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August 25, 2022

Dakota Ultrasonics
1500 Green Hills Road #107
Scotts Valley, CA

Dear Mr. Jason Treon,

Enclosed are the test data and photographs obtained from the testing of the Dakota Ultrasonics, ZX/PZX/PR Series Gauge was subjected to Environmental Testing in accordance with MIL-STD-810G, October 2008.

Thank you for using the services of Eurofins | E&E. If you have any questions regarding these results or if we can be of further service to you, please feel free to contact me.

Sincerely,

Angelia Htoo
Documentation Department, Union City
Eurofins Electrical and Electronic Testing NA, Inc.

Reference: (\Dakota Ultrasonics\ESLU119134-MIL)

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Environmental Testing

for the

Dakota Ultrasonics
ZX/PZX/PR Series Gauge

Tested Under
MIL-STD-810G

Report No.: ESLU119134-MIL

August 25, 2022

Prepared For:

Dakota Ultrasonics
1500 Green Hills Road #107
Scotts Valley, CA

Prepared By:
Eurofins | E&E.
33439 Western Avenue
Union City, CA 94587

Test Report
for the

Dakota Ultrasonics
ZX/PZX/PR Series Gauge

Tested Under
MIL-STD-810G

Testing Performed By:

Rosario Lopez
Project Engineer

Report Prepared By:

Angelia Htoo
Documentation Department

Lab Manager

Rob Cygan
Environmental Lab Manager

Report Status Sheet

Revision	Report Date	Reason for Revision
∅	August 25, 2022	Initial Issue.

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I. Executive Summary

Eurofins | E&E. was contracted by Dakota Ultrasonics to perform acceptance testing to MIL-STD-810G criteria on the ZX/PZX/PR Series Gauge.

The tests were based on MIL-STD-810G. The results obtained relate only to the item(s) tested.

Shock Test Methods

Procedure IV – Transit Drop

The EUT was subjected to a shock/drop test in accordance with the procedures of MIL-STD-810G, method 516.6, Procedure IV – Transit Drop. A visual inspection of the EUT after the test proved to have no anomalies. The EUT was functional after the test. The EUT **complied** with Method 516.6, Procedure IV – Transit Drop.

II. Equipment Configuration

A. Overview

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform an Acceptance Test of the Dakota Ultrasonics, ZX/PZX/PR Series Gauge. The tests were based on MIL-STD-810G. The tests described in this document were formal tests as described with the objective of the testing was to verify compliance of the Equipment Under Test (EUT) to the requirements of the aforementioned specifications.

Model(s) Tested:	ZX/PZX/PR Series Gauge
Model(s) Covered:	ZX/PZX/PR Series Gauge
Analysis:	The results obtained relate only to the item(s) tested.
Evaluated by:	Rosario Lopez
Date:	August 25, 2022

B. References

ISO/IEC 17025 - 2017	General requirements for the competence of testing and calibration laboratories
MIL-STD-810G **31 October 2008**	Department of Defense Test Methods Standard For Environmental Engineering Considerations and Laboratory Tests

C. Test Site

All testing was performed in a limited access test laboratory facility located at Eurofins | E&E., 33439 Western Avenue, Union City, CA 94587. All testing performed at Eurofins | E&E. was conducted in the Environmental Simulation Lab. All equipment used in making physical determinations is accurate and bears recent traceability to the National Standards and Technology.

D. Description of Test Sample

The ZX/PZX/PR Series Gauge, Equipment Under Test (EUT), is powered from a 3V DC supply.

Photograph 1. View of EUT

Name of EUT/Model:	ZX/PZX/PR Series Gauge
EUT Specifications	
Voltage:	3V DC
AC or DC:	DC
Voltage Frequency:	N.A.
Number of Phases:	0
Current:	500mA
Uses an external AC/DC adapter:	False
Size: (HxWxD - inches):	Size: Width (2.5 in / 63.5 mm) Height (5.17 in / 1
Weight (lbs.):	0.7
Description of EUT:	Ultrasonic thickness gauge. Aluminum enclosure.
Number of Samples Tested:	1
Mode of Operation:	Thickness measurement.
Monitoring Method - Pass/Fail Criteria:	After drop testing plug in the provided transducer. Power on the gauge by holding down and releasing the center key. Place a drop of the provided couplant gel on the end of the transducer. Press the transducer to the circular battery cap. A thickness of 0.412 inches (+/- 0.01 inches) should be displayed.
Configuration:	Gauge will be supplied with the proper options settings. 2 AA batteries to be inserted positive end down and the battery cap to be secured tightly. Transducer is not to be installed during drop tests as we are not testing the various transducer brands. For functional testing the transducer should be inserted firmly into the Limo connector on top of the gauge. A drop of couplant is applied to the end of the transducer, and it is pressed to the top of the battery cap to get a reading.

Table 1. EUT Configuration

Ref. Id	Port Name on EUT	Cable Description or reason for no cable	Qty	Length as tested (m)	Max Length (m)	Shielded? (Y/N)	Termination Box ID & Port Name
A	Transducer	RG-174A/U Lemo00	1	1	1	Yes	Transducer
A	Transducer	RG-174A/U Lemo00	1	1	1	Yes	Transducer

Table 2. Ports and Cabling

Ref. ID	Name/Description	Manufacturer	Model Number	Customer Supplied Calibration Data
A	Couplant Gel	Ultrasonic	V-000-0001	NA
B	Transducer	Dakota	5 MHz	NA

Table 3. Support Equipment

Figure 1. Block Diagram of the EUT

E. Modifications

a) Modifications to the EUT

No modifications to the EUT were required.

b) Modifications to the Test Standard

No modifications to the Test Standard were necessary.

F. Disposition of EUT

Two EUT's were submitted to the Environmental Simulation Lab for testing. The first EUT did not meet the customer defined functionality check post-test. The EUT was returned to the customer for further evaluation.

The second EUT, submitted to the Environmental Simulation Lab, was returned to customer following successful post-test functionality check.

III. MIL-STD-810G Method 516.6 – Shock

Shock, Procedure IV – Transit Drop

Test Requirements The equipment **shall not** sustain any damage or deteriorate in functional performance during or after it has been exposed to the environment described in MIL-STD-810G.

Test Procedure

A. The test was performed on an unpackaged EUT.

B. The EUT was subjected to drops heights specified in the Table 4. The number of drops per EUT was performed as specified in Table 4.

C. The EUT was drop onto a 2-inch plywood.

D. The EUT was dropped from a quick release and handheld method.

E. A visual and functional inspection was performed after the test.

Table 516.6-VI. Transit drop test.

Weight of Test Item & Case kg (lbs)	Largest Dimension, cm (in)	Notes	Height of Drop, h cm (in)	Number of Drops
Under 45.4 (100) Manpacked or man-portable	Under 91 (36)	A/	122 (48)	Drop on each face, edge and corner; total of 26 drops D/
	91 & over	A/	76 (30)	
45.4 - 90.8 (100 – 200) inclusive	Under 91	A/	76 (30)	Drop on each corner; total of eight drops
	91 & over	A/	61 (24)	
90.8-454 (200 – 1000) inclusive	Under 91	A/	61 (24)	
	91 – 152 (36 – 60)	B/	61 (24)	
	Over 152	B/	61 (24)	
Over 454	No limit	C/	46 (18)	Drop on each bottom edge. Drop on bottom face or skids; total of five drops

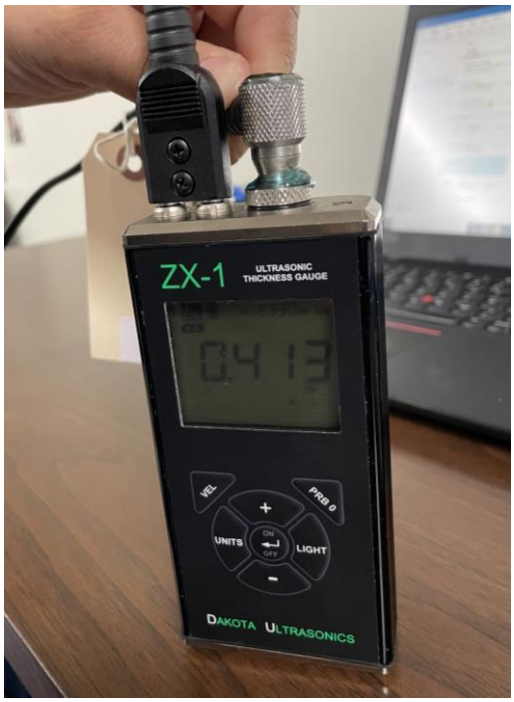
Table 4. Transit Drop Test Procedures

Test Results A visual and functional inspection of the EUT after the test proved to have no anomalies. The EUT was functional after the test. The EUT **complied** with Method 516.6, Procedure IV – Transit Drop.

Test Engineer(s): Rosario Lopez

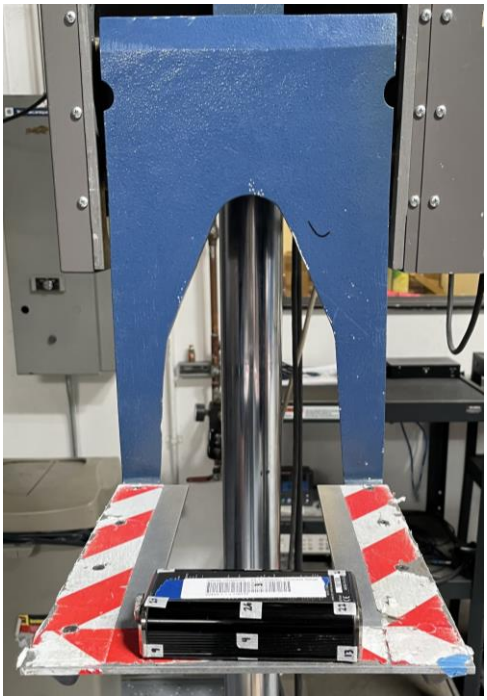
Test Date(s): July 22, 2022

Shock, Procedure IV – Transit Drop

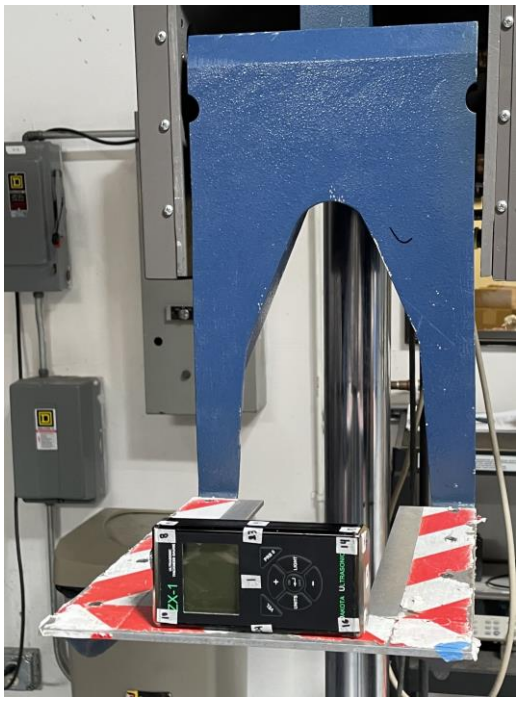


Photograph 2. Shock, Procedure IV – Transit Drop Setup (Drop Height 48 Inches) 1

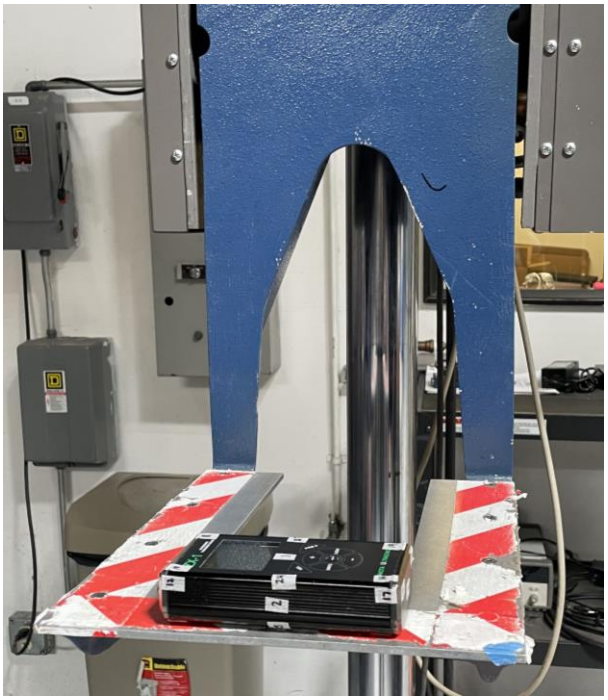
Photograph 3. Shock, Procedure IV – Transit Drop Setup (Drop Height 48 Inches) 2



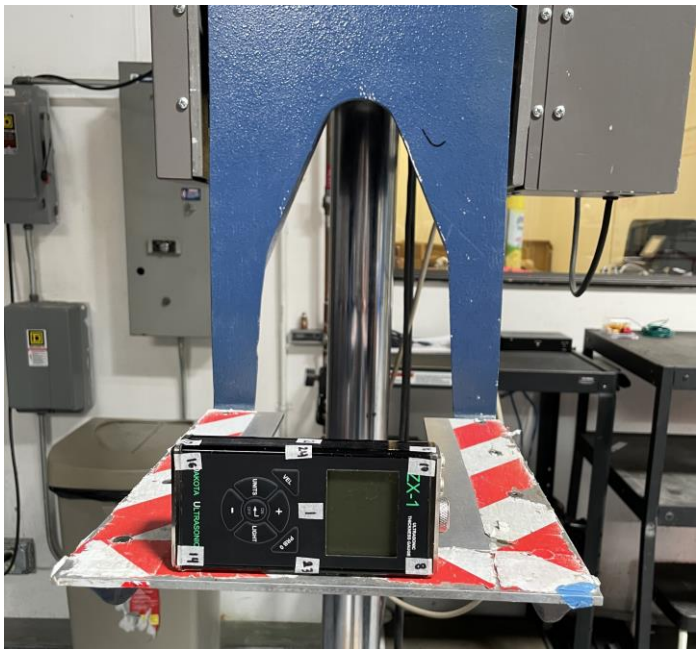
Photograph 4. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 1



Photograph 5. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 2

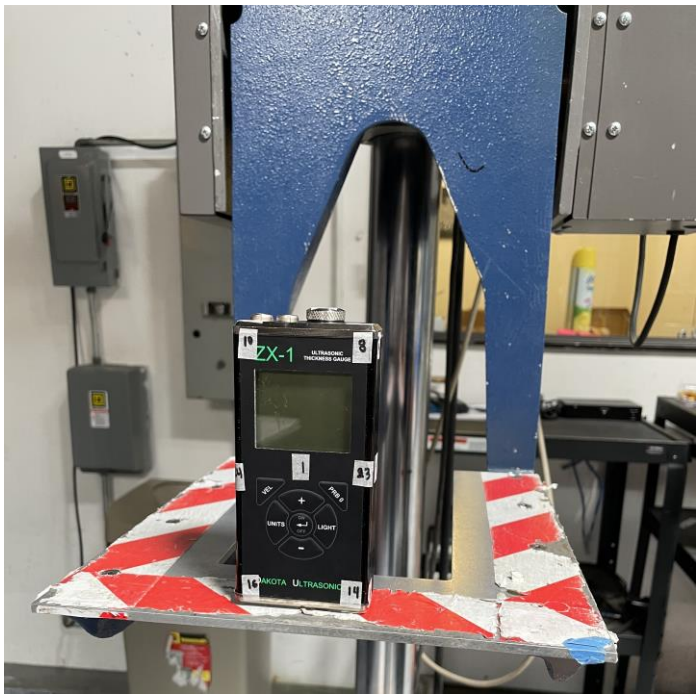


Photograph 6. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 3



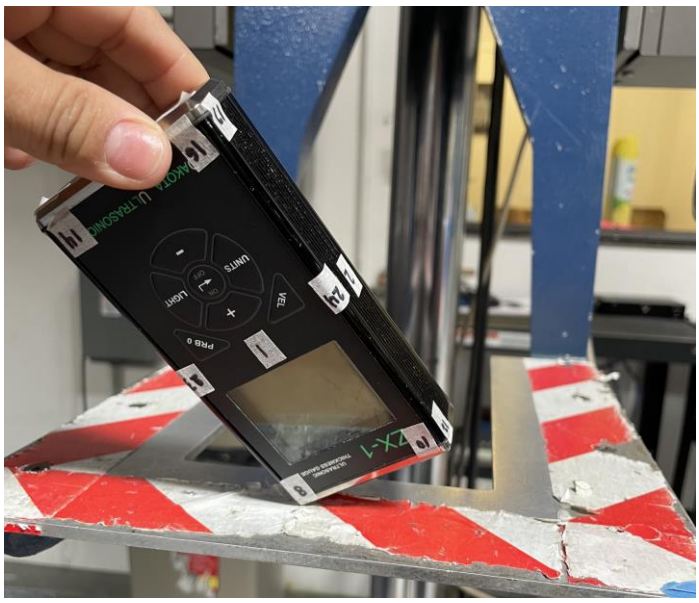
Photograph 7. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 4

Photograph 8. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 5



Photograph 9. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 6

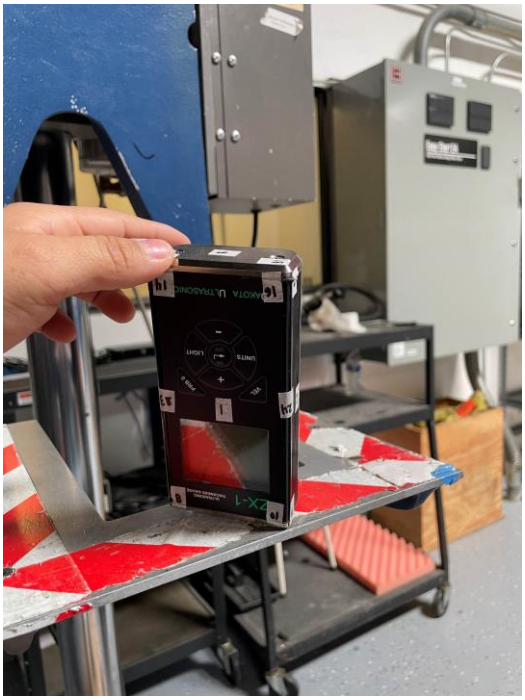
Photograph 10. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 7



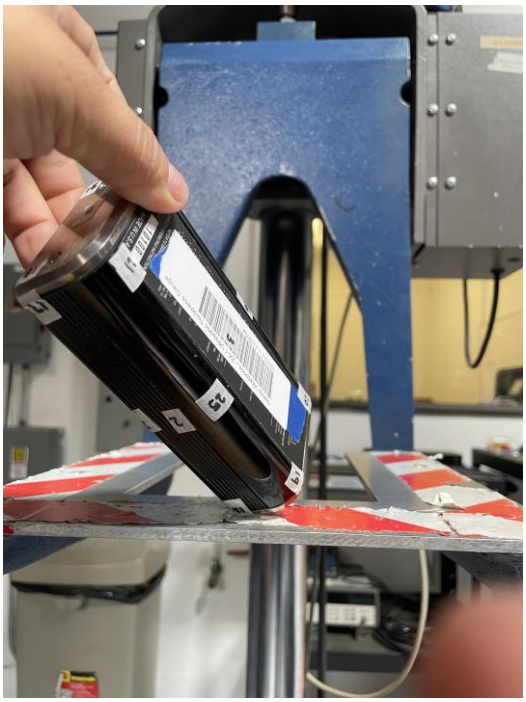
Photograph 11. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 8

Photograph 12. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 9

Photograph 13. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 10

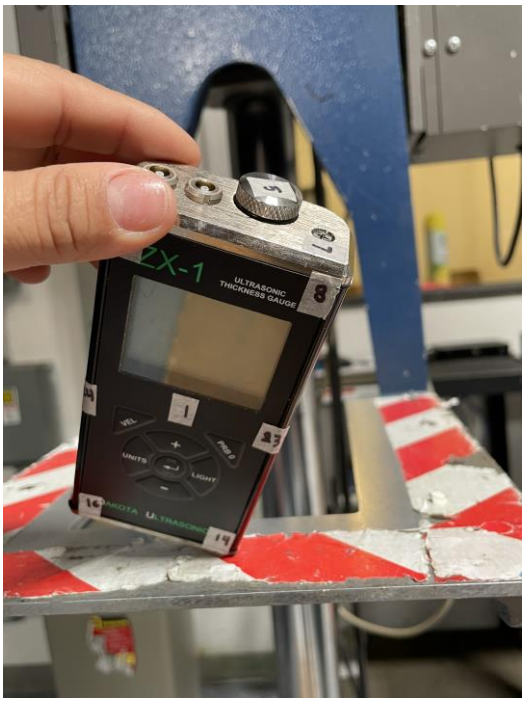


Photograph 14. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 11

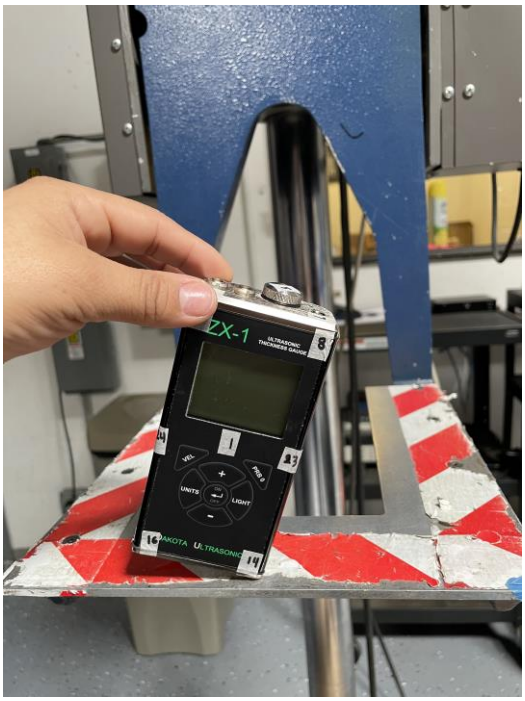


Photograph 15. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 12

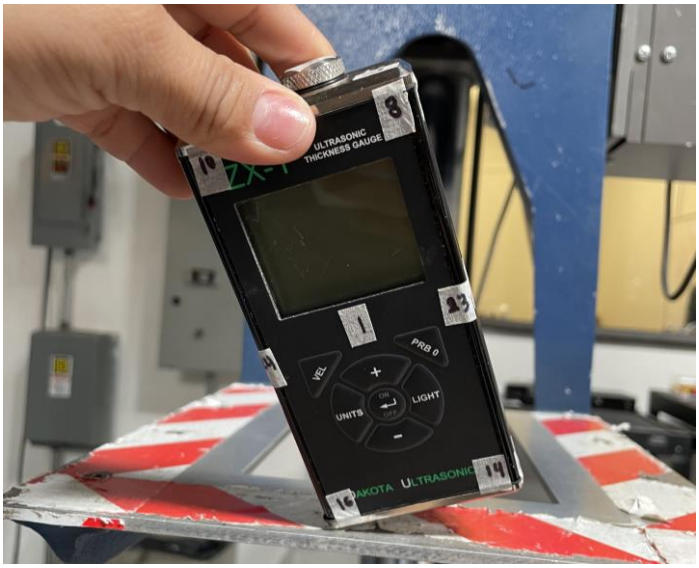
Photograph 16. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 13



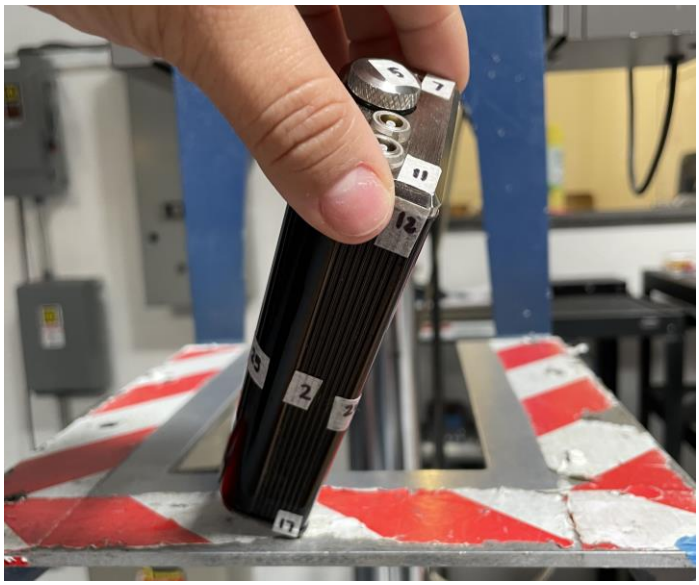
Photograph 17. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 14



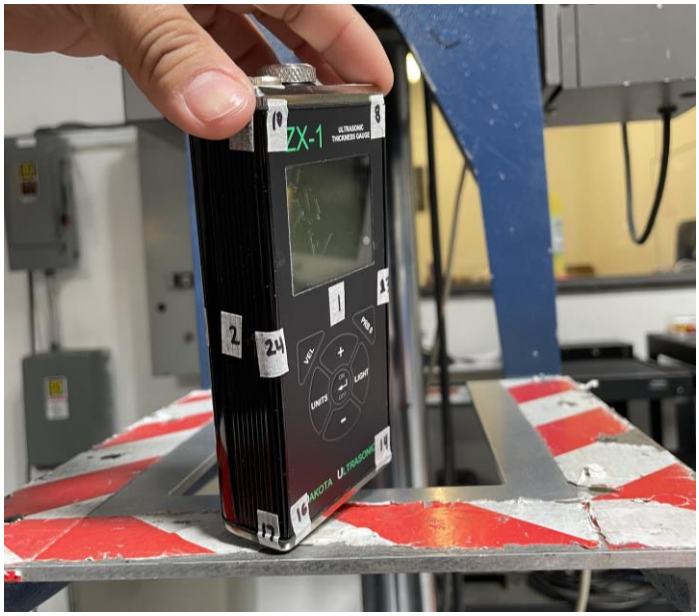
Photograph 18. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 15



Photograph 19. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 16



Photograph 20. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 17



Photograph 21. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 18

Photograph 22. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 19

Photograph 23. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 20

Photograph 24. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 21

Photograph 25. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 22

Photograph 26. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 23

Photograph 27. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 24

Photograph 28. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 25

Photograph 29. Shock, Procedure IV – Transit Drop (Drop Height 48 Inches) 26

IV. Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025: 2017.

Test Name: Method 51.6, Shock, Procedure IV – Transit Drop			**Test Date: 07/22/2022**		
Asset #	**Equipment**	**Manufacturer**	**Model #**	**Last Cal**	**Cal Due**
2U0598	Electronic Platform Scale	Cardinal Detecto	708/8950F	10/12/2021	4/12/2023
2U0217	Laser measuring Tool	General Tools	LTM1	7/9/2022	7/9/2023
2U0867	Digital controlled Drop Tester	Lansmont Corporation	PDT-56ED	See Note	See Note
2U0799	Quick Release Drop Tester	Lansmont Corporation	QR-3000	See Note	See Note

Table 5. Shock, Procedure IV – Transit Drop, Detailed List of Test Equipment

Note: Functionally verified test equipment is verified using calibrated instrumentation at time of testing.