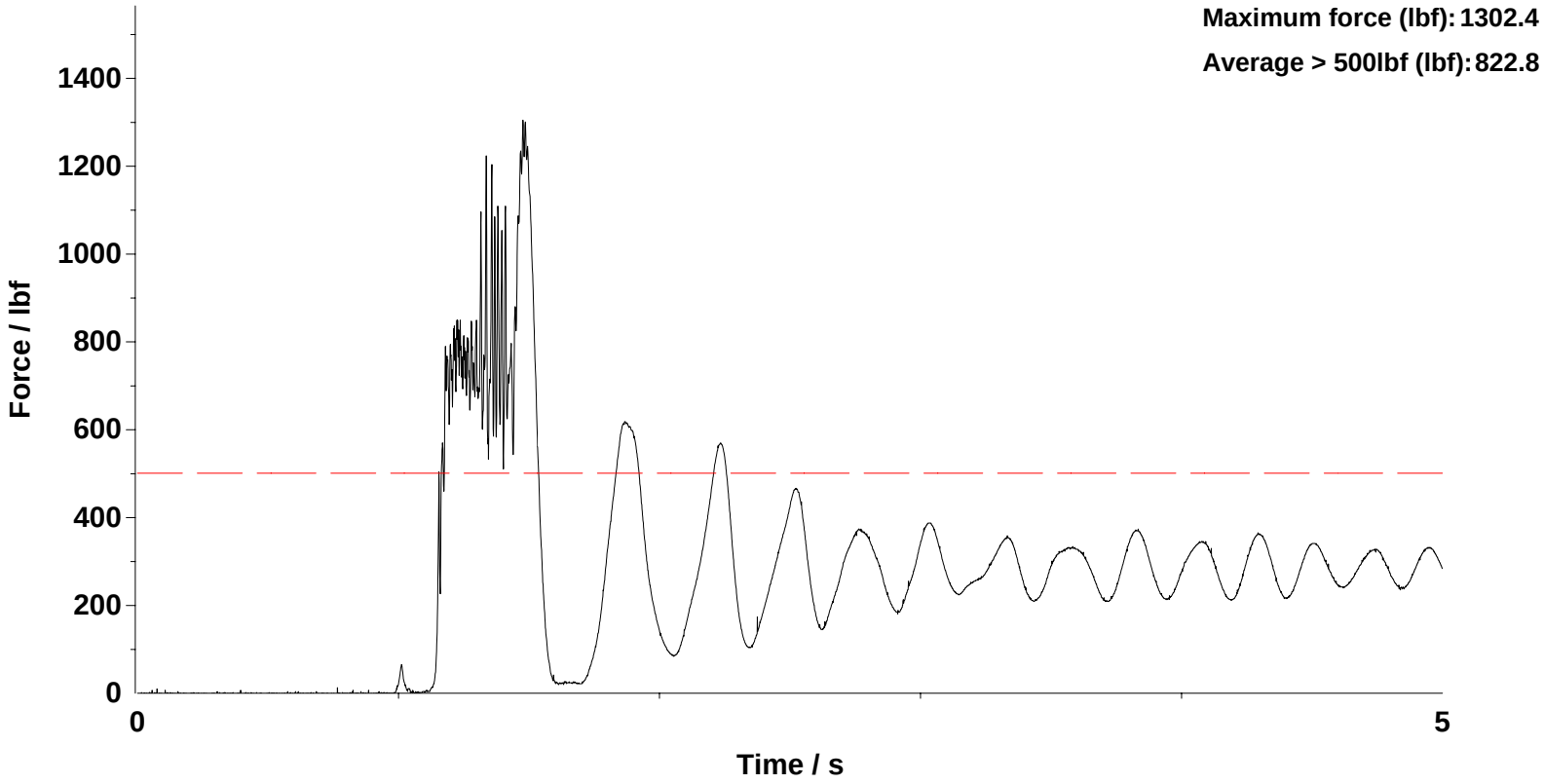
Technician:	Lu
Standard	ANSI Z359.13:2013 Energy absorbing lanyard
Sample / File name:	**CONFIDENCIAL**
Drop item	Drop weight, US - 128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	10:40 09/06/17



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

INSPEC Technical Services

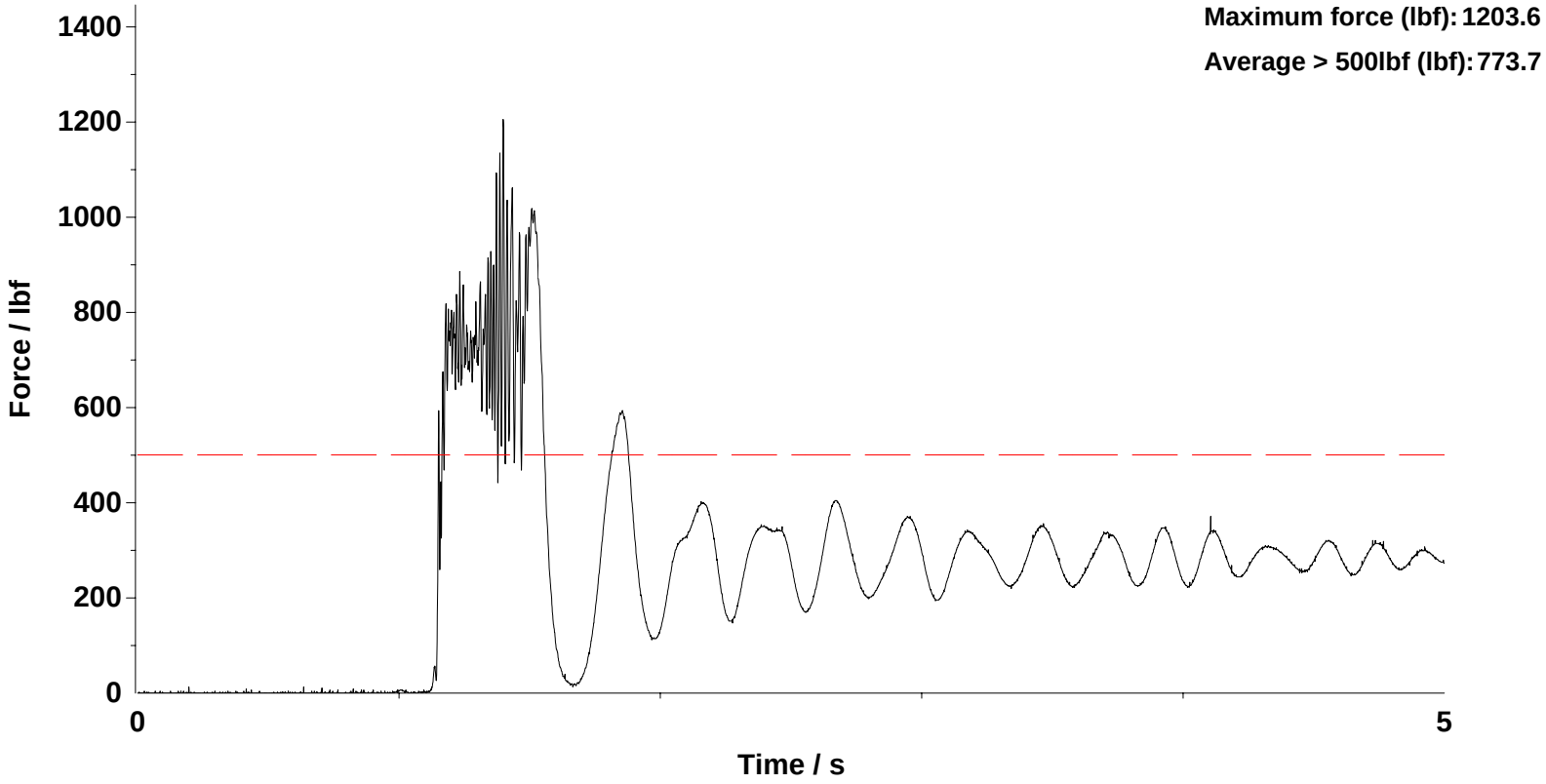
Technician:	Lu
Standard	ANSI Z359.13:2013 Energy absorbing lanyard
Sample / File name:	**CONFIDENCIAL**
Drop item	Drop weight, US - 128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	10:51 09/06/17



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

INSPEC Technical Services

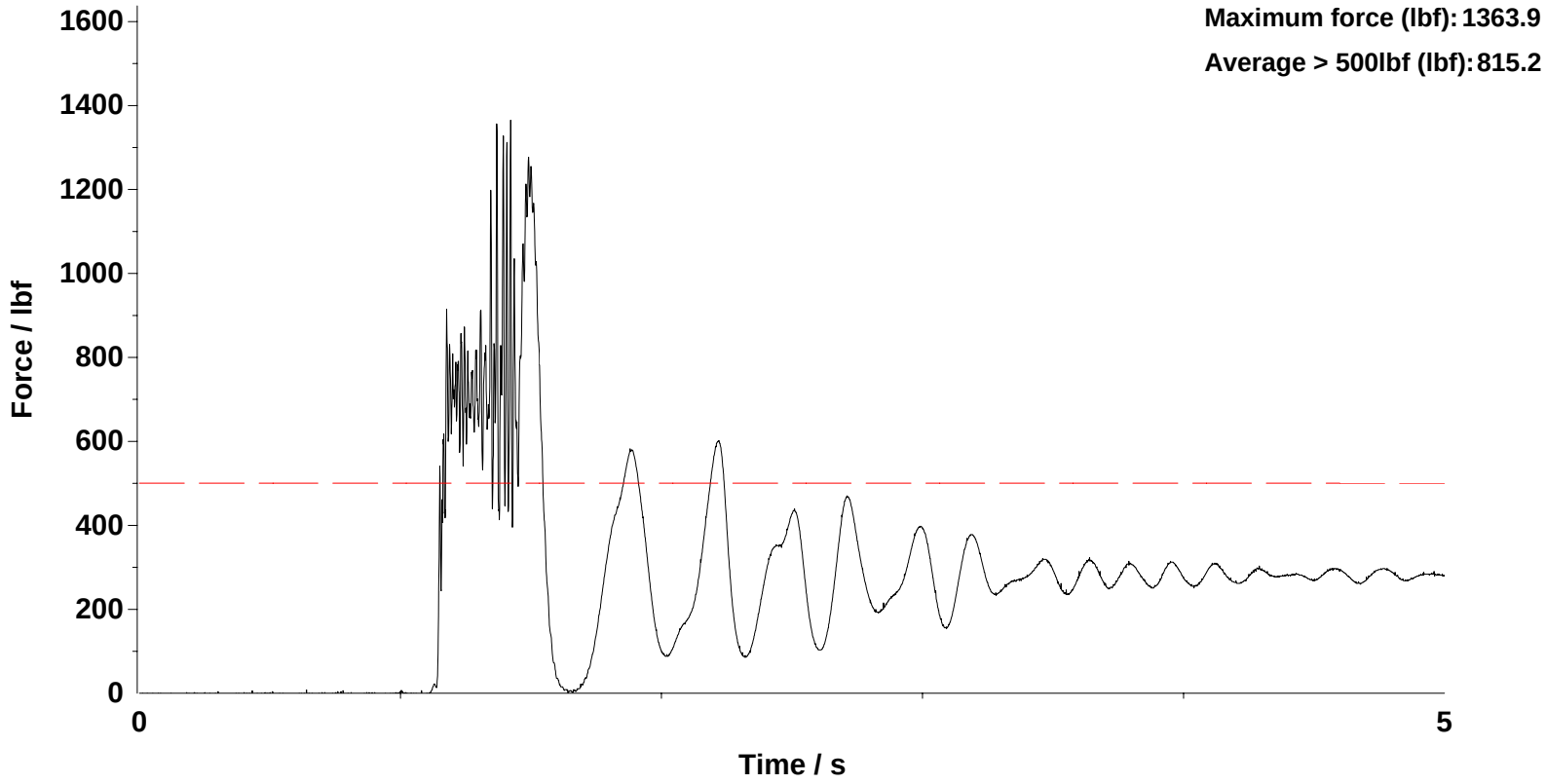
Technician:	Lu
Standard	ANSI Z359.13:2013 Energy absorbing lanyard
Sample / File name:	**CONFIDENCIAL**
Drop item	Drop weight, US - 128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	12:47 09/06/17



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

INSPEC Technical Services

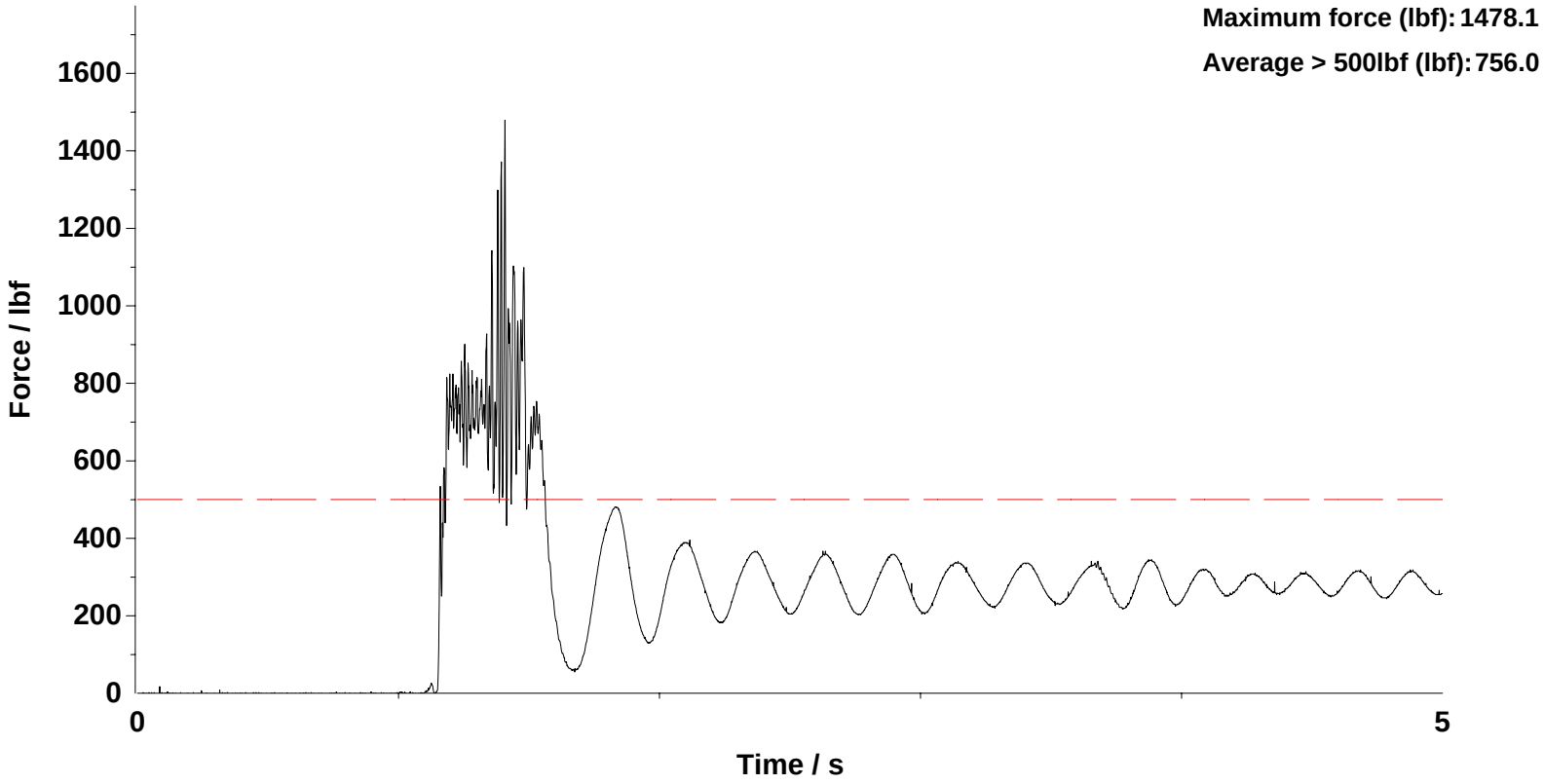
Technician:	Lu
Standard	ANSI Z359.13:2013 Energy absorbing lanyard
Sample / File name:	**CONFIDENCIAL**
Drop item	Drop weight, US - 128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	12:59 09/06/17



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

INSPEC Technical Services

Technician:	Lu
Standard	ANSI Z359.13:2013 Energy absorbing lanyard
Sample / File name:	**CONFIDENCIAL**
Drop item	Drop weight, US - 128 kg
Orientation/Attachment Point:	Centre eyebolt
Time and Date of Test:	13:10 09/06/17



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

Twin-legged energy absorbing lanyard

CONFIDENCIAL