Keystone Compliance, LLC
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New Castle, PA 16101

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ROY ALPHA

2407-071N

Environmental Test Report 2407-071N Rev. N/C

Test Standards: ANSI 136.31:2023

For

ROY ALPHA

Calle 15 # 32 - 598 zona Ind. Yumbo
Cali, Colombia

On

LED Luminaire

Model Number: RALED I Plus; Part Number: N/A; Serial Number: N/A

Performed By: **Keystone Compliance, LLC.**
131 Columbus Inner Belt
New Castle, PA 16101

Keystone Compliance, LLC. does hereby certify that all inspections and tests have been performed in accordance with the documents referenced herein with exceptions as noted in this report. The results in this report pertain to the specified equipment tested, as received. This report shall not be reproduced, except in full, without the written authorization of Keystone Compliance, LLC.

Prepared By:	**Tomasina Burrelli,** Technical Writer	**Date:**	**7/24/2024**
Approved By:	**Robert Turner,** Environmental Lab Manager	**Date:**	**7/24/2024**
Approved By:	**Maria Rodgers**, Quality Manager	**Date:**	**7/24/2024**

Document History

Revision	Issue Date	Description of Modifications	Revised By	Approved By
N/C	7/24/2024	Initial release	N/A	T.M.

Client Information

Purchase Order	Signed Quote
Quote Number	2407-071N
EUT Arrival Date	7/18/2024 -- Received in good condition
Company Name	ROY ALPHA
Address	Calle 15 # 32 - 598 zona Ind. Yumbo
City, State Zip	Cali, Colombia
Contact Name	Luis Asprilla
Email	luasprilla@royalpha.com.co

Test Facility Information

Test Laboratory	Keystone Compliance, LLC.
Address	131 Columbus Inner Belt
City, State, Zip Code	New Castle, PA 16101
Phone	(724) 657-9940
Fax	(724) 657-9920
Web Site	www.keystonecompliance.com
Contact Name	Robert Turner
Title	Environmental Lab Manager
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Test Program Information

Test Personnel	**Ben Darkey** -- Environmental Test Technician
Test Title & Test Dates	Vibration – **July 23, 2024**

TABLE OF CONTENTS

LIST OF TABLES

Introduction

This report documents the results of the Environmental tests performed on the LED Luminaire, Model Number: RALED I Plus; Part Number: N/A; Serial Number: N/A, submitted by ROY ALPHA

The Environmental test programs described herein were performed in accordance with the applicable requirements of ANSI 136.31:2023.

Statements of compliance are made in this report without taking measurement uncertainty into account, except for when specifically requested by the customer. Where statements of compliance are made in this report, the following decision rules are applied:

Complied/Met the criteria of the specification - Results are within the limits
Non-Compliant/Did not meet the criteria of the specification - Results exceed the limits

All test data is included in Section 3 of this document.

All tests performed at Keystone Compliance New Castle, PA Environmental test facility. All tests were performed using the test set-ups of the relevant standard for tests performed in laboratory conditions.

Acronyms and Abbreviations

M/N – Model Number

P/N – Part Number

S/N – Serial Number

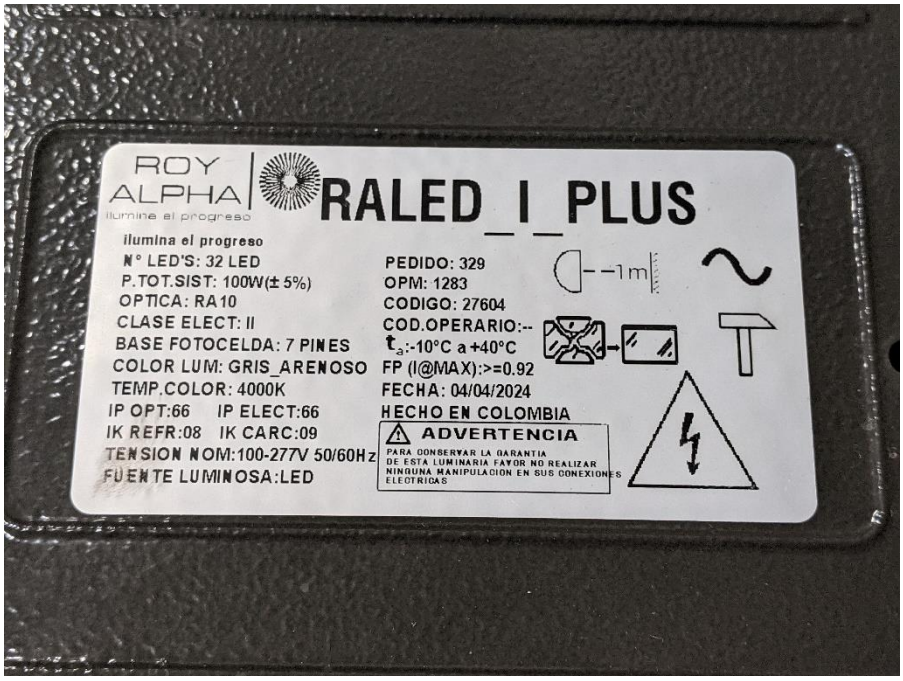
UUT – Unit Under Testing

EUT – Equipment Under Testing

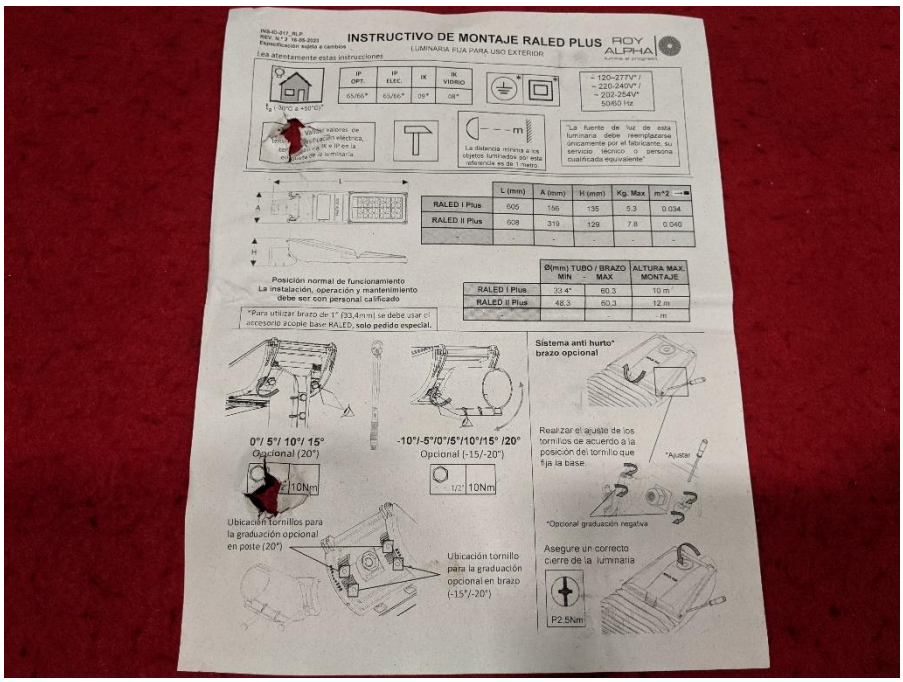
Equipment Under Test(s)

EUT		
Description	Manufacturer	
LED Luminaire	**ROY ALPHA**	
Model Number	Part Number	Serial Number
RALED I Plus	**N/A**	**N/A**

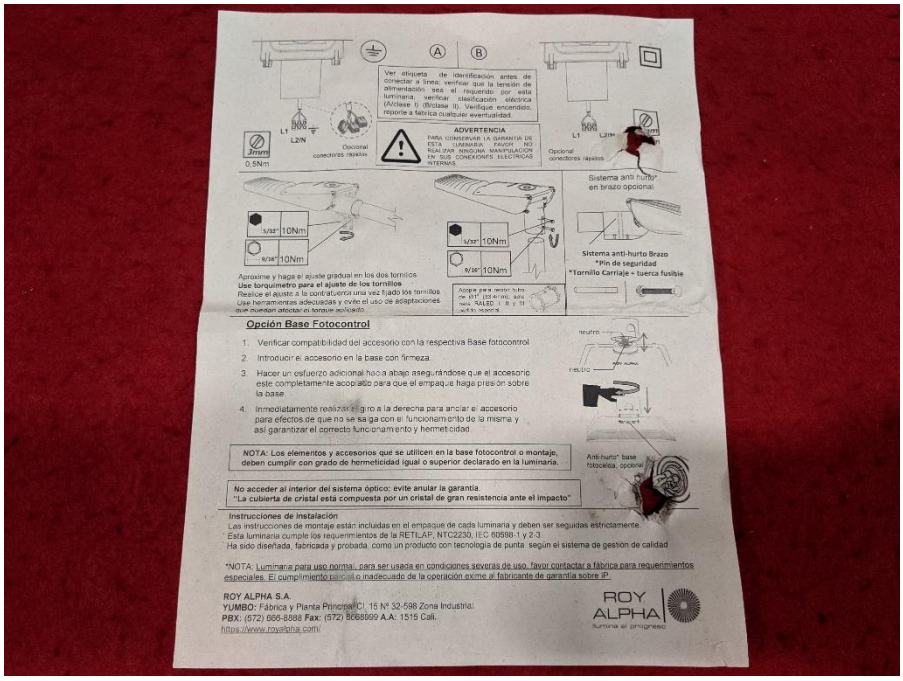
EUT
LED Luminaire



EUT
Unit Identification Verification



EUT
Unit Identification Verification



EUT

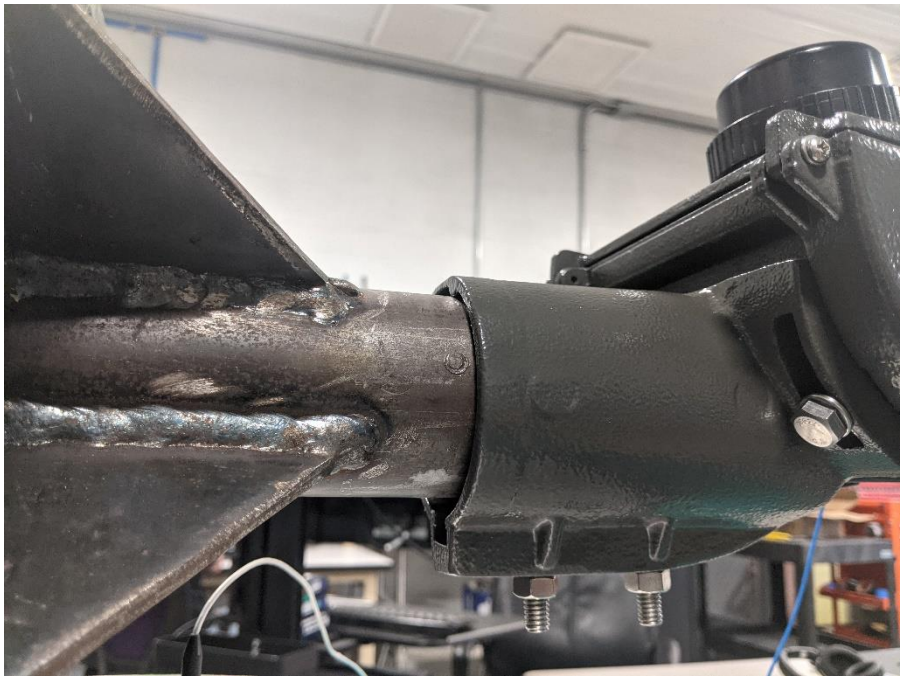
Unit Identification Verification

EUT

ANSI Testing Support Equipment

EUT

Fixturing Verification



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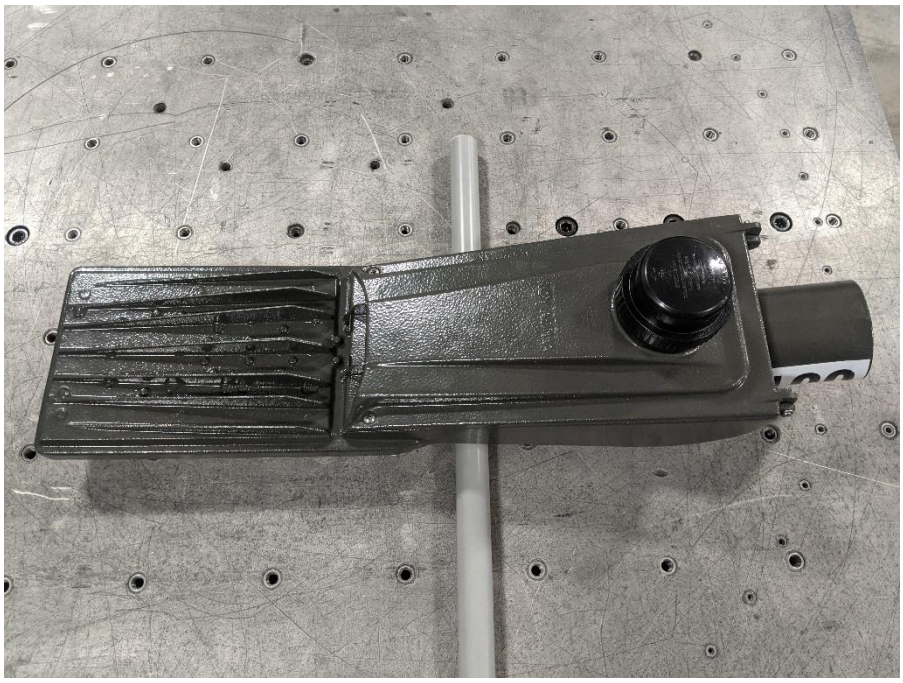
Fixturing Verification

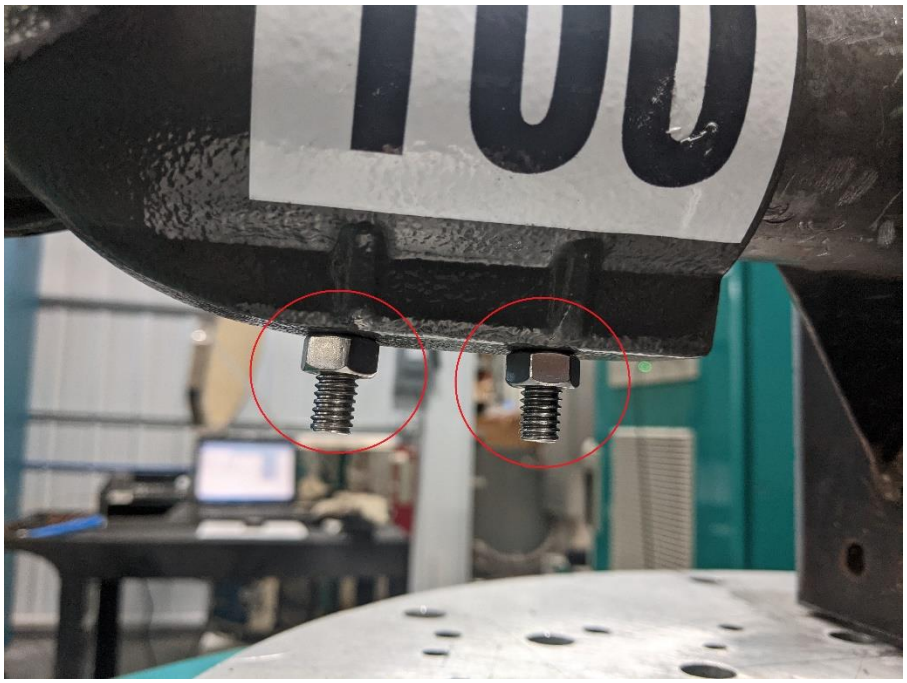


EUT

Center of Gravity
Location Verification

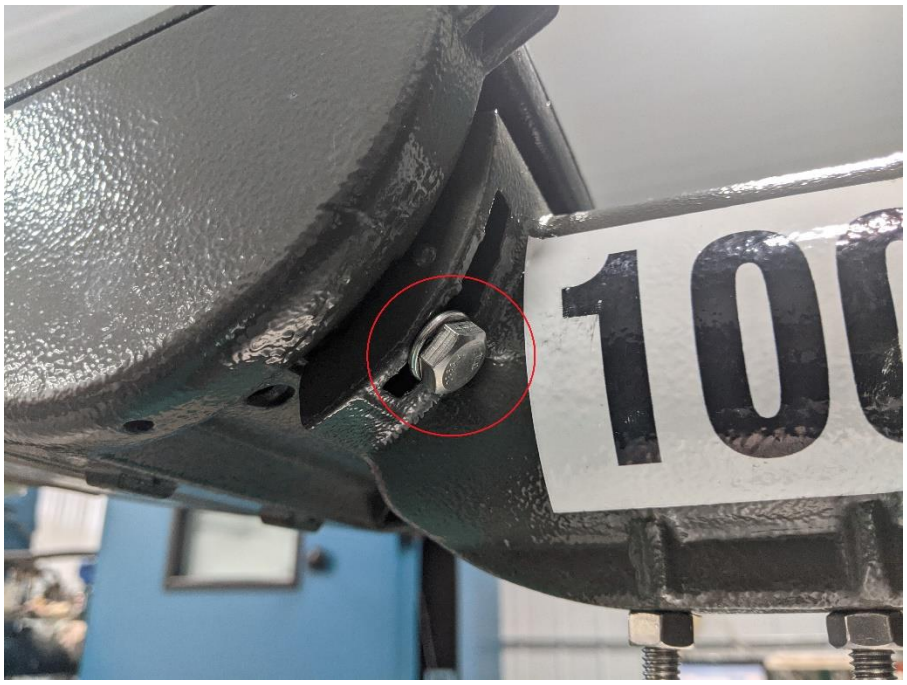
EUT

Pre-Testing
Functional Verification



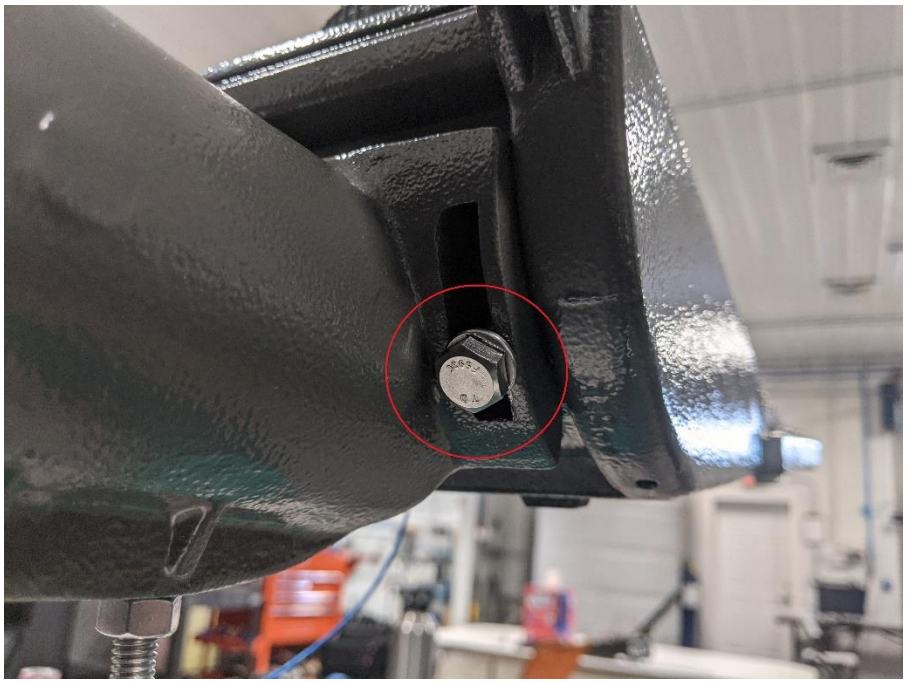
EUT

Torque Verification



EUT

Torque Verification



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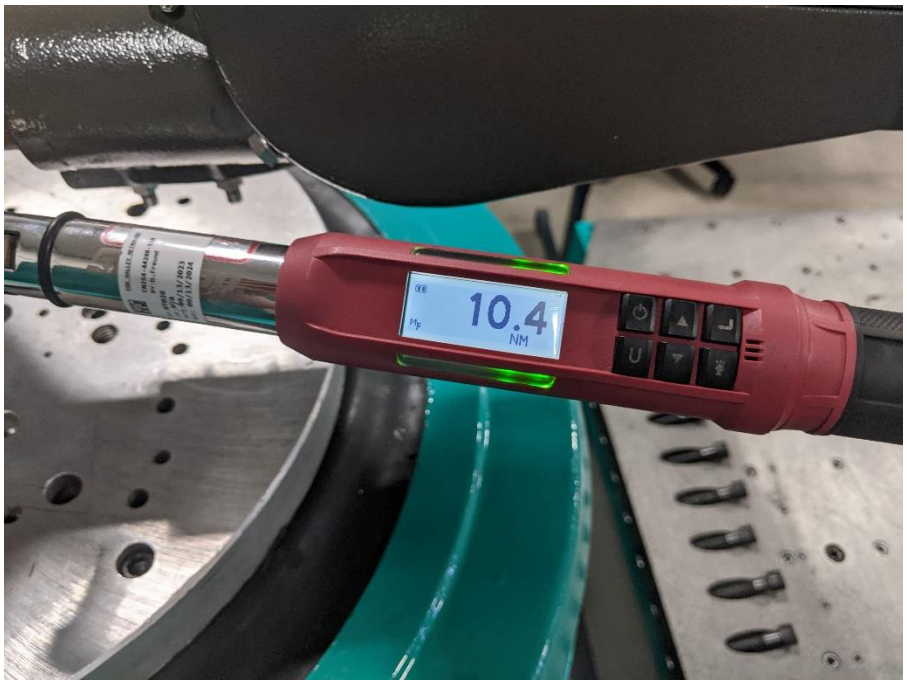
Torque Verification



EUT

Typical Torque Value Verification

Summary of Tests Performed & Results

Table 1 Tests Performed & Results

Report Paragraph	Test Description	Specification	Results
3.3	Vibration	ANSI C136.31-2023	ANSI C136.31-2023 Sinusoidal Vibration Complete. No signs of damage, deterioration, and/or functional anomalies were discovered. Unit Under Testing met the acceptance criteria of the specification.

Section 1 – Test Conditions and Equipment

1.1 Ambient Environmental Conditions

Unless otherwise specified herein, all tests were performed at an atmospheric pressure of 28 ±2.5 inches of mercury absolute, a temperature of 75 ±15°F, and a relative humidity of 50 ±30%.

1.2 Instrumentation and Equipment

Measuring and test equipment, utilized in the performance of these tests, was calibrated by Keystone Compliance, LLC. or a commercial facility, utilizing reference standards (or interim standards) whose calibrations have been certified as being traceable to the National Institute of Standards & Technology (NIST). All reference standards utilized in the above calibration system are supported by certificates, reports, or data sheets attesting to the date, accuracy, and conditions under which the results furnished were obtained. All subordinate standards, measuring and test equipment are supported by like data, when such information is essential to achieve the accuracy control required by the procedure.

Keystone Compliance, LLC. attests that the commercial sources providing calibration services on the above referenced equipment, other than the NIST Standards are in fact capable of performing the required services to the satisfaction of Keystone Compliance, LLC. Quality Assurance. Certifications of all calibrations performed are retained on file in the Keystone Compliance, LLC. Quality Assurance Department, and are available for inspection upon request by customer representatives.

The test equipment utilized during this test program is listed on individual Test Equipment Sheets located in Section 3 of this document.

1.3 Tolerances

All test conditions were maintained within all applicable specified tolerances.

Section 2 – References

2.1 Applicable Specifications

Reference Specification Title	**ANSI 136.31:2023** **American National Standard for Roadway and Area Lighting Equipment - Luminaire Vibration**

Section 3 – Test Logs, Test Equipment, Test Data, & Test Photographs

3.1 Test Log

Test Log			
EUT:	**LED Luminaire**	Job Number:	**2407-071N**
Customer:	**Roy Alpha S.A. Cali, Columbia**	Model Number:	**RALED I Plus**
Date:	**7/23/2024**	Part Number:	**N/A**
Test Engineer:	**B. Darkey**	Serial Number:	**N/A**

Date	Time	Axis	Description
			Received Unit's Under Testing. Luminaire showed no signs of damage, or degradation. DUT was powered on to verify performance prior to testing.
7/23/2024	1130	Z	Performed .3G Pre-Sine Sweep at 1 octave/minute. From 5Hz to 75Hz to look for frequency of resonance.
	1134	Z	Resonance discovered at 49.35 Hz.
	1147	Z	Performed 1.3 G Sine Sweep at 1 octave/minute. From 5Hz to 75Hz to verify transmissibility.
	1150	Z	Transmissibility at resonance was greater than 2.
	1154	Z	Conducted a resonance dwell at 44 Hz for 100,000 cycles. (1.3 / 3G) 00:37:53 duration.
	1232	Z	ANSI C136.31-2018 Resonant Dwell Complete. No signs of damage, or deterioration were discovered.
	1237	Z	Performed 1.3 G Sine Sweep at 1 octave/minute. From 5Hz to 75Hz to verify transmissibility.
	1241	Z	Transmissibility at resonance did not change.
	1244	Z	Performed .3G Post-Sine Sweep at 1 octave/minute. From 5Hz to 75Hz to look for resonance shift.
	1248	Z	No Resonance shift was discovered.
			No damage, deterioration, and/or functional anomalies were discovered after completion of the Z-Axis. Fixture was rotated on slip table and DUT torque was again verified before proceeding further.
	1327	Y	Performed .3G Pre-Sine Sweep at 1 octave/minute. From 5Hz to 75Hz to look for frequency of resonance.
	1330	Y	No Resonant Frequency was discovered.
	1345	Y	Conducted a resonance dwell at 21.7 Hz for 100,000 cycles. (0.125 in pk-pk) 01:16:48 duration.
	1502	Y	ANSI C136.31-2018 Resonant Dwell Complete. No signs of damage, or deterioration were discovered.
	1508	Y	Performed .3G Post-Sine Sweep at 1 octave/minute. From 5Hz to 75Hz to look for resonance shift.
	1512	Y	No Resonance shift was discovered.

Date	Time	Axis	Description
			No damage, deterioration, and/or functional anomalies were discovered after completion of the Y-Axis. Fixture was rotated on slip table and DUT torque was again verified before proceeding further.
	1538	X	Performed .3G Pre-Sine Sweep at 1 octave/minute. From 5Hz to 75Hz to look for frequency of resonance.
	1541	X	Resonance discovered at 64.7Hz.
	1607	X	Performed 0.4G Sine Sweep at 1 octave/minute. From 5Hz to 75Hz to verify transmissibility.
	1611	X	Resonance Shifted to 62.3 Hz. Transmissibility at resonance was greater than 2.
	1616	X	Started resonance dwell at 0.4G. Acceleration began to shift, therefore moved amplitude to conducted a resonance dwell at 62.3 Hz for 100,000 cycles at 0.7G for 00:26:45 duration.
	1639	X	Paused test to reduce amplitude to 0.5G in order to maintain an acceleration of 3G at COG.
	1652	X	ANSI C136.31-2018 Resonant Dwell Complete. No signs of damage, or deterioration were discovered.
	1653	X	Performed .55 G Sine Sweep at 1 octave/minute. From 5Hz to 75Hz to verify transmissibility.
	1657	X	Transmissibility at resonance did not change.
	1659	X	Performed .3G Post-Sine Sweep at 1 octave/minute. From 5Hz to 75Hz to look for resonance shift.
	1704	X	No Resonance shift was discovered.
			ANSI C136.31-2023 Sinusoidal Vibration Complete. No signs of damage, deterioration, and/or functional anomalies were discovered. Unit Under Testing met the acceptance criteria of the specification.

3.2 Equipment List

Equipment Log			
EUT:	**LED Luminaire**	Job Number:	**2407-071N**
Customer:	**Roy Alpha S.A. Cali, Columbia**	Model Number:	**RALED I Plus**
Date:	**7/23/2024**	Part Number:	**N/A**
Test Engineer:	**B. Darkey**	Serial Number:	**N/A**

Test Equipment					
Asset No.	Description	Manufacturer	Model	Serial No.	Cal. Due
ND002	**Shaker, LDS**	**Ling Dynamics Systems**	**483.42**	**377**	**UWCE**
ND008	**Accelerometer**	**PCB Piezotronics**	**353B04**	**147743**	**1/24/2025**
ND103	**Vibration Controller**	**Vibration Research**	**VR9500 Revolution**	**95588122**	**5/16/2025**
ND113	**Vibration Controller**	**Vibration Research**	**VR9500 Revolution**	**951BFFF5**	**2/15/2025**
ND126	**Accelerometer**	**The Modal Shop**	**356A03**	**LW393288**	**4/18/2025**
NM097	**Temperature/Humidity Meter**	**Traceable**	**4096 98766-84**	**240013750**	**1/4/2026**
NS008	**Vibration View Software**	**Vibration Research**	**Version 2021.1.12**	**None**	**UWCE**
NT026	**Torque wrench 5-100Ft lb.**	**Snap-On**	**ATECH2F100RB**	**0319140240**	**9/13/2024**
OA034	**Desktop Computer**	**Keystone Compliance**	**None**	**None**	**UWCE**
OA086	**Laptop**	**Samsung**	**GALAXY BOOK**	**4WPD9FGR500491**	**UWCE**
OC025	**Smart Phone**	**Google**	**PIXEL 2 XL**	**358034089117458**	**UWCE**

UWCE: Used with Calibrated Equipment
REF: Reference Only
IPU: Inspect Prior to Use

3.3 Vibration Test

a) The Vibration test requirements for the LED Luminaire are specified in ANSI C136.31-2023.

b) The Vibration test log for the LED Luminaire is located in Paragraph 3.1 of this document.

c) The Vibration test equipment used to test the LED Luminaire is located in Paragraph 3.2 of this document.

d) All recorded test data for the Vibration test on the LED Luminaire is located in Paragraph 3.3.1 of this document.

e) The Vibration test photographs for the LED Luminaire are located in Paragraph 3.3.2 of this document.

3.3.1 Vibration Test Data

Pre-Low Level Resonance Search Data Sheet			
EUT:	**LED Luminaire**	Job Number:	**2407-071N**
Customer:	**Roy Alpha S.A. Cali, Columbia**	Model Number:	**RALED I Plus**
Date:	**7/23/2024**	Part Number:	**N/A**
Test Engineer:	**B. Darkey**	Serial Number:	**N/A**
Test Specifications			
Test Spec:	**ANSI C136.31-2023**	Para. /Sec.:	**Luminaire Testing**

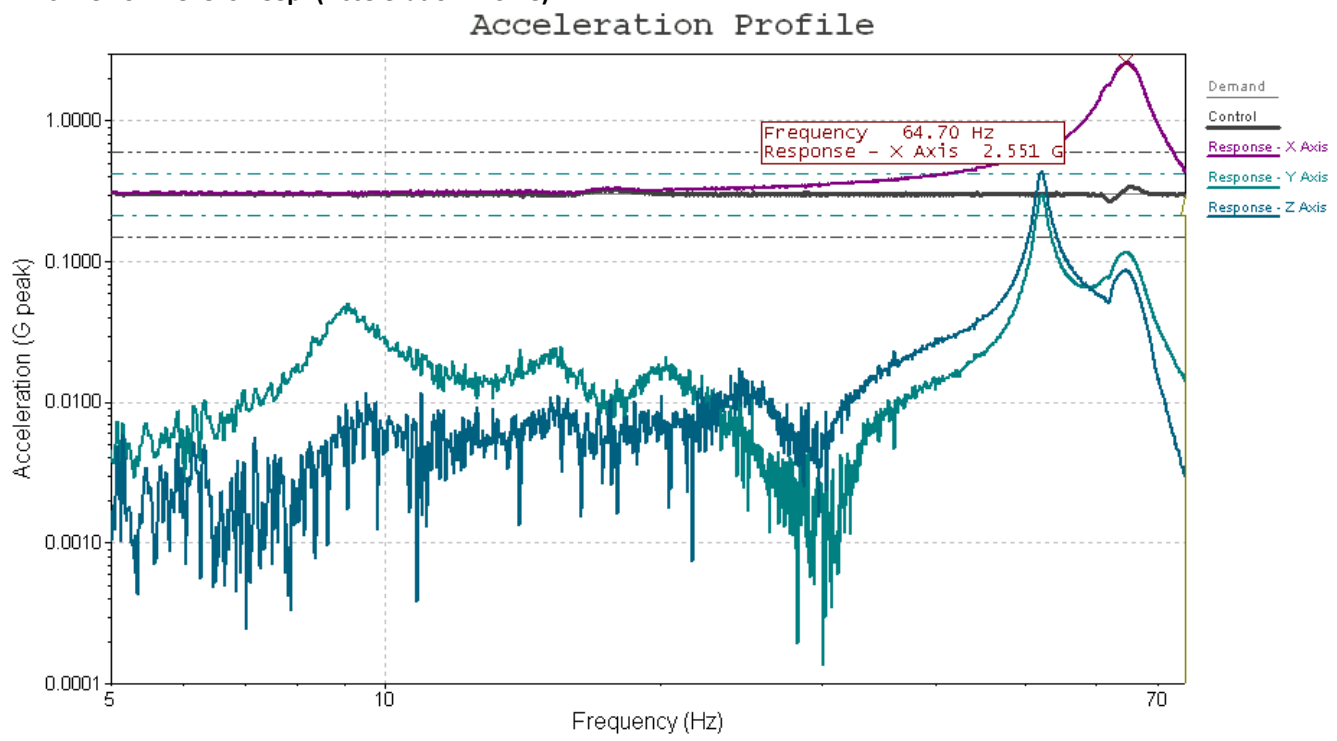
Test Data

Lateral Axis Profile (X)				
Sweep Rate (Octave/Minute):	**1**			
Duration (Time or # of Sweeps):	**00:03:55 (1 Sweep)**			
Frequency (Hz)	Acceleration (G's)			Displacement (Inches Peak to Peak)
5 - 75	**0.3**			—
EUT Test Information	Y	N	N/A	Comments
Physical Damage Noted:		✓		**None**

Longitudinal Axis Profile (Y)				
Sweep Rate (Octave/Minute):	**1**			
Duration (Time or # of Sweeps):	**00:03:55 (1 Sweep)**			
Frequency (Hz)	Acceleration (G's)			Displacement (Inches Peak to Peak)
5 - 75	**0.3**			—
EUT Test Information	Y	N	N/A	Comments
Physical Damage Noted:		✓		**None**

Vertical Axis Profile (Z)				
Sweep Rate (Octave/Minute):	**1**			
Duration (Time or # of Sweeps):	**00:03:55 (1 Sweep)**			
Frequency (Hz)	Acceleration (G's)			Displacement (Inches Peak to Peak)
5 - 75	**0.3**			—
EUT Test Information	Y	N	N/A	Comments
Physical Damage Noted:		✓		**None**

X-Axis Pre-Low-Level Sweep- (Acceleration Profile)

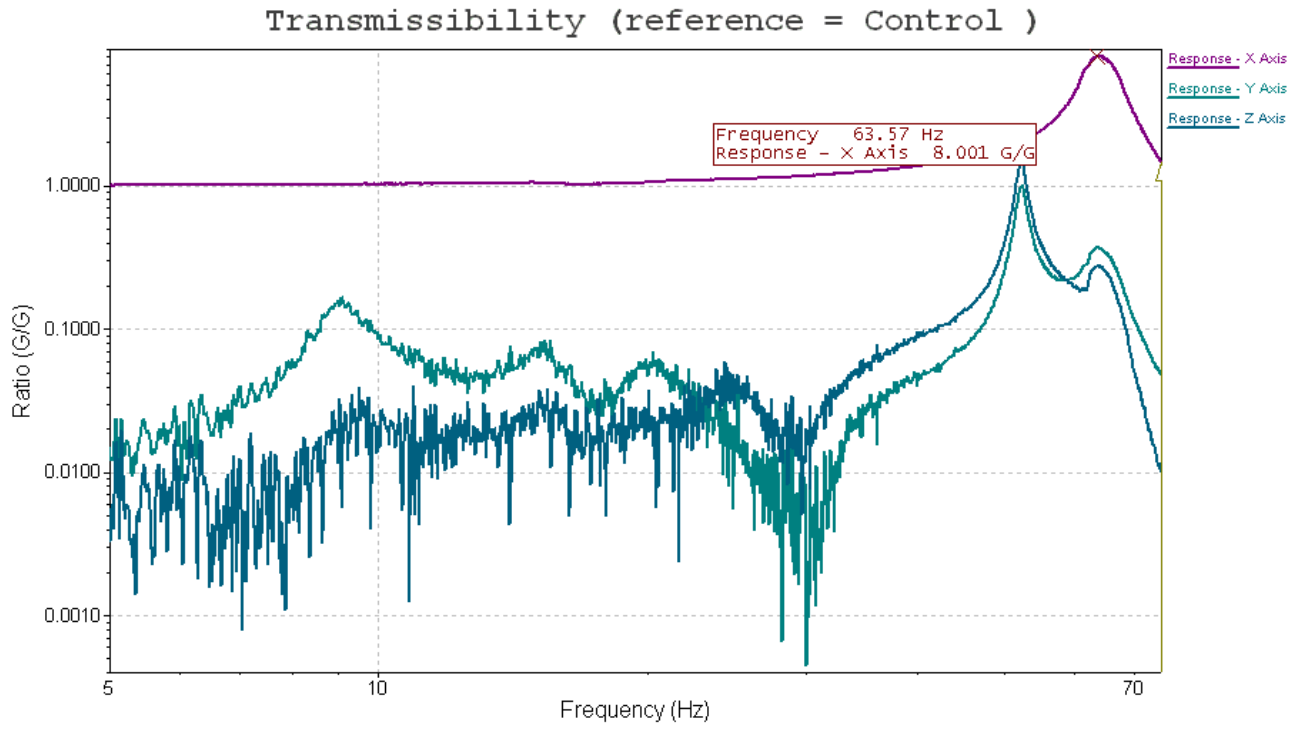


Jul 23, 2024 15:41:42 | Level 1) 100 % | Output: 0.02686 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 0.3 G | Level Time: 0:03:55 | X-Axis Response: 0.4281 G | ANSI C136.31-2023

Control: 0.2966 G | Total Time: 0:04:04 | End of Sweep Test | X-Axis Pre (Low Level) Resonance Search

X-Axis Pre-Low-Level Sweep-(Transmissibility)

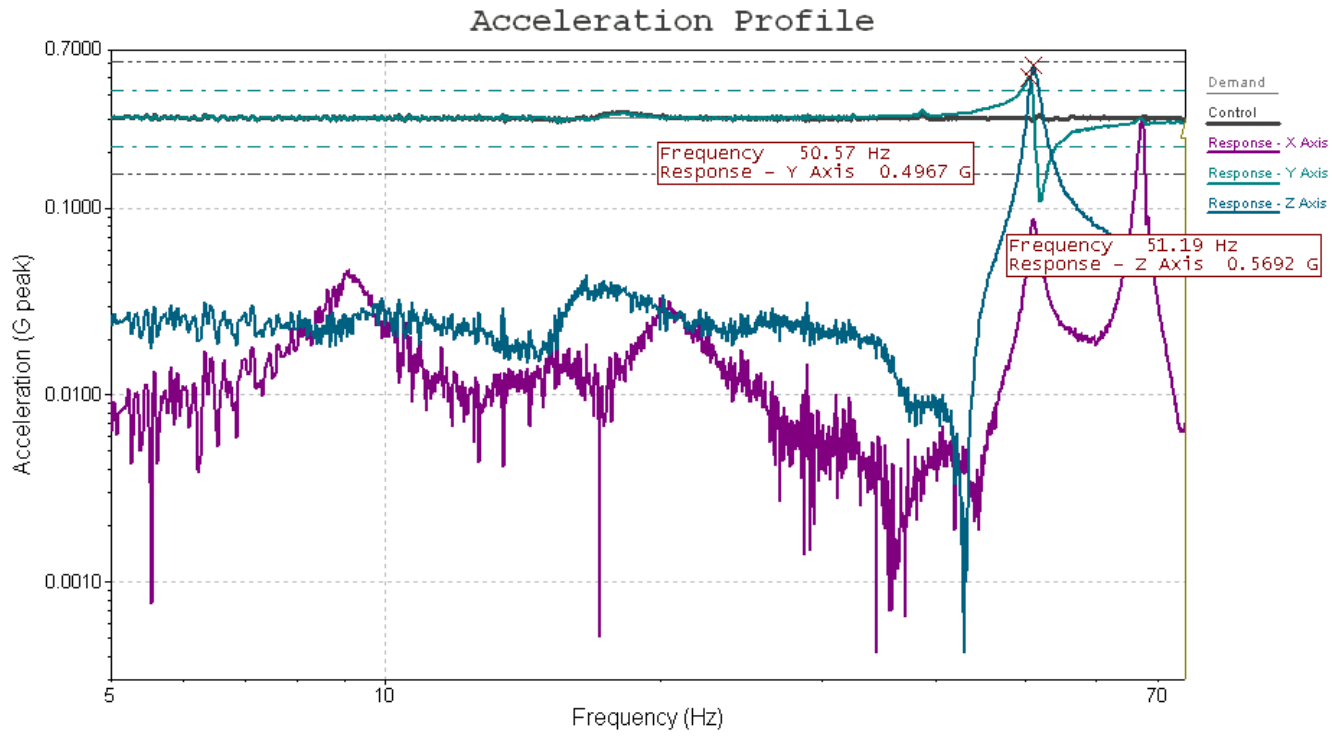


Jul 23, 2024 15:41:42 | Level 1) 100 % | Output: 0.02686 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 0.3 G | Level Time: 0:03:55 | Frequency: 75 Hz | ANSI C136.31-2023

Control: 0.2966 G | Total Time: 0:04:04 | End of Sweep Test | X-Axis Pre (Low Level) Resonance Search

Y-Axis Pre-Low-Level Sweep- (Acceleration Profile)

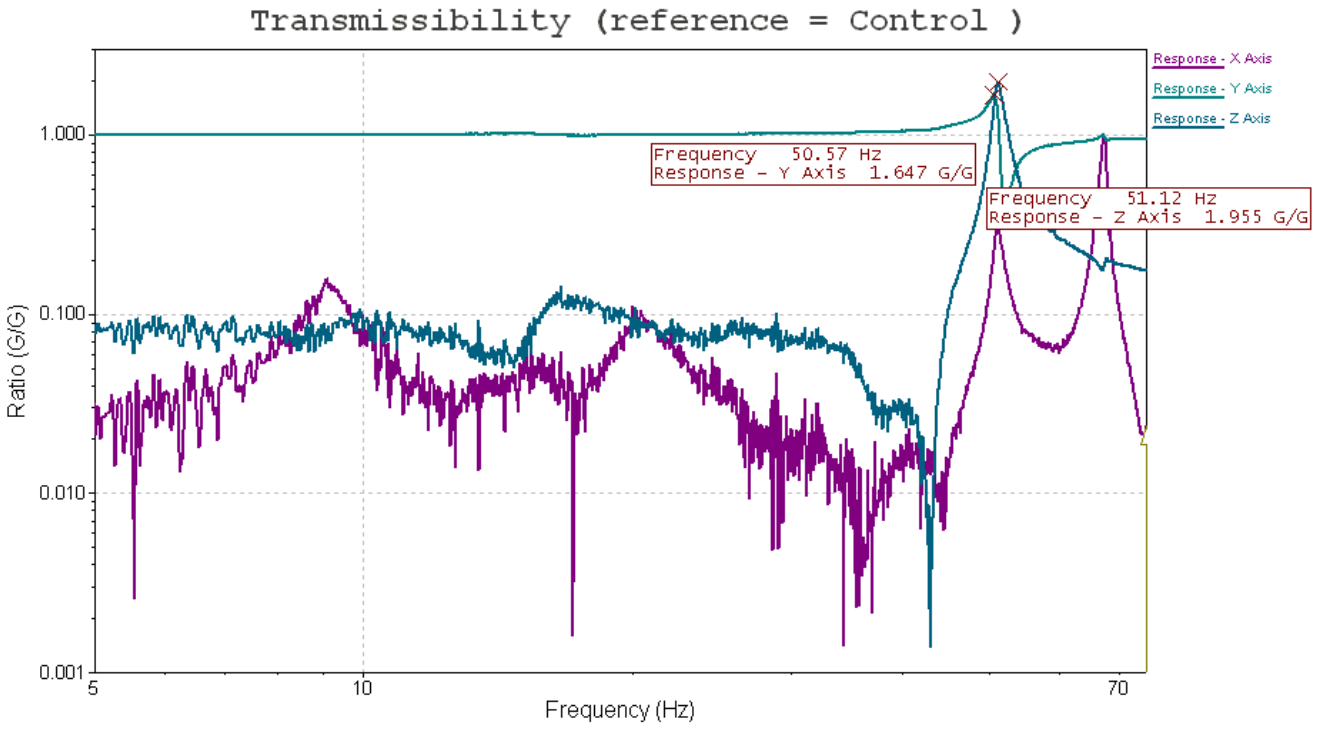


Jul 23, 2024 13:30:53 | Level 1) 100 % | Output: 0.03662 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 0.3 G | Level Time: 0:03:55 | Y-Axis Response: 0.2831 G | ANSI C136.31-2023

Control: 0.2991 G | Total Time: 0:04:04 | End of Sweep Test | Y-Axis Pre (Low Level) Resonance Search

Y-Axis Pre-Low-Level Sweep-(Transmissibility)

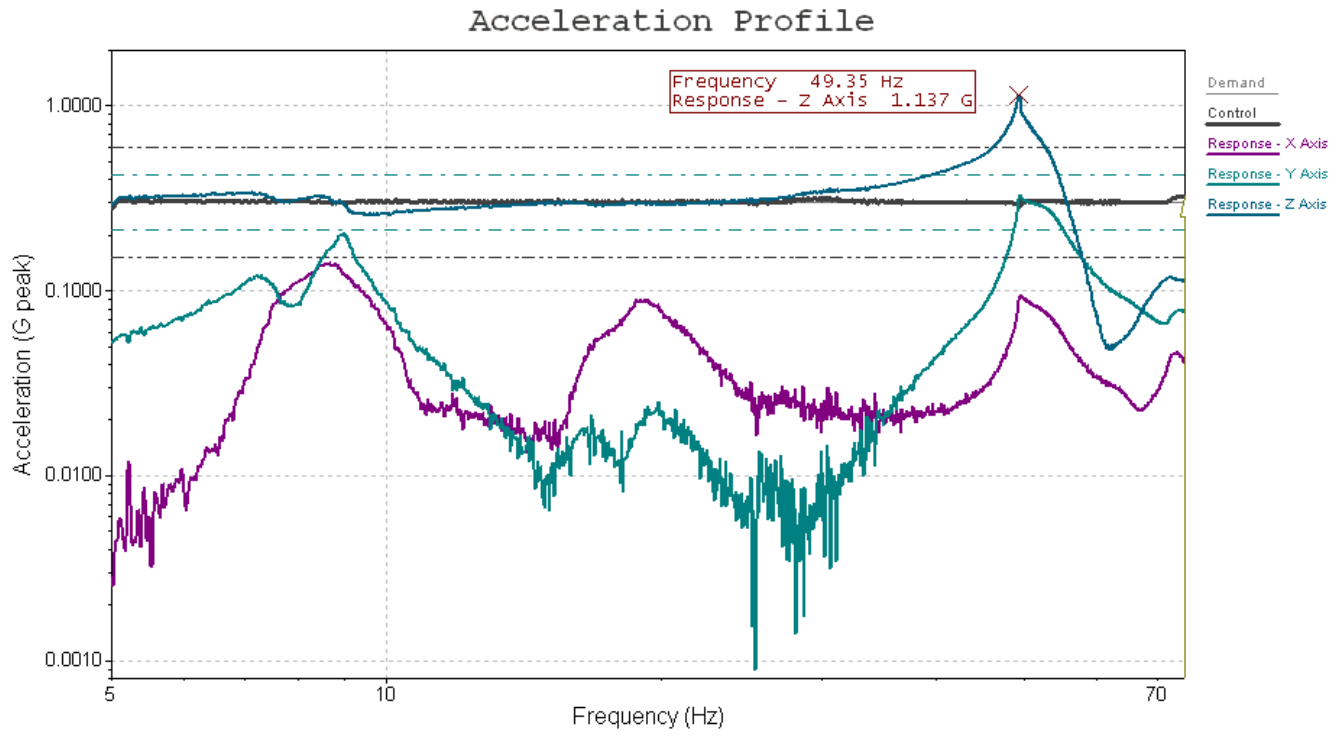


Jul 23, 2024 13:30:53 | Level 1) 100 % | Output: 0.03662 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 0.3 G | Level Time: 0:03:55 | Frequency: 75 Hz | ANSI C136.31-2023

Control: 0.2991 G | Total Time: 0:04:04 | End of Sweep Test | Y-Axis Pre (Low Level) Resonance Search

Z-Axis Pre-Low-Level Sweep (Acceleration Profile)

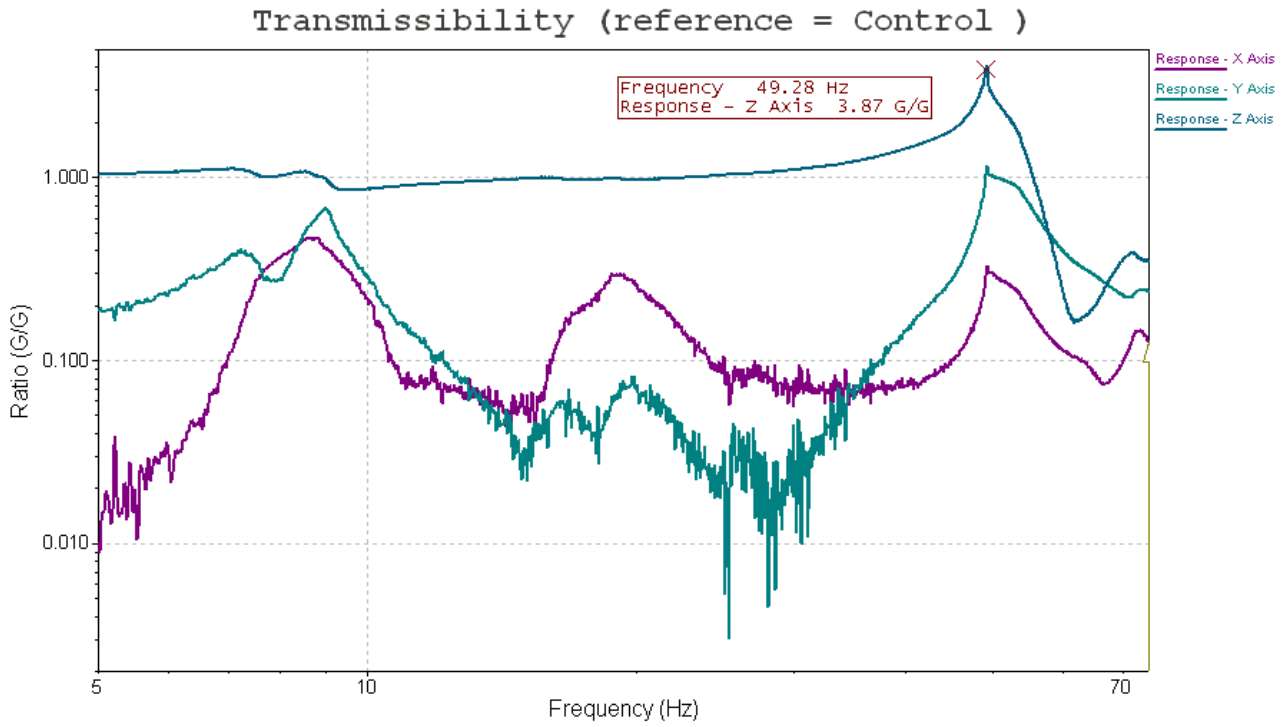


Jul 23, 2024 11:34:26 | Level 1) 100 % | Output: 0.00748 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 0.3 G | Level Time: 0:03:55 | S-Axis Response: 0.1123 G | ANSI C136.31-2023

Control: 0.3215 G | Total Time: 0:04:09 | End of Sweep Test | S-Axis Pre (Low Level) Resonance Search

Z-Axis Pre-Low-Level Sweep (Transmissibility)



Jul 23, 2024 11:34:26 | Level 1) 100 % | Output: 0.00748 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 0.3 G | Level Time: 0:03:55 | Frequency: 75 Hz | ANSI C136.31-2023

Control: 0.3215 G | Total Time: 0:04:09 | End of Sweep Test | Z-Axis Pre (Low Level) Resonance Search

Pre- Dwell (Sweep) Data Sheet			
EUT:	**LED Luminaire**	Job Number:	**2407-071N**
Customer:	**Roy Alpha S.A. Cali, Columbia**	Model Number:	**RALED I Plus**
Date:	**7/23/2024**	Part Number:	**N/A**
Test Engineer:	**B. Darkey**	Serial Number:	**N/A**
Test Specifications			
Test Spec:	**ANSI C136.31-2023**	Para. /Sec.:	**Luminaire Testing**

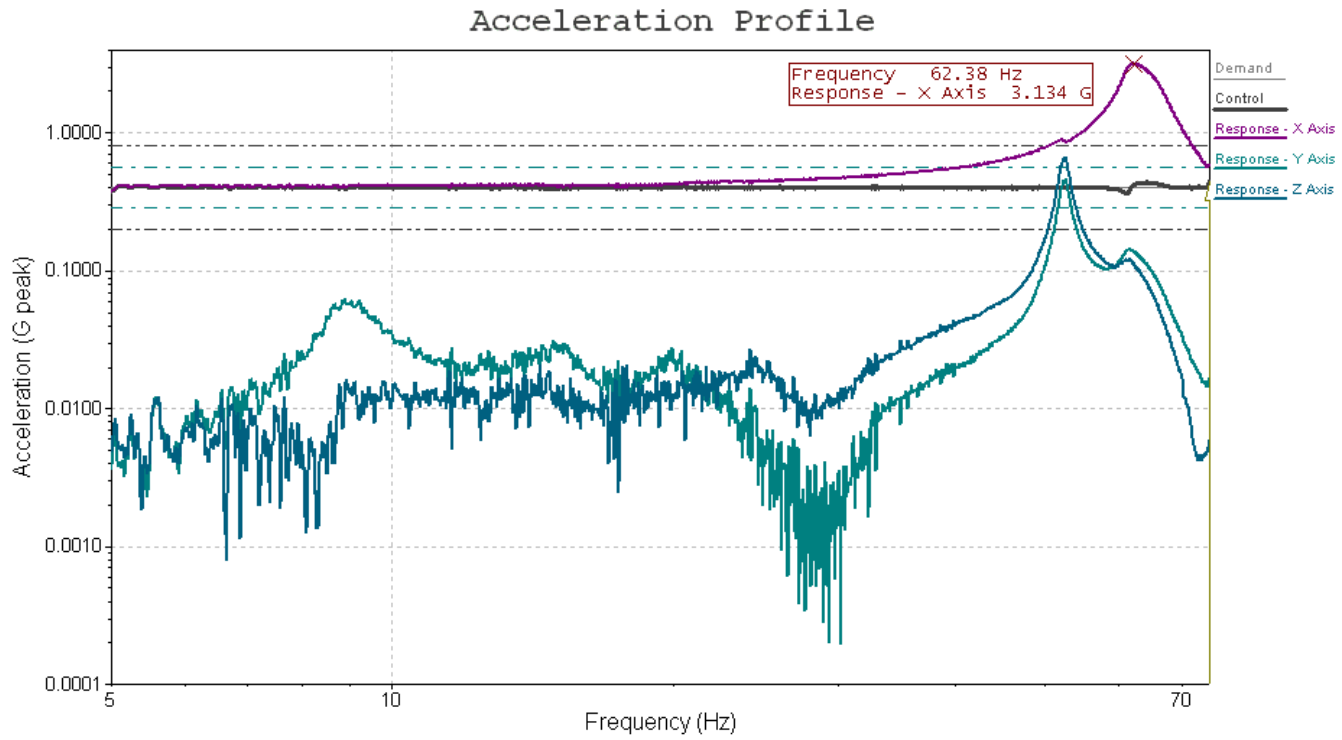
Test Data

Lateral Axis Profile (X)				
Sweep Rate (Octave/Minute):	**1**			
Duration (Time or # of Sweeps):	**00:03:55 (1 Sweep)**			
Frequency (Hz)	Acceleration (G's)	Displacement (Inches Peak to Peak)		
5 - 75	**0.4**	—		
EUT Test Information	Y	N	N/A	Comments
Physical Damage Noted:		✓		See Test Log for further details

Longitudinal Axis Profile (Y)				
Sweep Rate (Octave/Minute):	-			
Duration (Time or # of Sweeps):	-			
Frequency (Hz)	Acceleration (G's)	Displacement (Inches Peak to Peak)		
-	-	—		
EUT Test Information	Y	N	N/A	Comments
Physical Damage Noted:			✓	Did not perform due to no resonance. See test log for further details.

Vertical Axis Profile (Z)				
Sweep Rate (Octave/Minute):	**1**			
Duration (Time or # of Sweeps):	**00:03:55 (1 Sweep)**			
Frequency (Hz)	Acceleration (G's)	Displacement (Inches Peak to Peak)		
5 - 75	**1.3**	—		
EUT Test Information	Y	N	N/A	Comments
Physical Damage Noted:		✓		See Test Log for further details

X-Axis Pre-Sweep Plot- (Acceleration Profile)

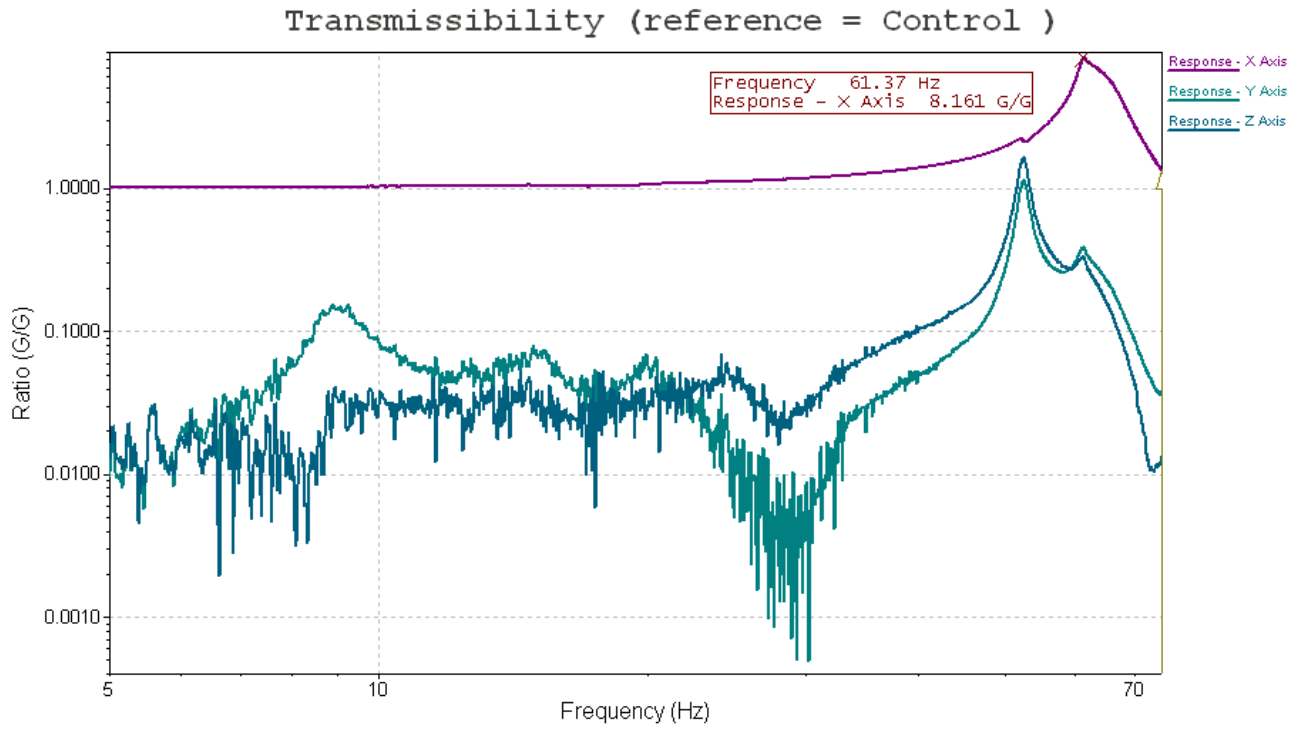


Jul 23, 2024 16:11:04 | Level 1) 100 % | Output: 0.03089 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 0.4 G | Level Time: 0:03:55 | X-Axis Response: 0.005837 G | ANSI C136.31-2023

Control: 0.4377 G | Total Time: 0:04:15 | End of Sweep Test | X-Axis Pre Resonance Search

X-Axis Pre-Sweep Plot-(Transmissibility)

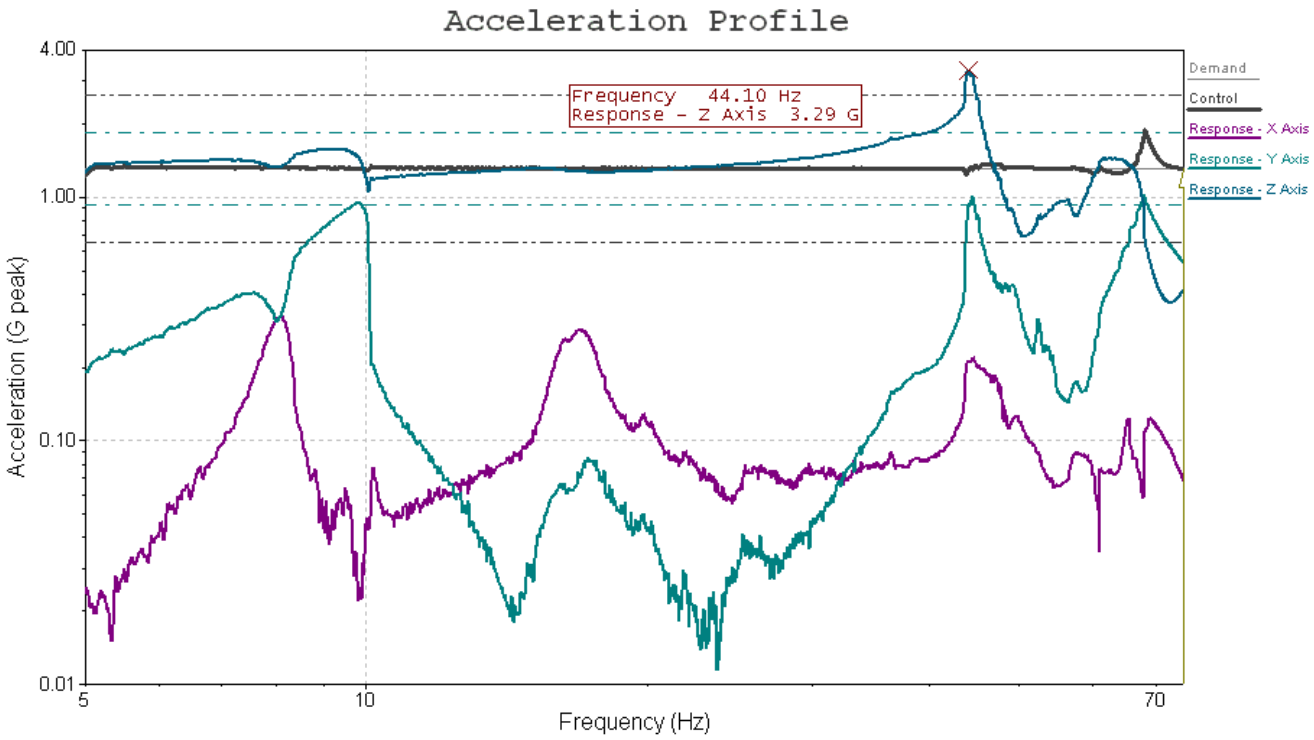


Jul 23, 2024 16:11:04 | Level 1) 100 % | Output: 0.03089 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 0.4 G | Level Time: 0:03:55 | Frequency: 75 Hz | ANSI C136.31-2023

Control: 0.4377 G | Total Time: 0:04:15 | End of Sweep Test | X-Axis Pre Resonance Search

Z-Axis Pre-Sweep Plot (Acceleration Profile)

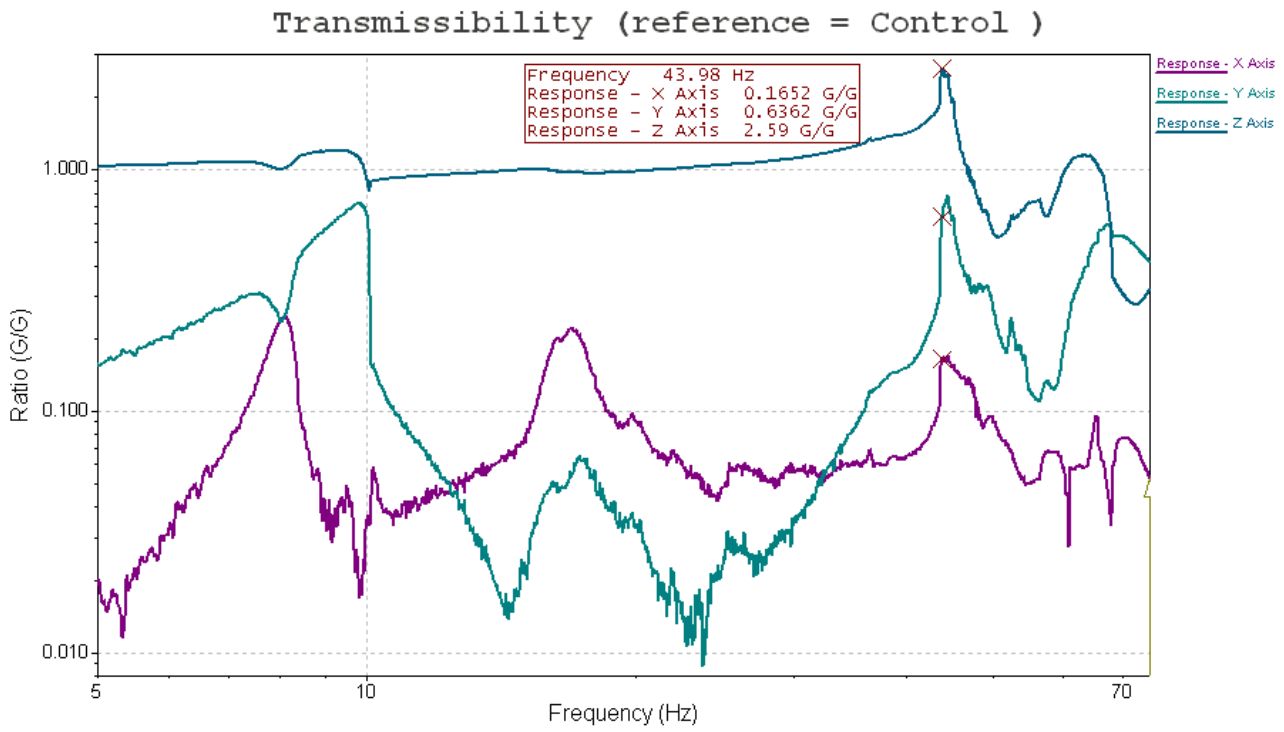


Jul 23, 2024 11:50:54 | Level 1) 100 % | Output: 0.02779 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 1.3 G | Level Time: 0:03:55 | Z-Axis Response: 0.4168 G | ANSI C136.31-2023

Control: 1.305 G | Total Time: 0:04:13 | End of Sweep Test | Z-Axis Pre Resonance Search

Z-Axis Pre-Sweep Plot (Transmissibility)



Jul 23, 2024 11:50:54 | Level 1) 100 % | Output: 0.02779 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 1.3 G | Level Time: 0:03:55 | Frequency: 75 Hz | ANSI C136.31-2023

Control: 1.305 G | Total Time: 0:04:13 | End of Sweep Test | Z-Axis Pre Resonance Search

Fixed Displacement Data Sheet			
EUT:	**LED Luminaire**	Job Number:	**2407-071N**
Customer:	**Roy Alpha S.A. Cali, Columbia**	Model Number:	**RALED I Plus**
Date:	**7/23/2024**	Part Number:	**N/A**
Test Engineer:	**B. Darkey**	Serial Number:	**N/A**
Test Specifications			
Test Spec:	**ANSI C136.31-2023**	Para. /Sec.:	**Luminaire Testing**

Test Data

Test Procedure:

Vibration-Fixed Displacement:

1) Luminaire shall be attached as it would be in the field to a vibration table capable of withstanding the loads and forces encountered during the test and tested in a manner to simulate a normal installation.
2) The luminaire shall be vibrated at or near fundamental resonant frequency.
3) This frequency shall be determined for each of the three mutually perpendicular planes and should be between 5 and 75 hertz.
4) The acceleration intensity measured at the luminaire's center of gravity.
5) The luminaire shall be capable of withstanding the described vibration for 100,000 cycles in each plane
6) A separate sample luminaire may be used for each plane to eliminate the effect of conjunctive material fatigue.

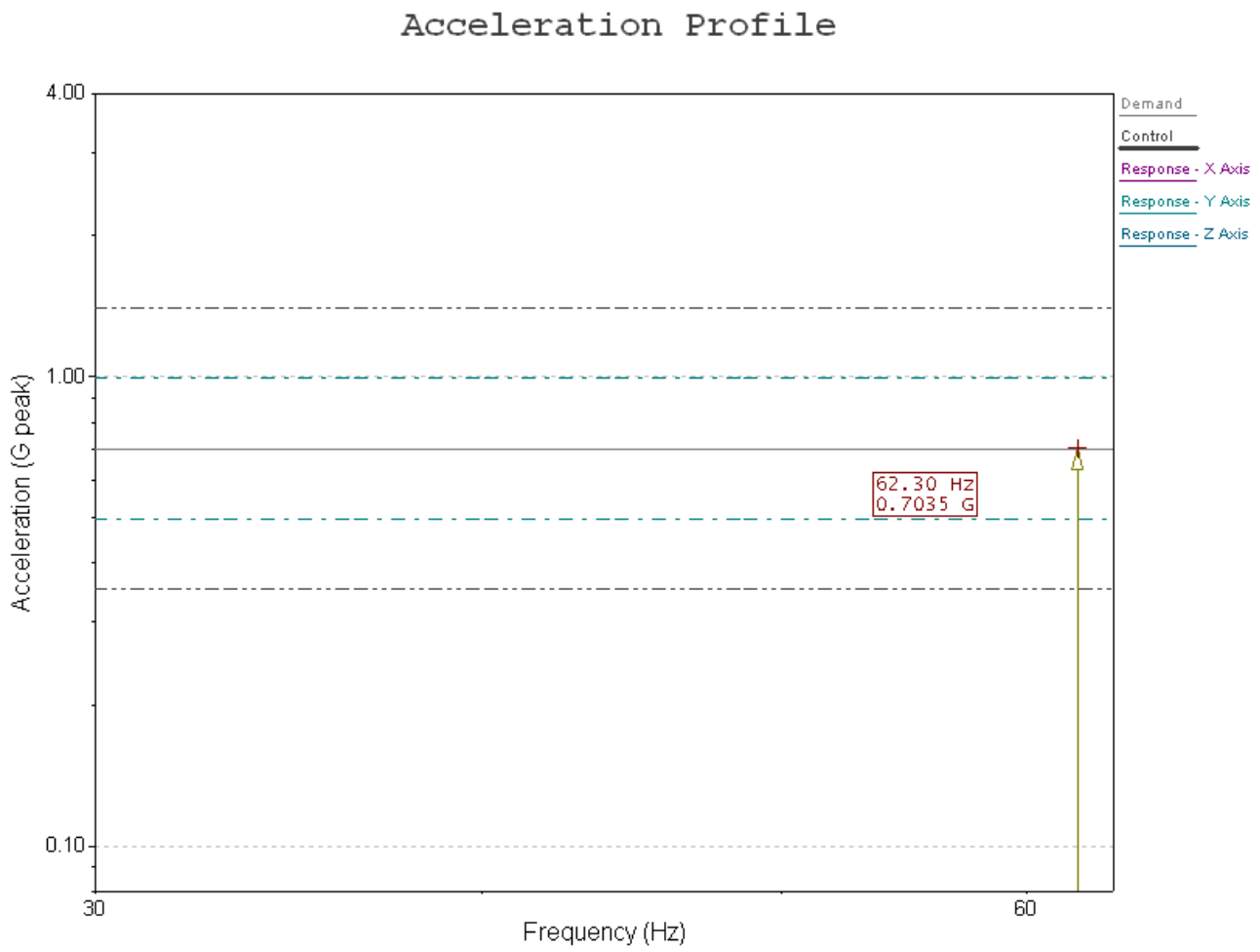
X-Axis Test Profile		
Frequency Determined (Hz)	**Duration (HH:MM:SS)**	**Acceleration Level (G)**
62.3	**00:26:45**	**3**

Y-Axis Test Profile		
Frequency Determined (Hz)	**Duration (HH:MM:SS)**	**Displacement (pk-pk)**
21.7	**1:16:48**	**(0.125 in)**

Z-Axis Test Profile		
Frequency Determined (Hz)	**Duration (HH:MM:SS)**	**Acceleration Level (G)**
44	**00:53:25**	**3**

*Plots were saved at the beginning of the testing (10,000 cycles), and then again at the end (100,000 cycles) of the dwell test.

X-Axis Dwell - 10000 Cycles Plot (Acceleration Profile)



Jul 23, 2024 16:27:19 | Level 1) 100 % at 62.3 Hz | Output: 0.0488 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

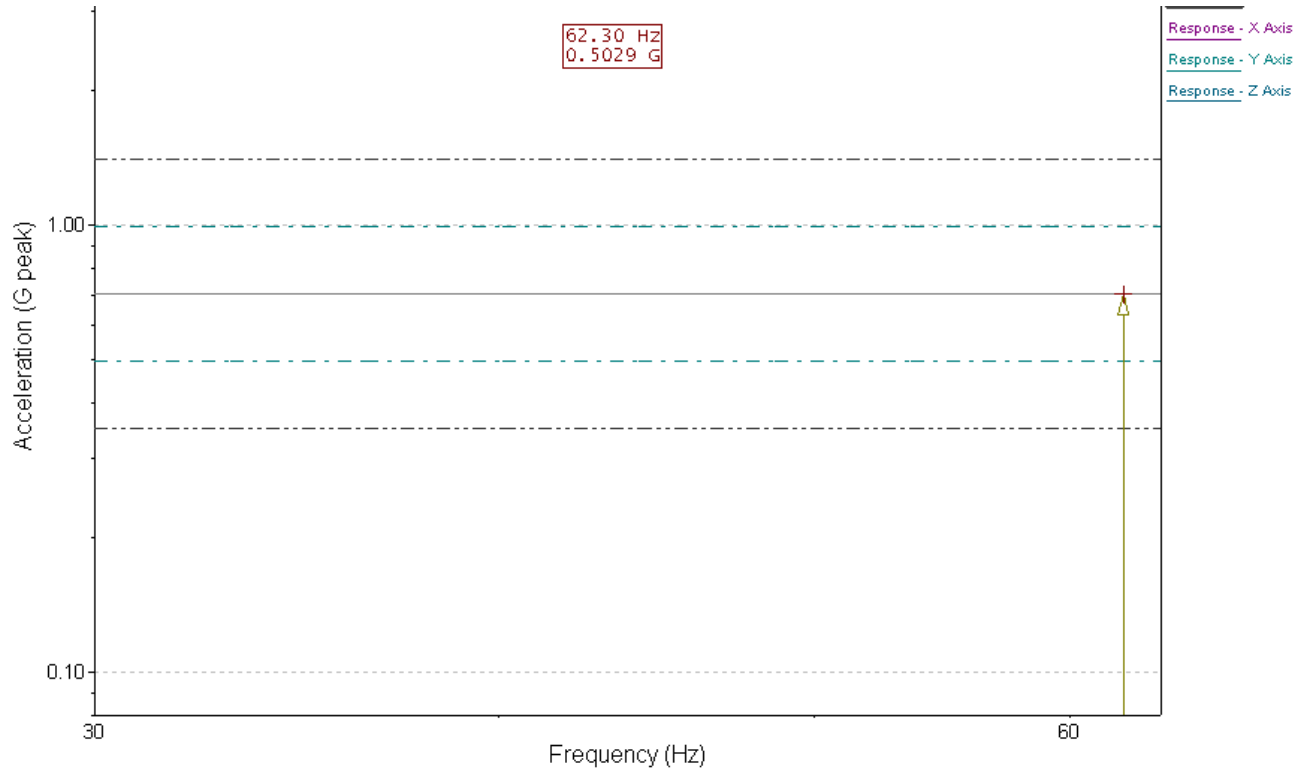
Demand: 0.7 G | Level Time: 0:02:41 | X-Axis Response: 3.156 G | ANSI C136.31-2023

Control: 0.7033 G | Total Time: 0:02:47 | Holding Frequency | X-Axis Dwell

X-Axis Dwell - 10000 Cycles Plot (Transmissibility)

Jul 23, 2024 16:27:19	Level 1) 100 % at 62.3 Hz	Output: 0.0488 Volts peak	2407-071N Roy Alpha S.A. Cali, Columbia
Demand: 0.7 G	Level Time: 0:02:41	Frequency: 62.3 Hz	ANSI C136.31-2023
Control: 0.7033 G	Total Time: 0:02:47	Holding Frequency	X-Axis Dwell

X-Axis Dwell - 100000 Cycles Plot (Acceleration Profile)



Jul 23, 2024 16:52:02 | Level 1) 100 % at 62.3 Hz | Output: 0.03975 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 0.5 G | Level Time: 0:26:46 | X-Axis Response: 3.237 G | ANSI C136.31-2023

Control: 0.5029 G | Total Time: 0:27:07 | End of Cycle Count Test | X-Axis Dwell

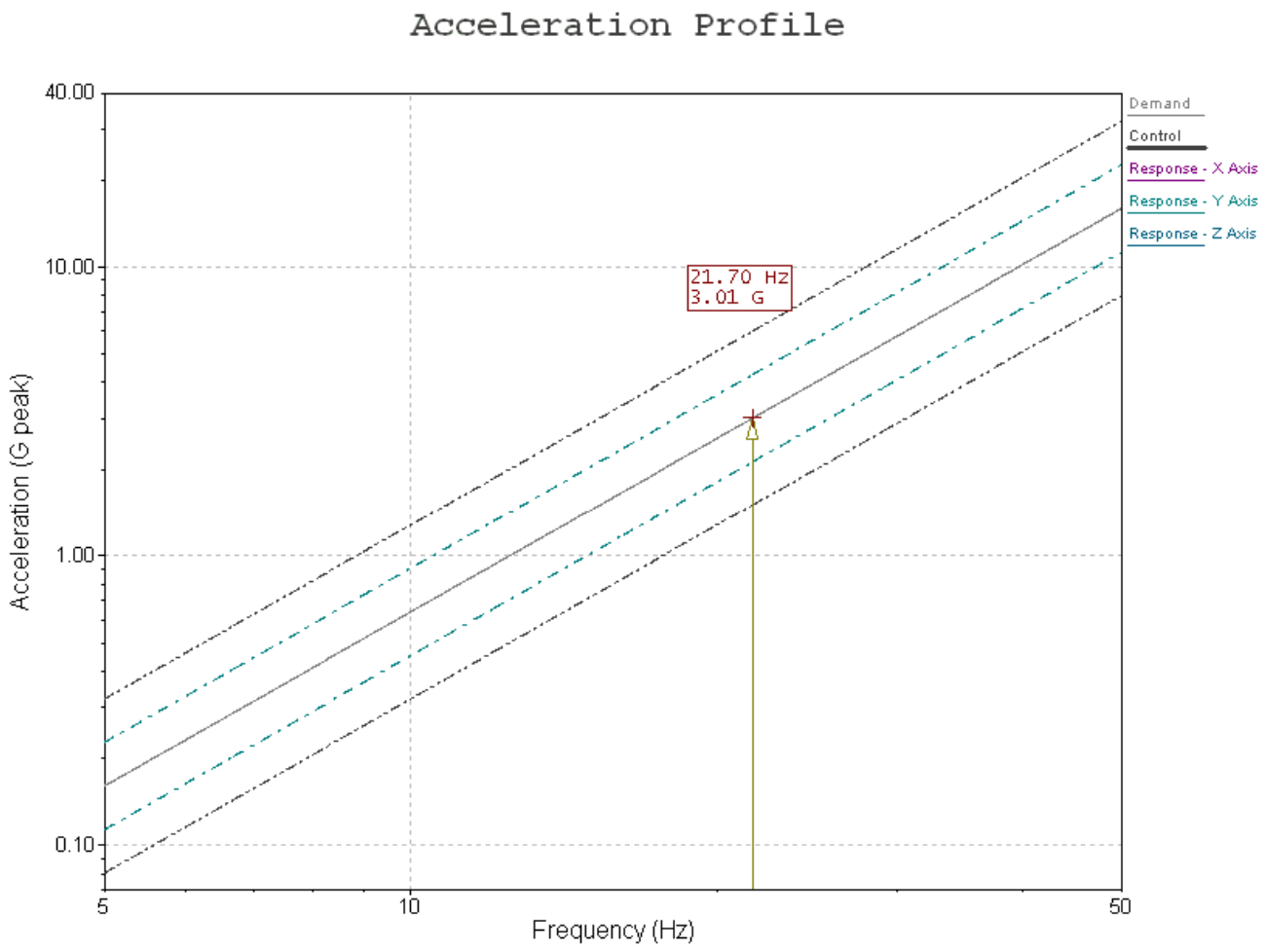
X-Axis Dwell - 100000 Cycles Plot (Transmissibility)

Jul 23, 2024 16:52:02 | Level 1) 100 % at 62.3 Hz | Output: 0.03975 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 0.5 G | Level Time: 0:26:46 | Frequency: 62.3 Hz | ANSI C136.31-2023

Control: 0.5029 G | Total Time: 0:27:07 | End of Cycle Count Test | Y-Axis Dwell

Y-Axis Dwell - 10000 Cycles Plot (Acceleration Profile)

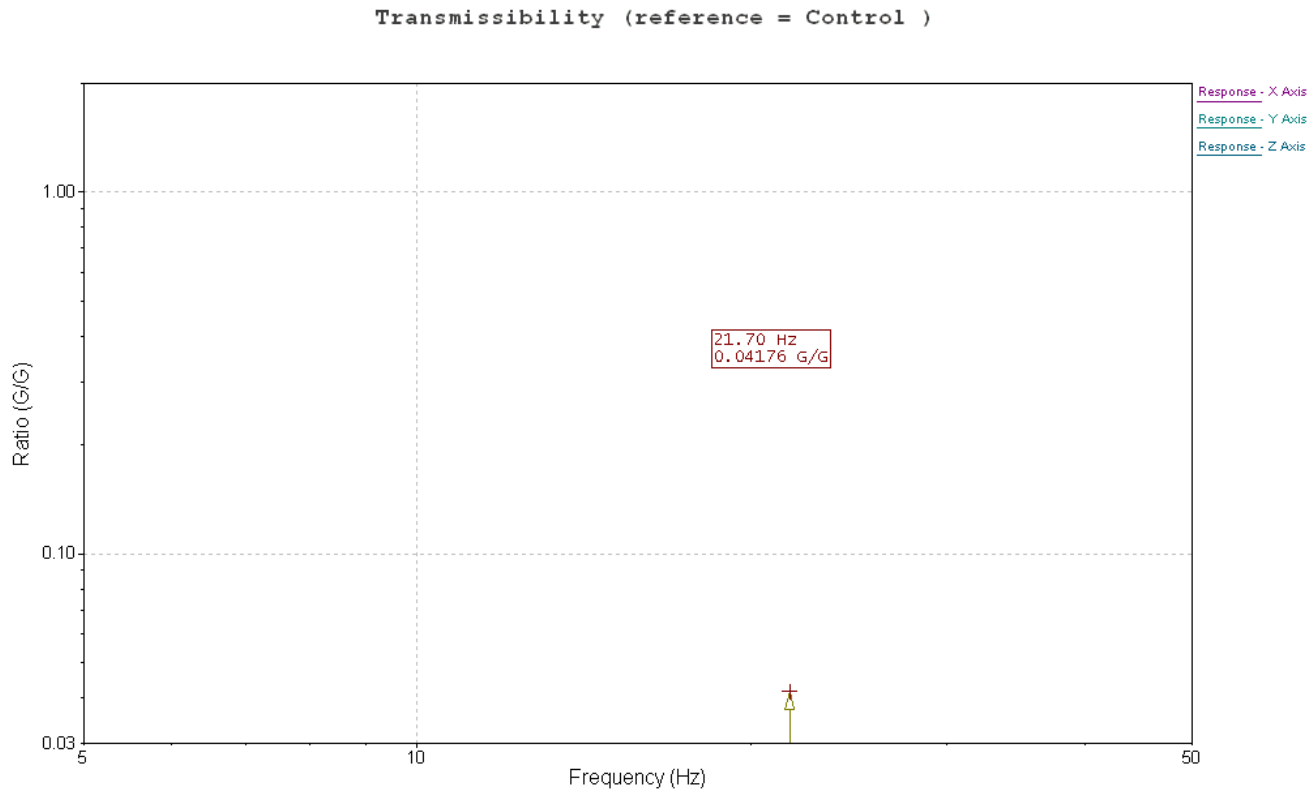


Jul 23, 2024 13:53:16 | Level 1) 100 % at 21.7 Hz | Output: 0.2463 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 3.009 G | Level Time: 0:07:41 | Y-Axis Response: 3.006 G | ANSI C136.31-2023

Control: 3.01 G | Total Time: 0:07:52 | Holding Frequency | Y-Axis Dwell

Y-Axis Dwell - 10000 Cycles Plot (Transmissibility)

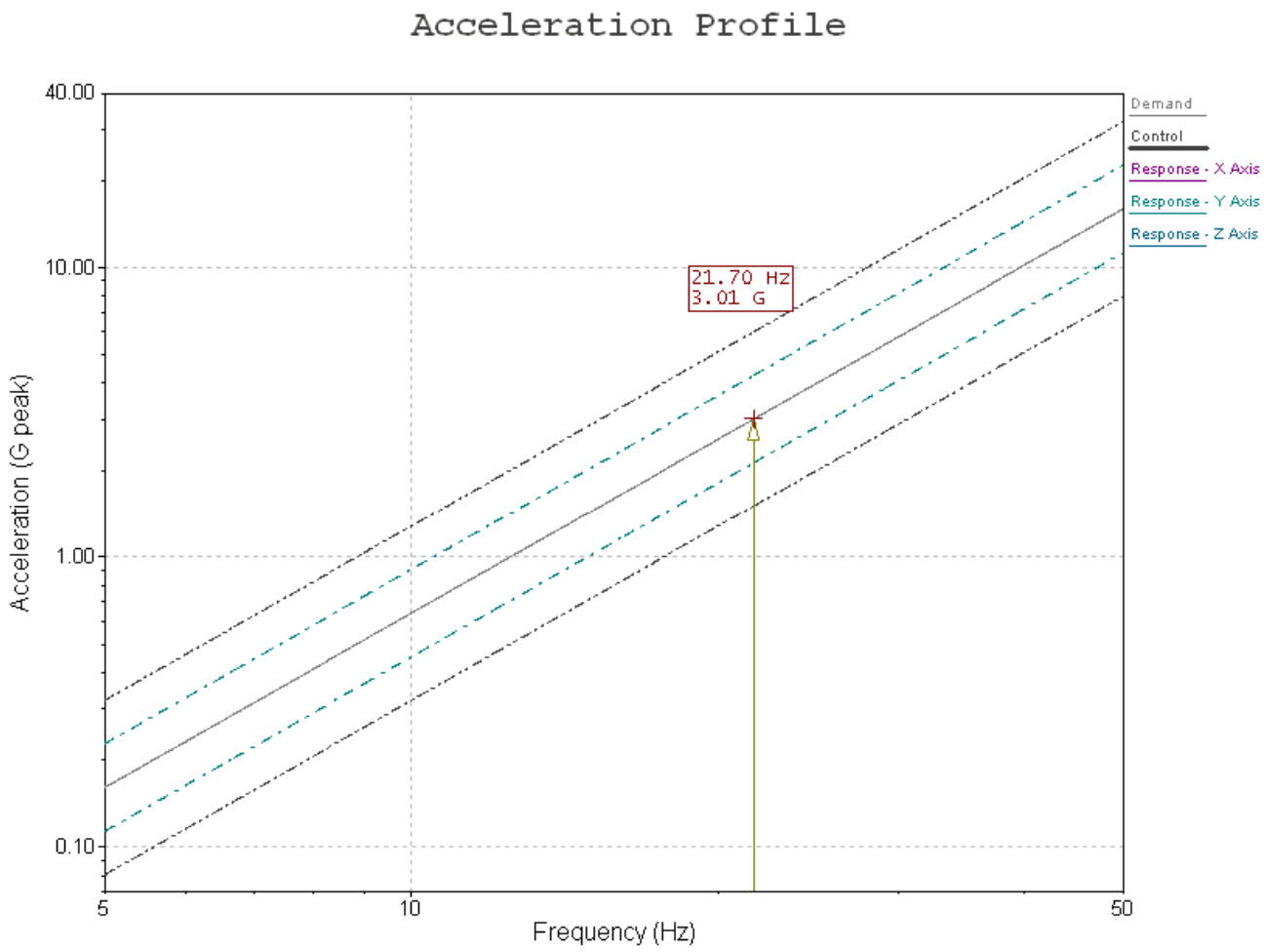


Jul 23, 2024 13:53:16 | Level 1) 100 % at 21.7 Hz | Output: 0.2463 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 3.009 G | Level Time: 0:07:41 | Frequency: 21.7 Hz | ANSI C136.31-2023

Control: 3.01 G | Total Time: 0:07:52 | Holding Frequency | Y-Axis Dwell

Y-Axis Dwell - 100000 Cycles Plot (Acceleration Profile)

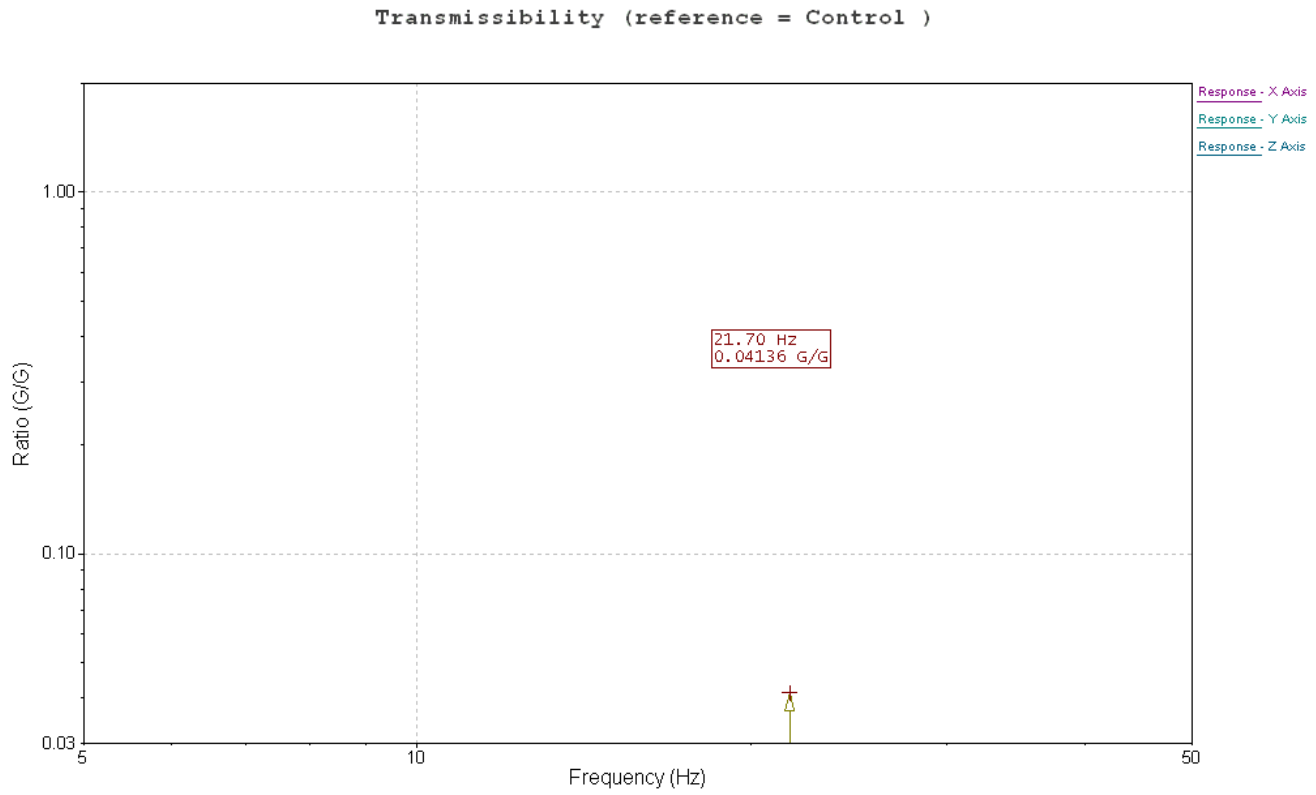


Jul 23, 2024 15:02:23 | Level 1) 100 % at 21.7 Hz | Output: 0.2463 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 3.009 G | Level Time: 1:16:49 | Y-Axis Response: 3.007 G | ANSI C136.31-2023

Control: 3.01 G | Total Time: 1:17:00 | End of Cycle Count Test | Y-Axis Dwell

Y-Axis Dwell - 100000 Cycles Plot (Transmissibility)

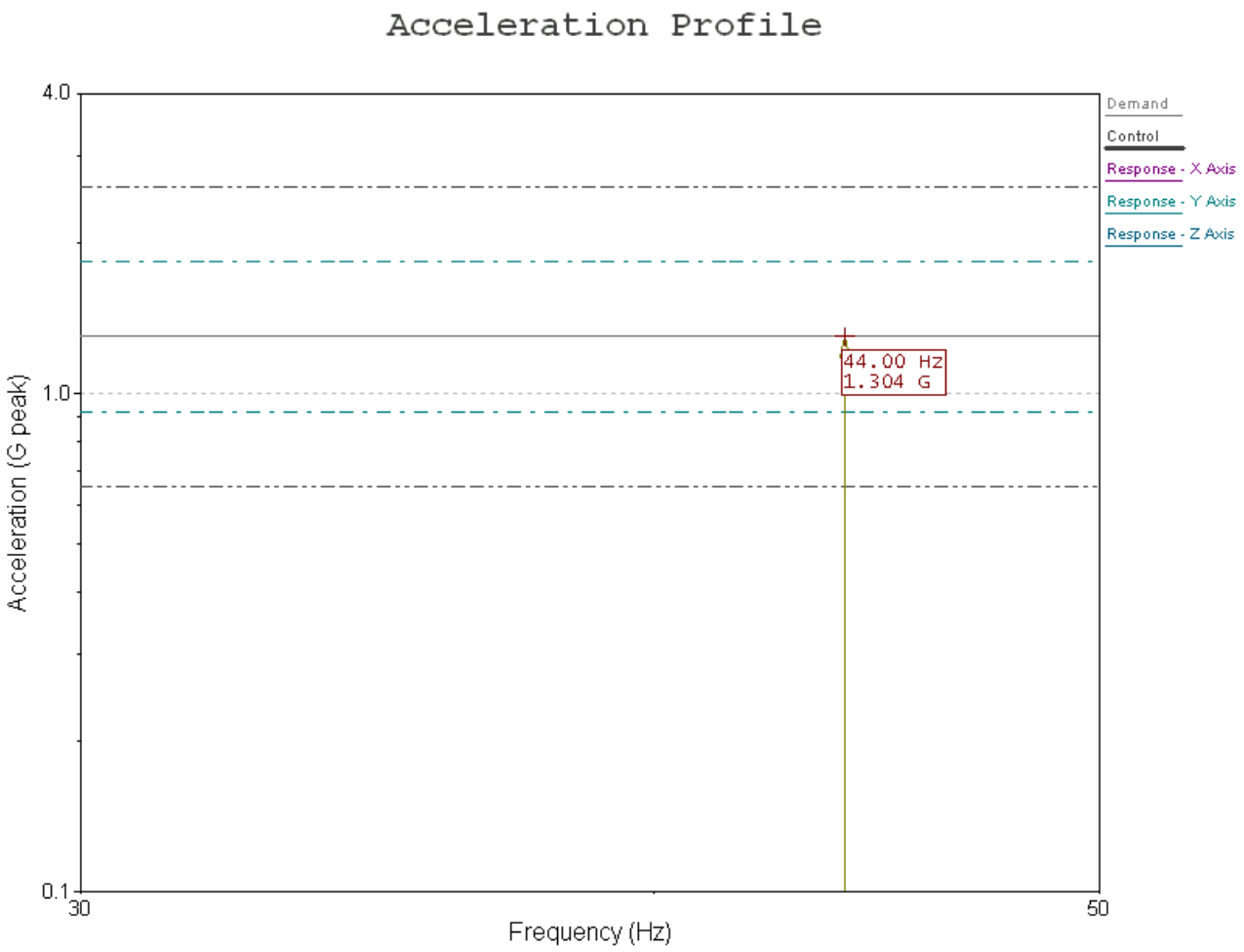


Jul 23, 2024 15:02:23 | Level 1) 100 % at 21.7 Hz | Output: 0.2463 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 3.009 G | Level Time: 1:16:49 | Frequency: 21.7 Hz | ANSI C136.31-2023

Control: 3.01 G | Total Time: 1:17:00 | End of Cycle Count Test | Y-Axis Dwell

Z-Axis Dwell - 10000 Cycles Plot (Acceleration Profile)

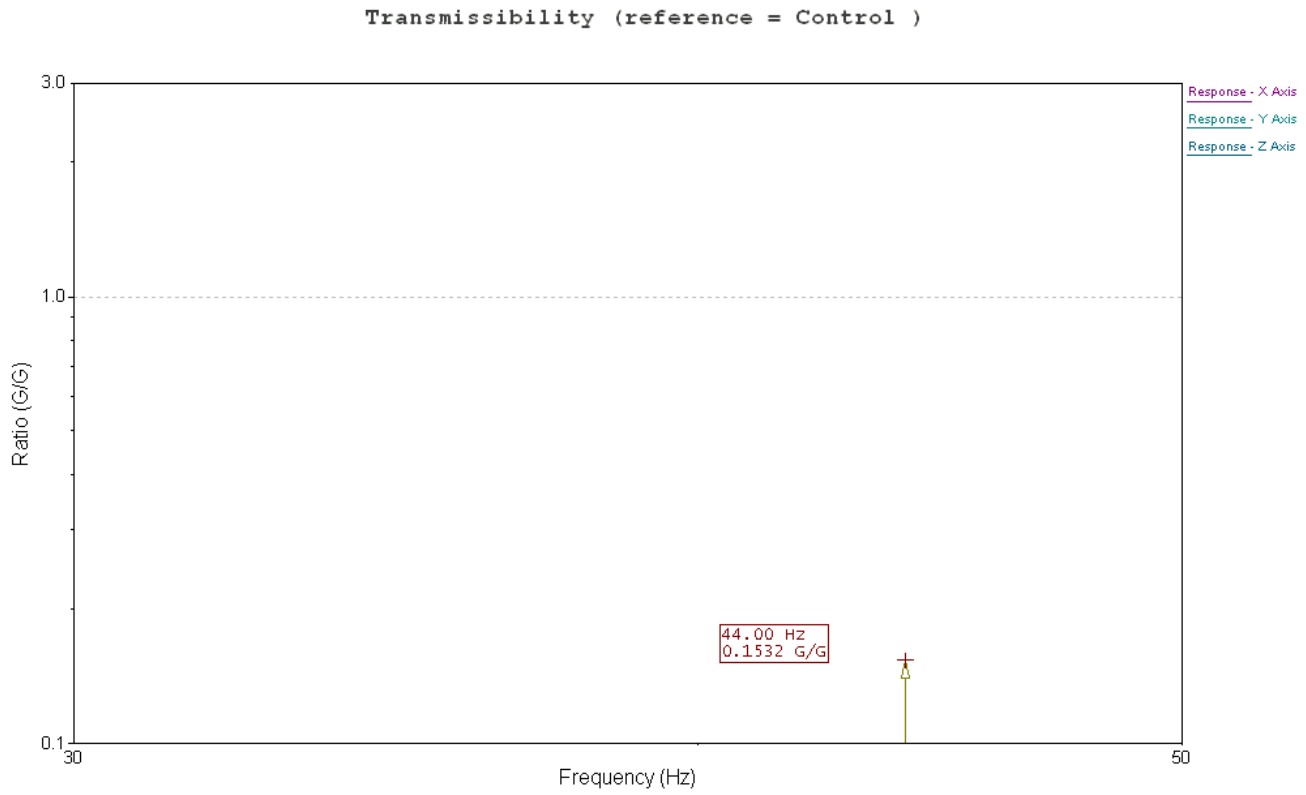


Jul 23, 2024 11:58:18 | Level 1) 100 % at 44 Hz | Output: 0.05134 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 1.3 G | Level Time: 0:03:47 | Z-Axis Response: 2.841 G | ANSI C136.31-2023

Control: 1.304 G | Total Time: 0:03:56 | Holding Frequency | Z-Axis Dwell

Z-Axis Dwell - 10000 Cycles Plot (Transmissibility)

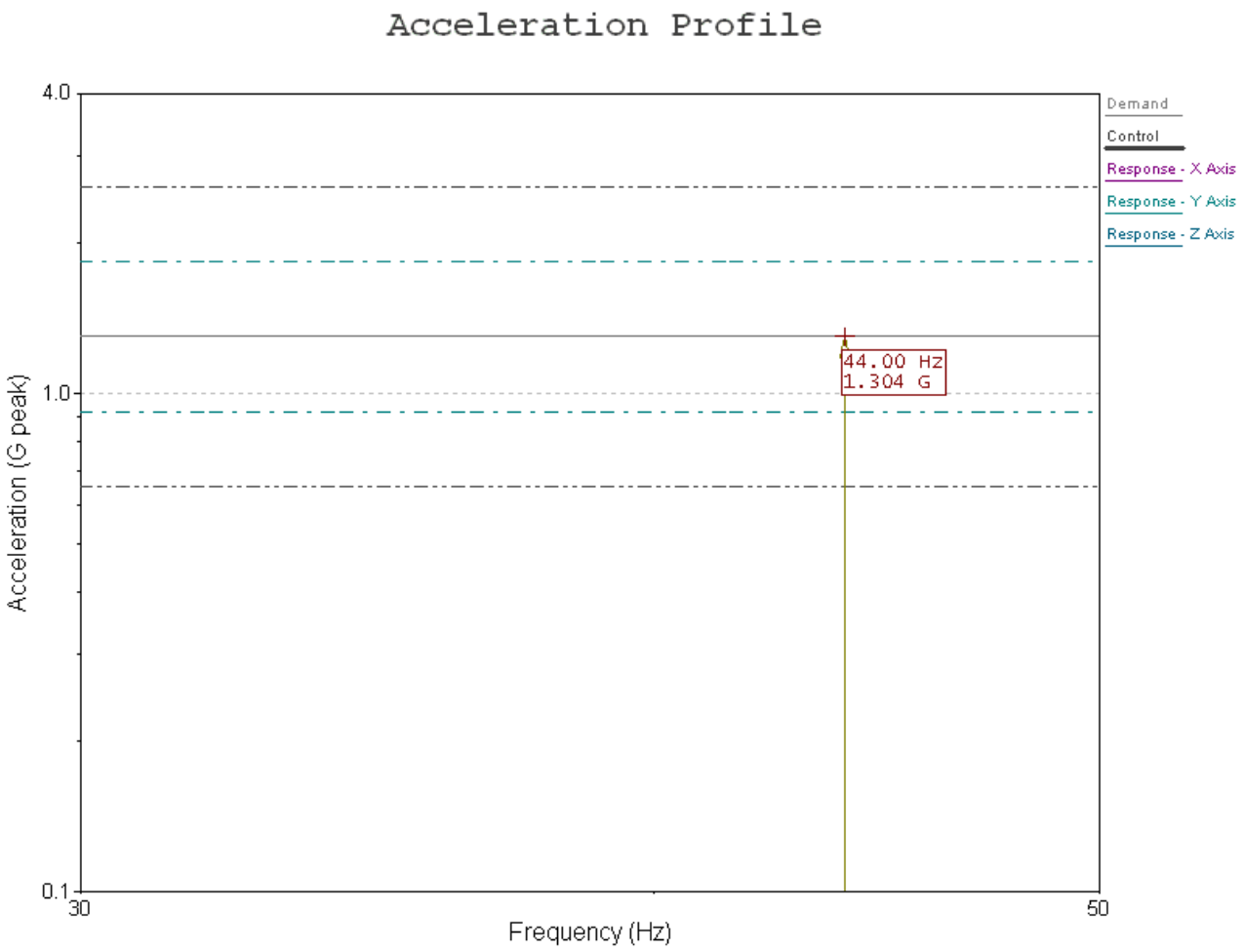


Jul 23, 2024 11:58:18 | Level 1) 100 % at 44 Hz | Output: 0.05134 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 1.3 G | Level Time: 0:03:47 | Frequency: 44 Hz | ANSI C136.31-2023

Control: 1.304 G | Total Time: 0:03:56 | Holding Frequency | Z-Axis Dwell

Z-Axis Dwell - 100000 Cycles Plot (Acceleration Profile)

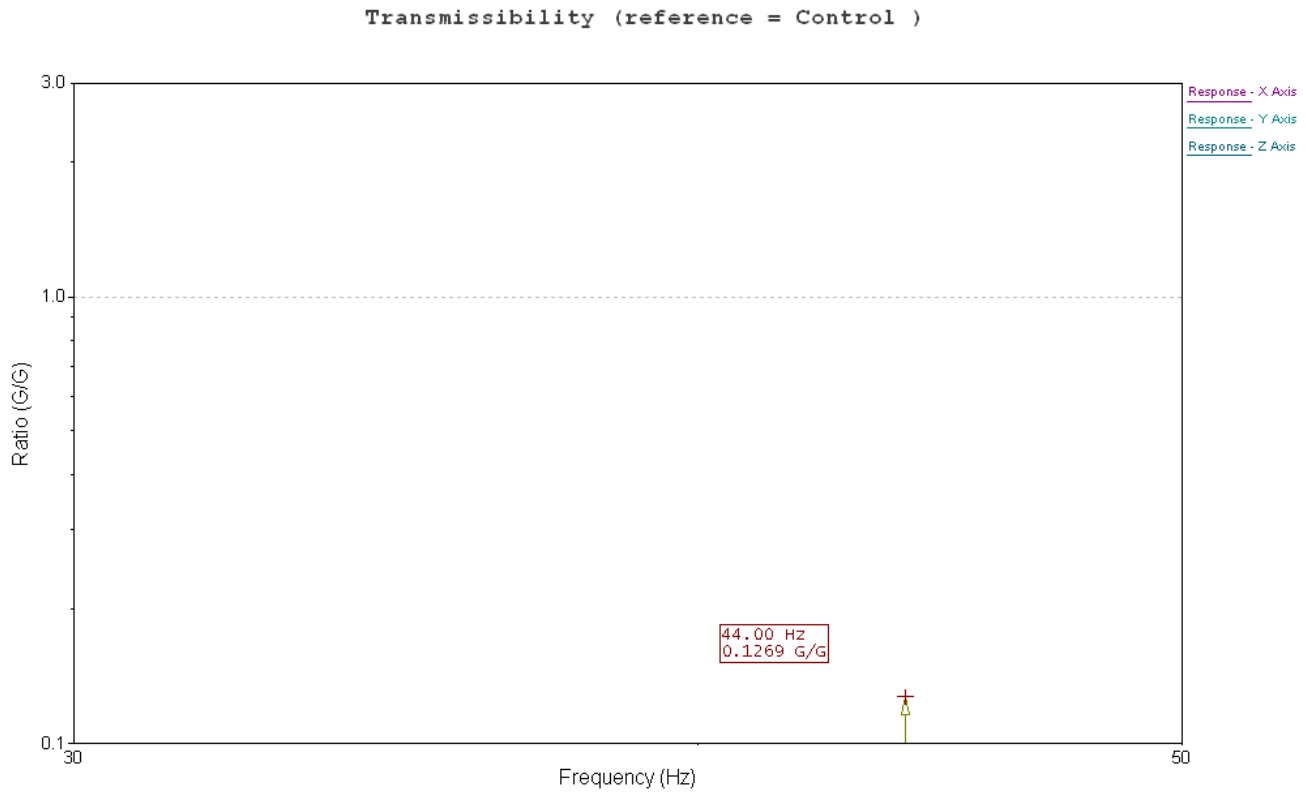


Jul 23, 2024 12:32:24 | Level 1) 100 % at 44 Hz | Output: 0.04915 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 1.3 G | Level Time: 0:37:53 | Z-Axis Response: 2.907 G | ANSI C136.31-2023

Control: 1.304 G | Total Time: 0:38:01 | End of Cycle Count Test | Z-Axis Dwell

Z-Axis Dwell - 100000 Cycles Plot (Transmissibility)



Jul 23, 2024 12:32:24 | Level 1) 100 % at 44 Hz | Output: 0.04915 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 1.3 G | Level Time: 0:37:53 | Frequency: 44 Hz | ANSI C136.31-2023

Control: 1.304 G | Total Time: 0:38:01 | End of Cycle Count Test | Z-Axis Dwell

Post- Dwell (Sweep) Data Sheet			
EUT:	**LED Luminaire**	Job Number:	**2407-071N**
Customer:	**Roy Alpha S.A. Cali, Columbia**	Model Number:	**RALED I Plus**
Date:	**7/23/2024**	Part Number:	**N/A**
Test Engineer:	**B. Darkey**	Serial Number:	**N/A**
Test Specifications			
Test Spec:	**ANSI C136.31-2023**	Para. /Sec.:	**Luminaire Testing**

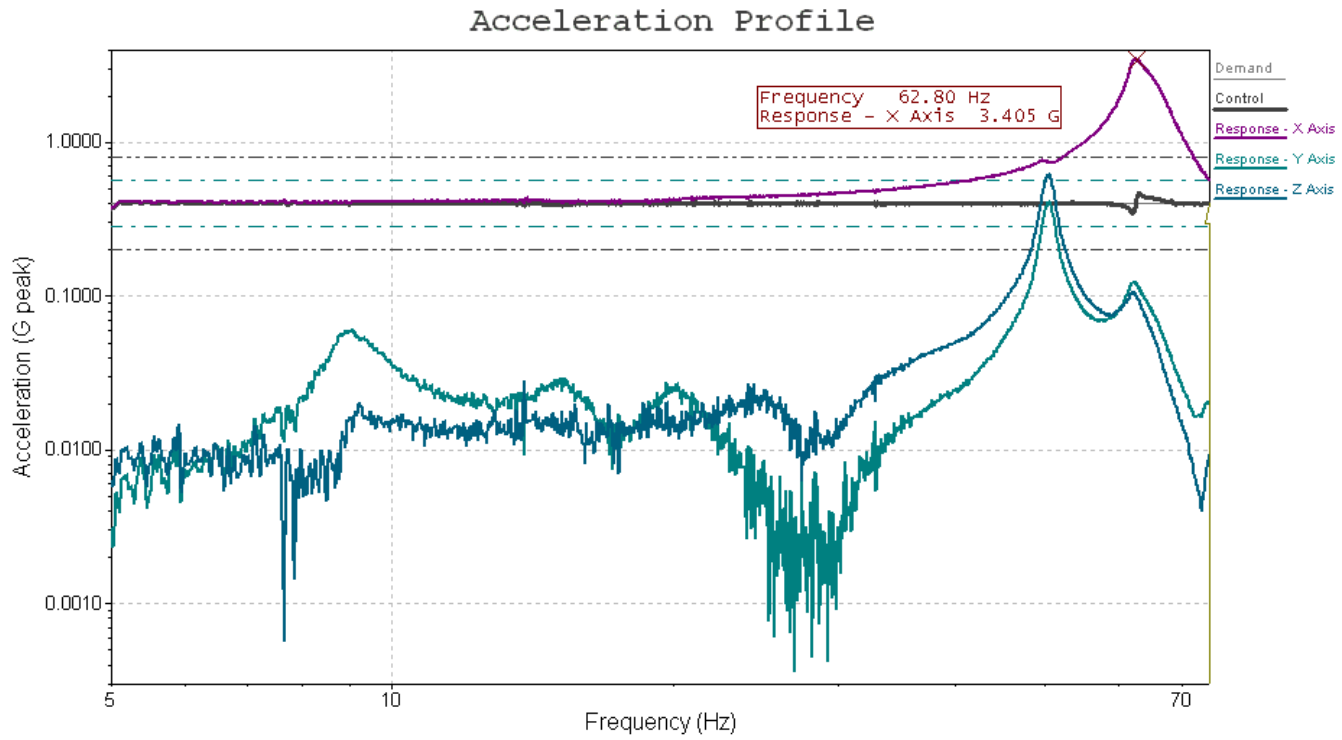
Test Data

Lateral Axis Profile (X)				
Sweep Rate (Octave/Minute):	**1**			
Duration (Time or # of Sweeps):	**00:03:55 (1 Sweep)**			
Frequency (Hz)	Acceleration (G's)			Displacement (Inches Peak to Peak)
5 - 75	**0.4**			—
EUT Test Information	Y	N	N/A	Comments
Physical Damage Noted:		✓		See Test Log for further details

Longitudinal Axis Profile (Y)				
Sweep Rate (Octave/Minute):	-			
Duration (Time or # of Sweeps):	-			
Frequency (Hz)	Acceleration (G's)			Displacement (Inches Peak to Peak)
-	-			—
EUT Test Information	Y	N	N/A	Comments
Physical Damage Noted:		✓		Not performed due to no resonance. See Test Log for further details.

Vertical Axis Profile (Z)				
Sweep Rate (Octave/Minute):	**1**			
Duration (Time or # of Sweeps):	**00:03:55 (1 Sweep)**			
Frequency (Hz)	Acceleration (G's)			Displacement (Inches Peak to Peak)
5 - 75	**1.3**			—
EUT Test Information	Y	N	N/A	Comments
Physical Damage Noted:		✓		See Test Log for further details

X-Axis Post Sweep Plot- (Acceleration Profile)

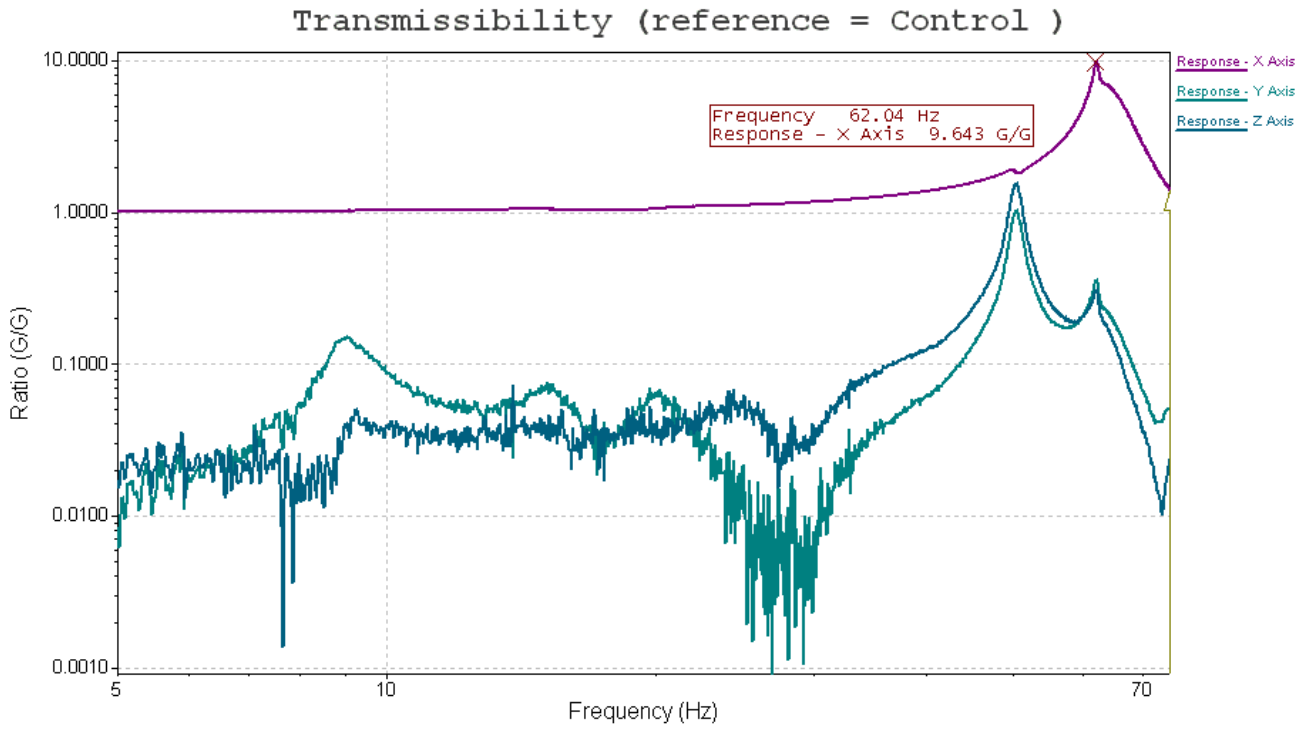


Jul 23, 2024 16:57:55 | Level 1) 100 % | Output: 0.03777 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 0.4 G | Level Time: 0:03:55 | X-Axis Response: 0.009296 G | ANSI C136.31-2023

Control: 0.3983 G | Total Time: 0:04:10 | End of Sweep Test | X-Axis Post Resonance Search

X-Axis Post Sweep Plot-(Transmissibility)

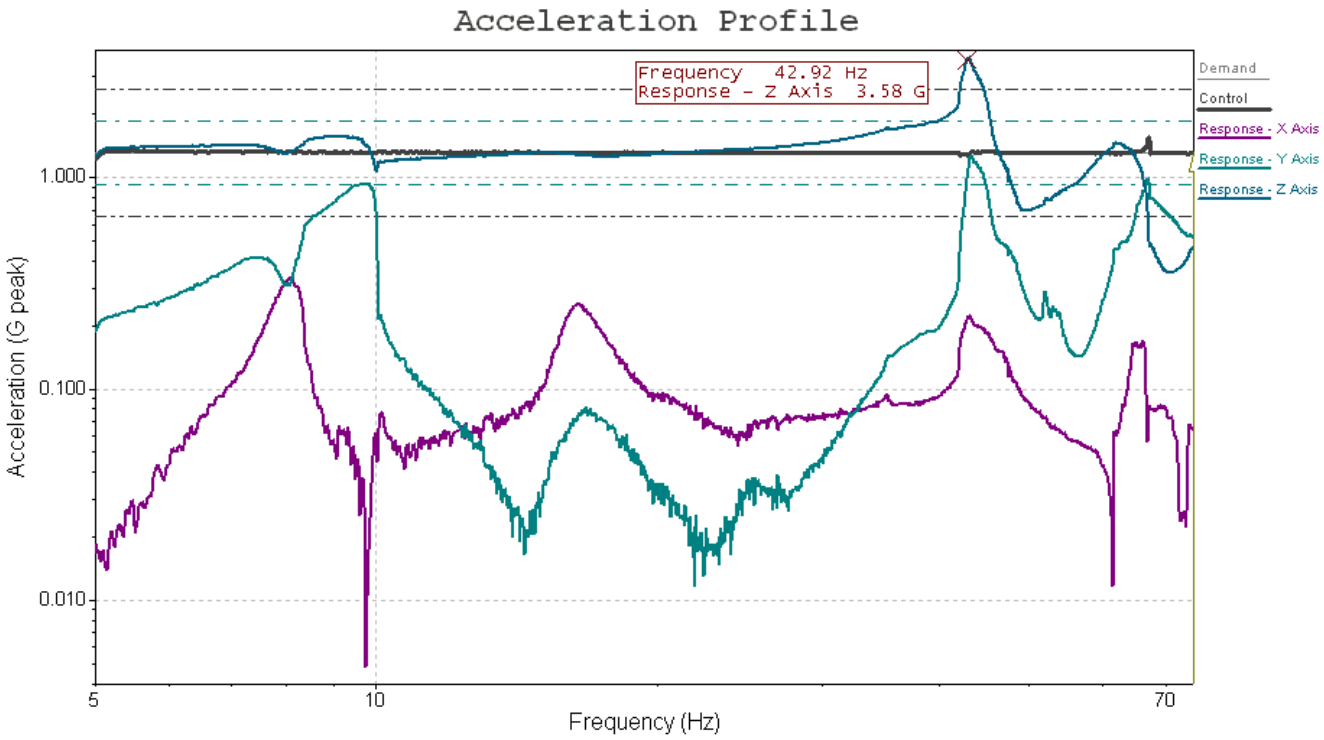


Jul 23, 2024 16:57:55 | Level 1) 100 % | Output: 0.03777 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 0.4 G | Level Time: 0:03:55 | Frequency: 75 Hz | ANSI C136.31-2023

Control: 0.3983 G | Total Time: 0:04:10 | End of Sweep Test | X-Axis Post Resonance Search

Z-Axis Post Sweep Plot- (Acceleration Profile)

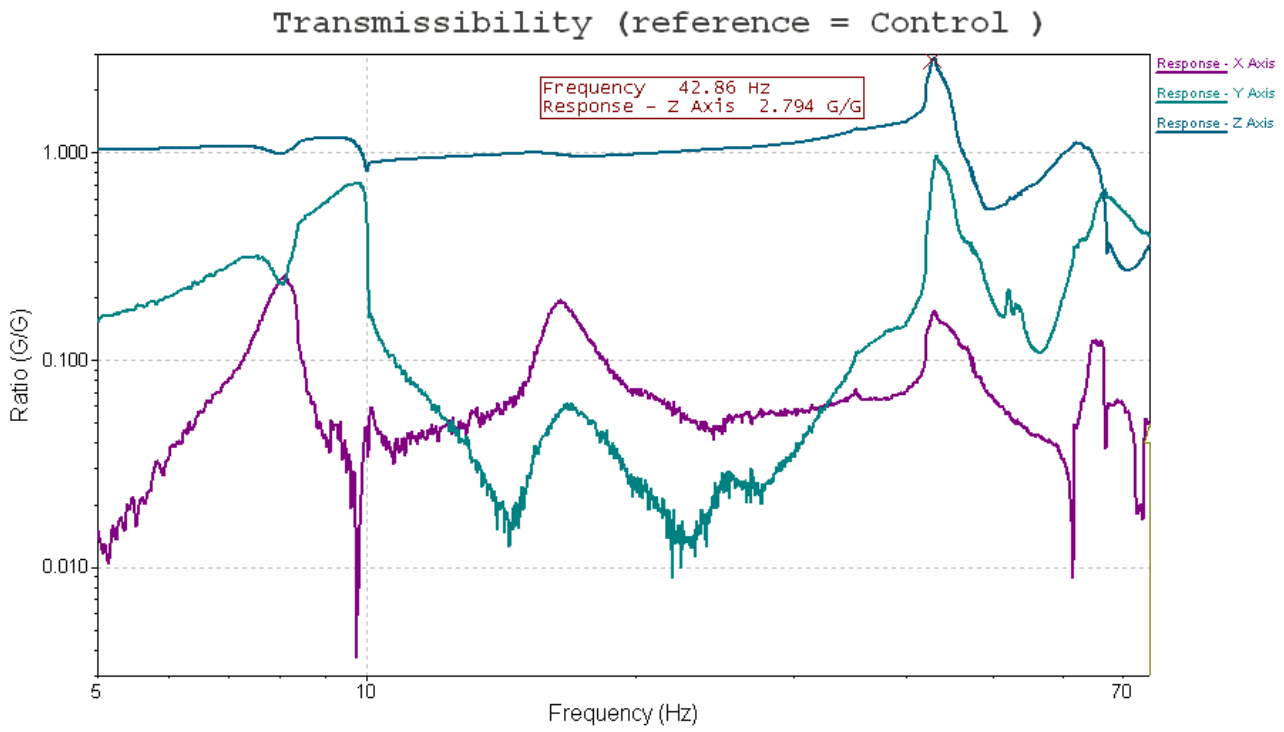


Jul 23, 2024 12:41:36 | Level 1) 100 % | Output: 0.02801 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 1.3 G | Level Time: 0:03:55 | Z-Axis Response: 0.4665 G | ANSI C136.31-2023

Control: 1.3 G | Total Time: 0:04:13 | End of Sweep Test | Z-Axis Post Resonance Search

Z-Axis Post Sweep Plot-(Transmissibility)



Jul 23, 2024 12:41:36 | Level 1) 100 % | Output: 0.02801 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 1.3 G | Level Time: 0:03:55 | Frequency: 75 Hz | ANSI C136.31-2023

Control: 1.3 G | Total Time: 0:04:13 | End of Sweep Test | Z-Axis Post Resonance Search

Post-Low Level Resonance Search Data Sheet			
EUT:	LED Luminaire	Job Number:	2407-071N
Customer:	Roy Alpha S.A. Cali, Columbia	Model Number:	RALED I Plus
Date:	7/23/2024	Part Number:	N/A
Test Engineer:	B. Darkey	Serial Number:	N/A
Test Specifications			
Test Spec:	ANSI C136.31-2023	Para. /Sec.:	Luminaire Testing

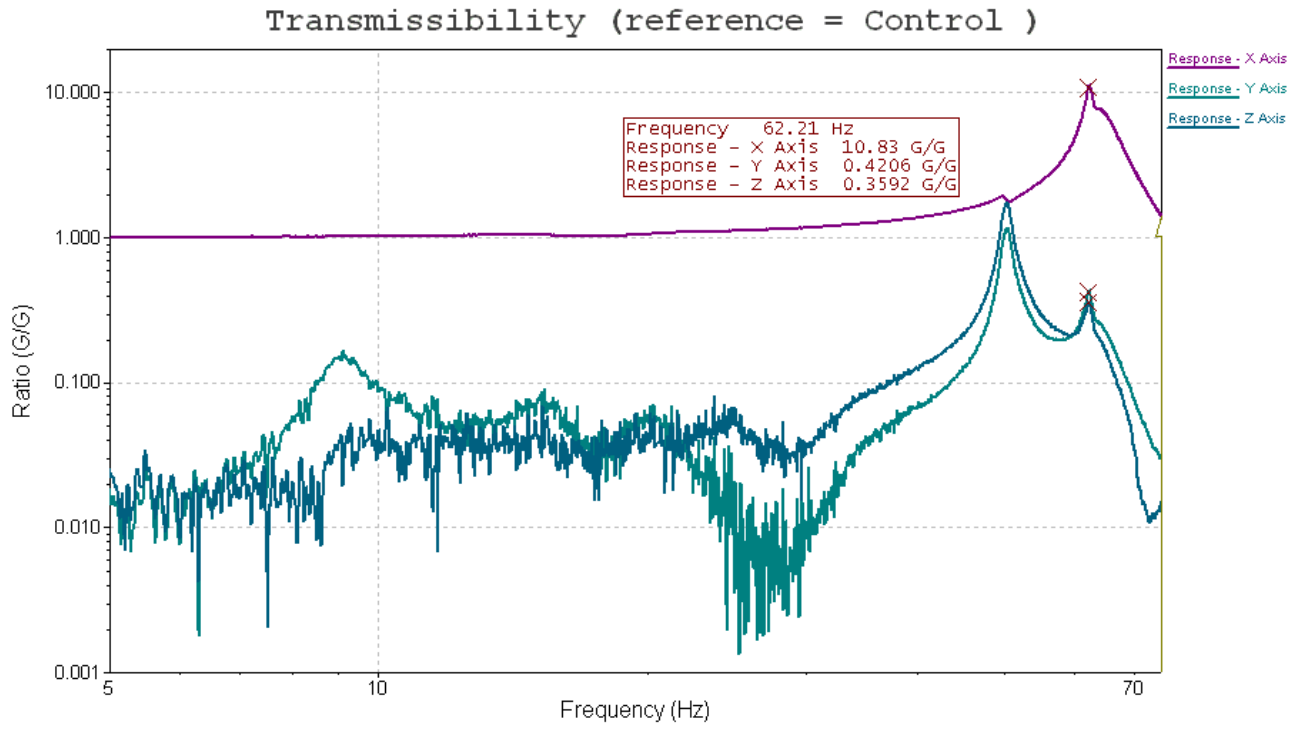
Test Data

Lateral Axis Profile (X)				
Sweep Rate (Octave/Minute):	1			
Duration (Time or # of Sweeps):	00:03:55 (1 Sweep)			
Frequency (Hz)	Acceleration (G's)			Displacement (Inches Peak to Peak)
5 - 75	0.3			—
EUT Test Information	Y	N	N/A	Comments
Physical Damage Noted:		✓		None

Longitudinal Axis Profile (Y)				
Sweep Rate (Octave/Minute):	1			
Duration (Time or # of Sweeps):	00:03:55 (1 Sweep)			
Frequency (Hz)	Acceleration (G's)			Displacement (Inches Peak to Peak)
5 - 75	0.3			—
EUT Test Information	Y	N	N/A	Comments
Physical Damage Noted:		✓		None

Vertical Axis Profile (Z)				
Sweep Rate (Octave/Minute):	1			
Duration (Time or # of Sweeps):	00:03:55 (1 Sweep)			
Frequency (Hz)	Acceleration (G's)			Displacement (Inches Peak to Peak)
5 - 75	0.3			—
EUT Test Information	Y	N	N/A	Comments
Physical Damage Noted:		✓		None

X-Axis Post Low-Level Sweep (Transmissibility)

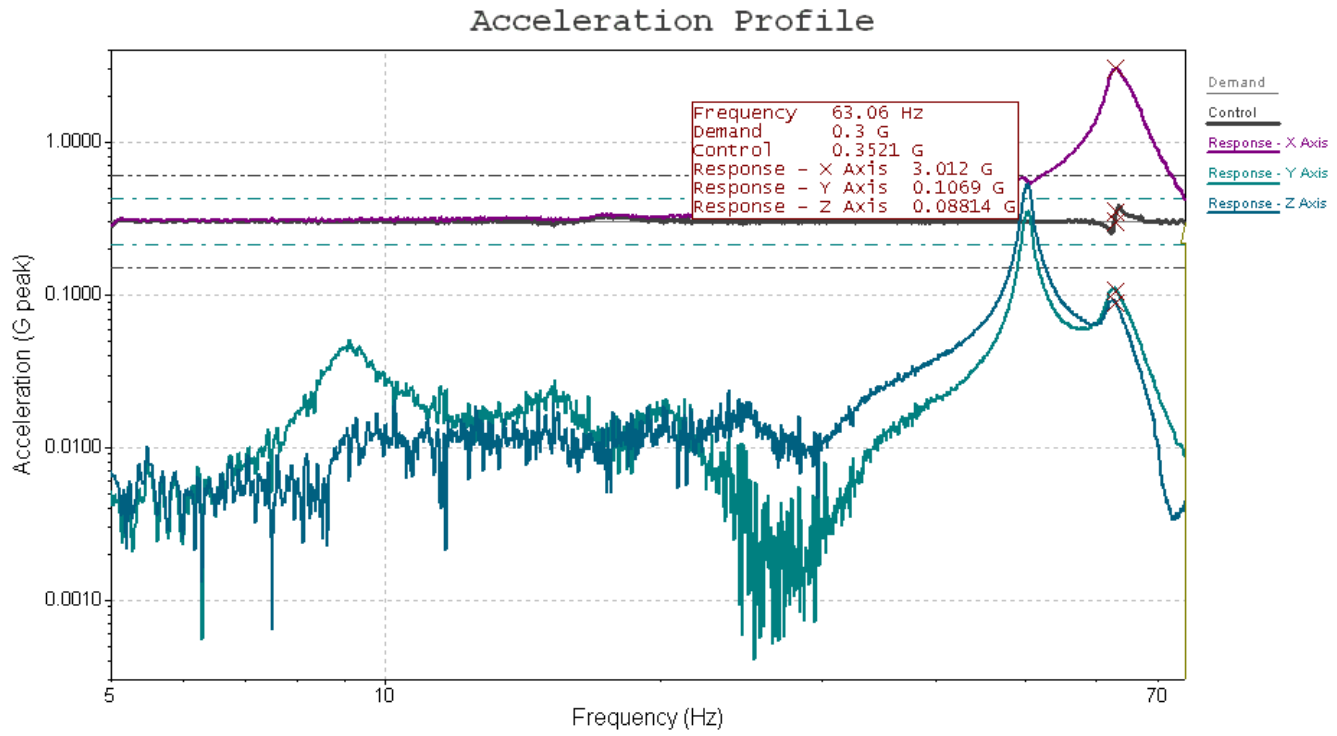


Jul 23, 2024 17:03:36 | Level 1) 100 % | Output: 0.02689 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 0.3 G | Level Time: 0:03:55 | Frequency: 75 Hz | ANSI C136.31-2023

Control: 0.2944 G | Total Time: 0:04:20 | End of Sweep Test | X-Axis Post (Low Level) Resonance Search

X-Axis Post Low-Level Sweep- (Acceleration Profile)

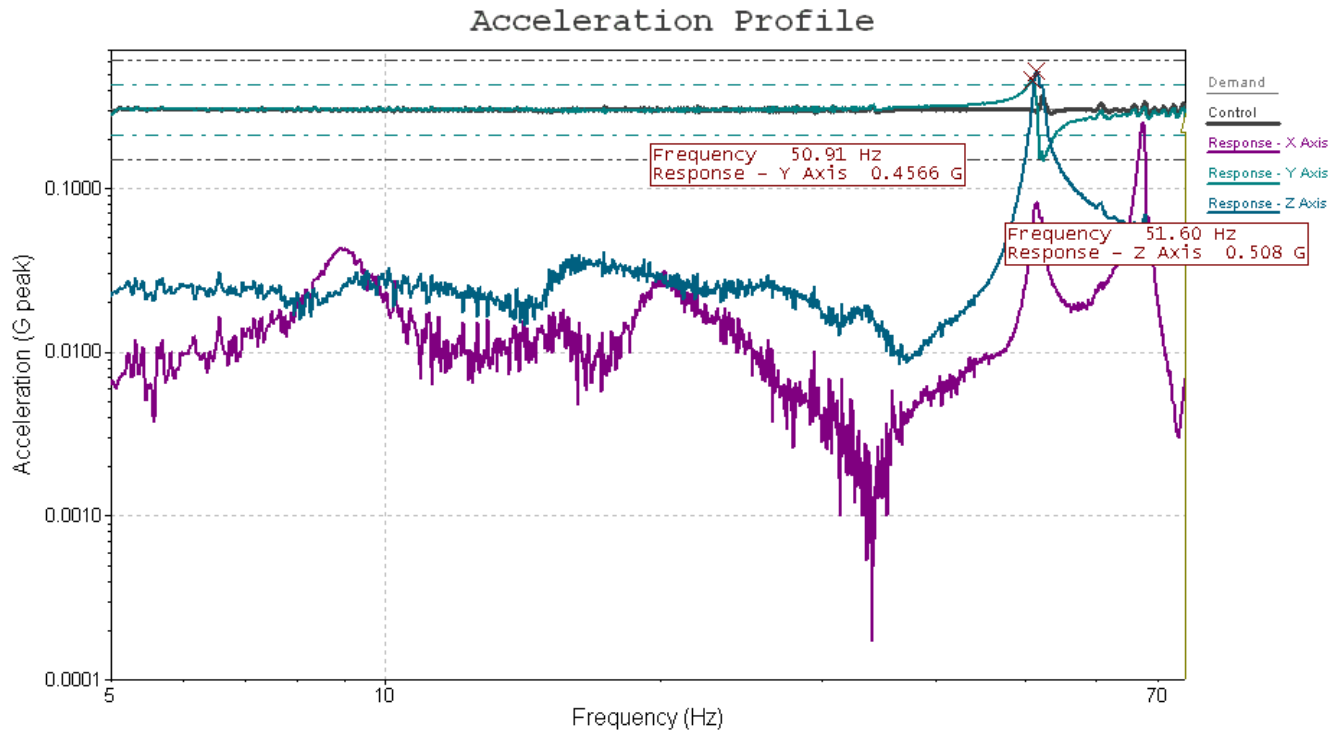


Jul 23, 2024 17:03:36 | Level 1) 100 % | Output: 0.02689 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 0.3 G | Level Time: 0:03:55 | X-Axis Response: 0.4122 G | ANSI C136.31-2023

Control: 0.2944 G | Total Time: 0:04:20 | End of Sweep Test | X-Axis Post (Low Level) Resonance Search

Y-Axis Post Low-Level Sweep- (Acceleration Profile)

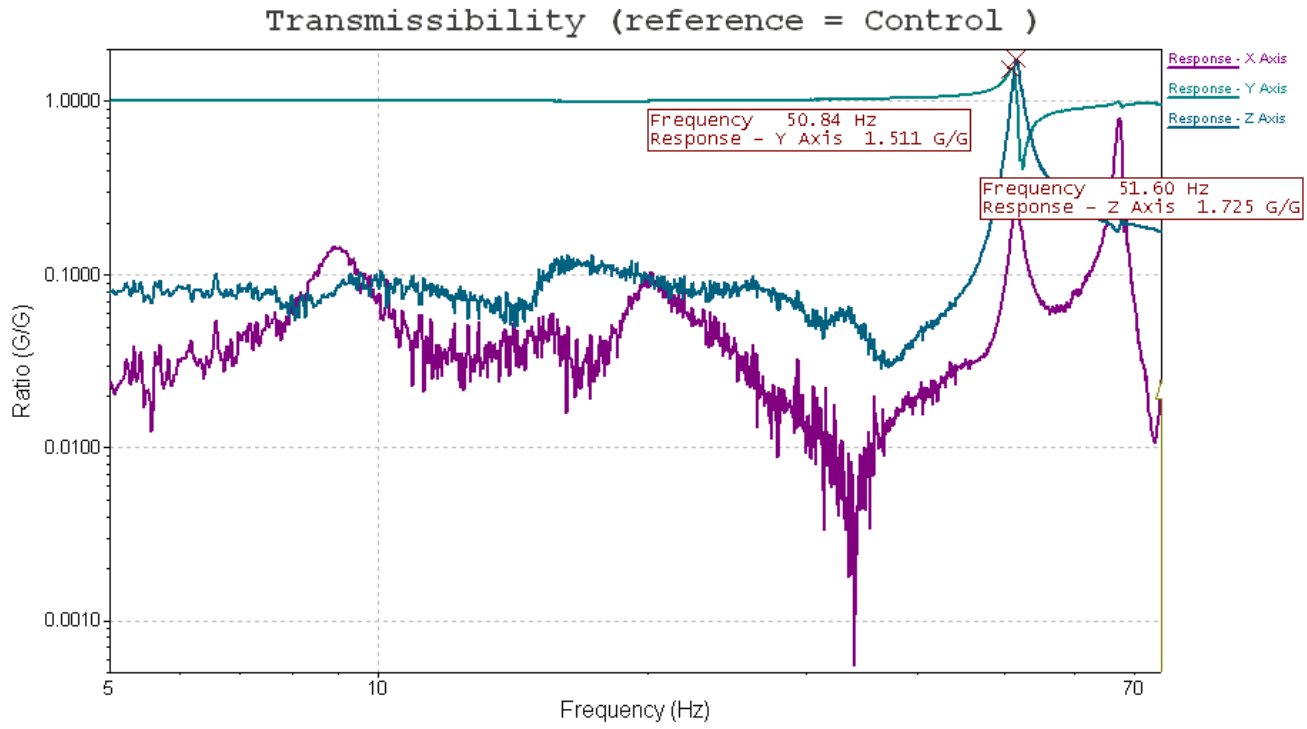


Jul 23, 2024 15:12:31 | Level 1) 100 % | Output: 0.04168 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 0.3 G | Level Time: 0:03:55 | Y-Axis Response: 0.2725 G | ANSI C136.31-2023

Control: 0.2849 G | Total Time: 0:04:43 | End of Sweep Test | Y-Axis Post (Low Level) Resonance Search

Y-Axis Post Low-Level Sweep-(Transmissibility)

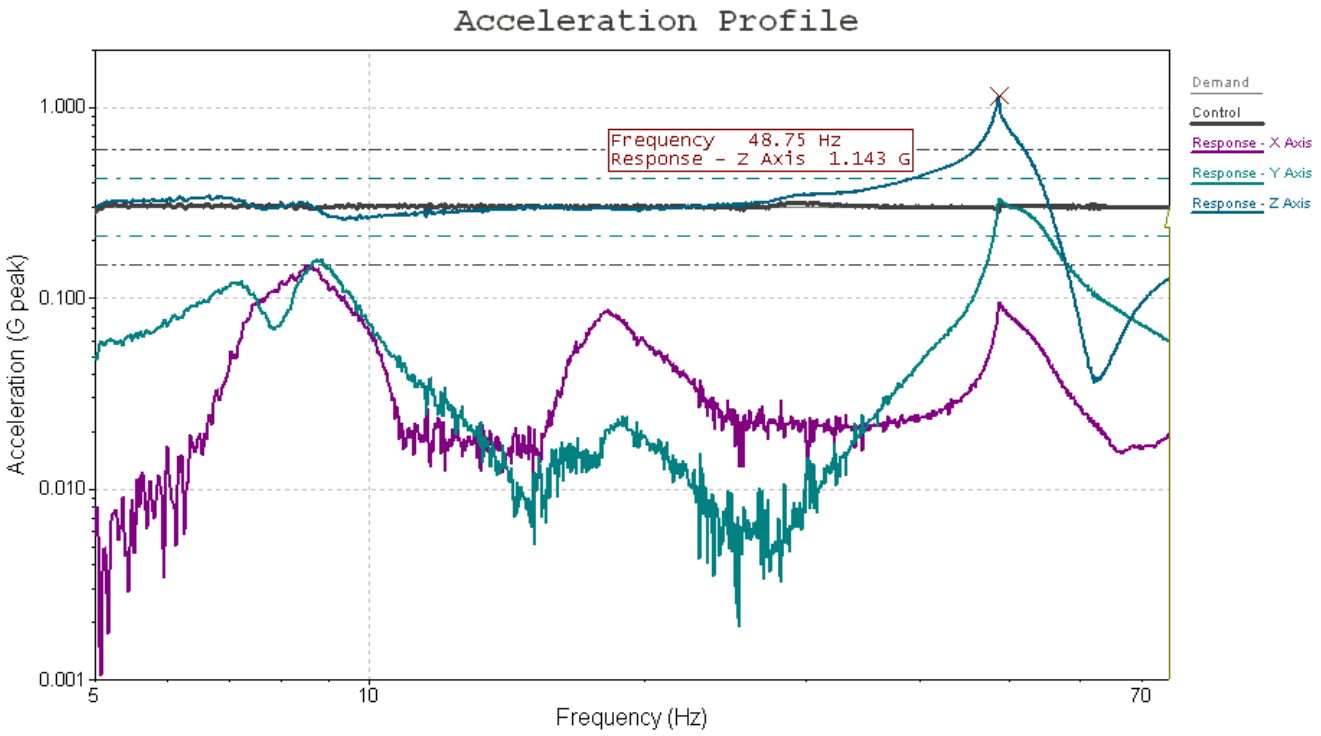


Jul 23, 2024 15:12:31 | Level 1) 100 % | Output: 0.04168 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 0.3 G | Level Time: 0:03:55 | Frequency: 75 Hz | ANSI C136.31-2023

Control: 0.2849 G | Total Time: 0:04:43 | End of Sweep Test | Y-Axis Post (Low Level) Resonance Search

Z-Axis Post Low-Level Sweep- (Acceleration Profile)

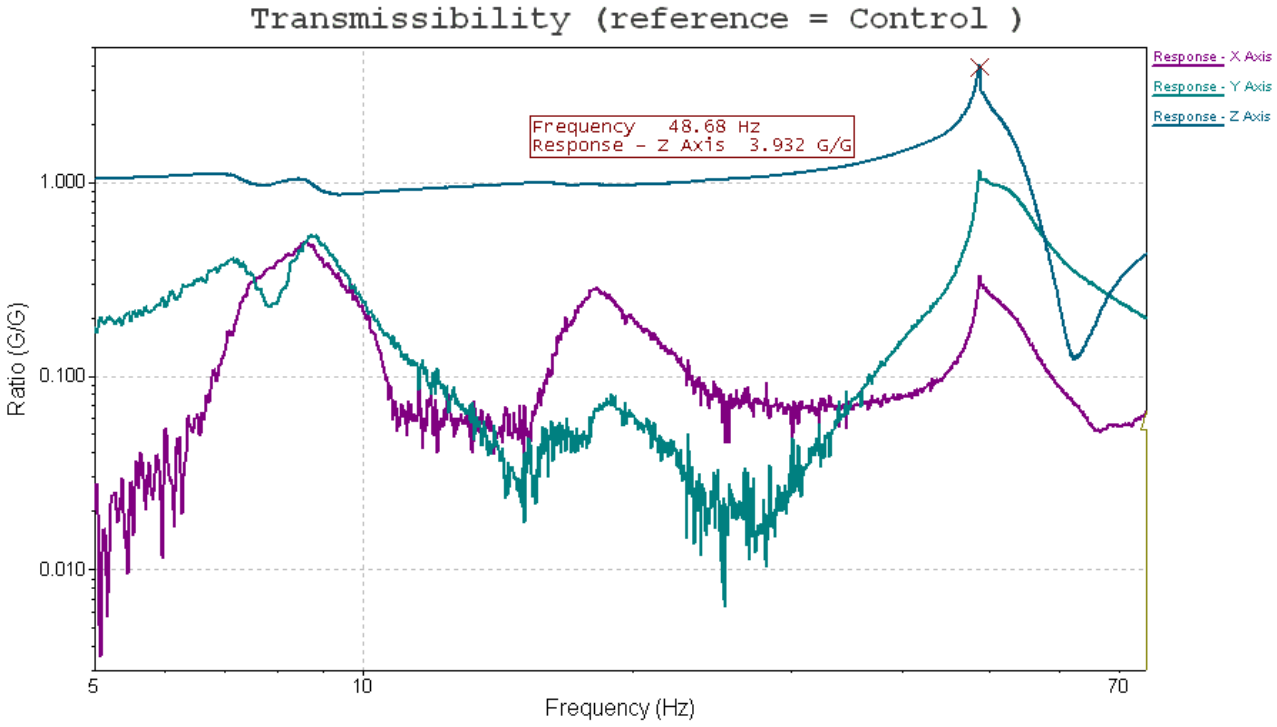


Jul 23, 2024 12:48:25 | Level 1) 100 % | Output: 0.007901 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

Demand: 0.3 G | Level Time: 0:03:55 | S-Axis Response: 0.1271 G | ANSI C136.31-2023

Control: 0.298 G | Total Time: 0:04:09 | End of Sweep Test | S-Axis Post (Low Level) Resonance Search

Z-Axis Post Low-Level Sweep-(Transmissibility)

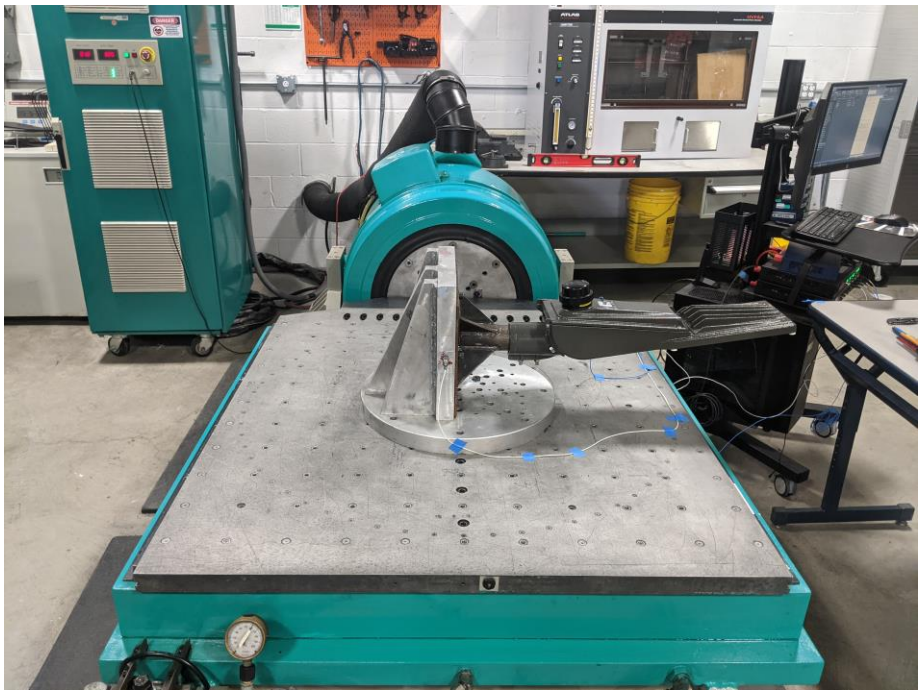


Jul 23, 2024 12:48:25 | Level 1) 100 % | Output: 0.007901 Volts peak | 2407-071N Roy Alpha S.A. Cali, Columbia

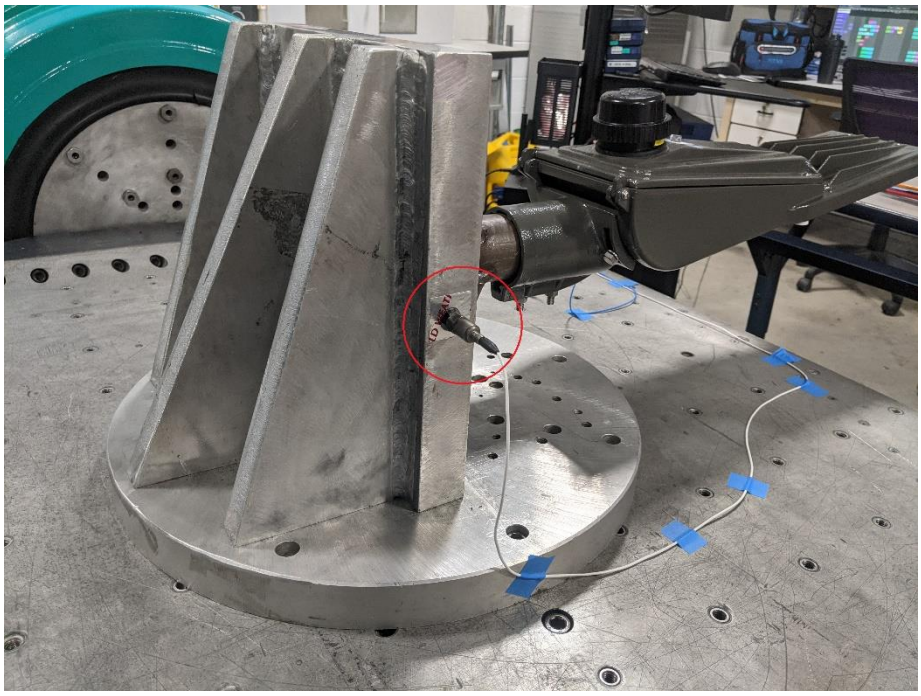
Demand: 0.3 G | Level Time: 0:03:55 | Frequency: 75 Hz | ANSI C136.31-2023

Control: 0.298 G | Total Time: 0:04:09 | End of Sweep Test | Z-Axis Post (Low Level) Resonance Search

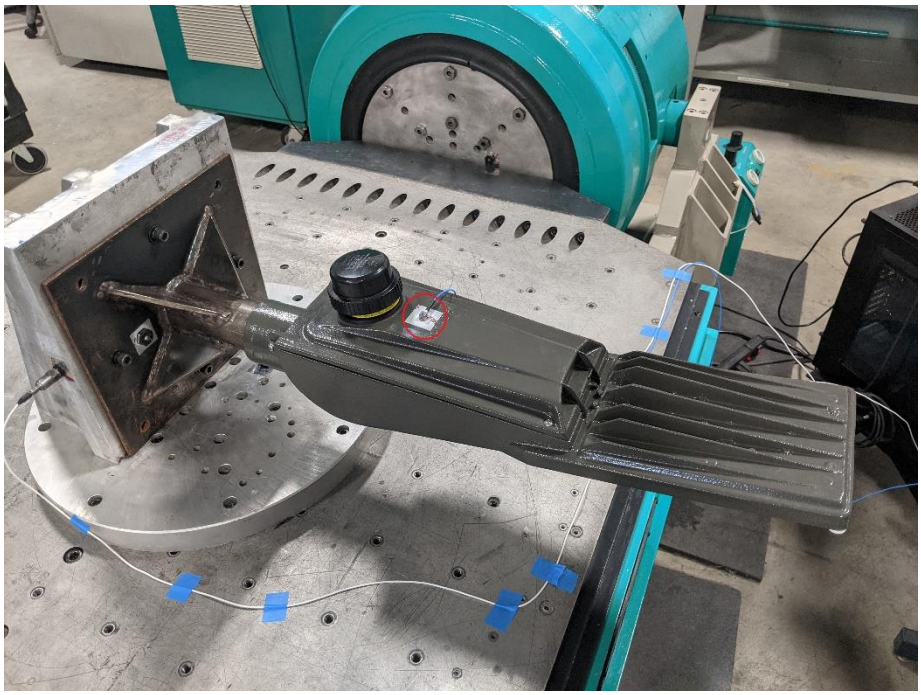
3.3.2 Vibration Test Photographs



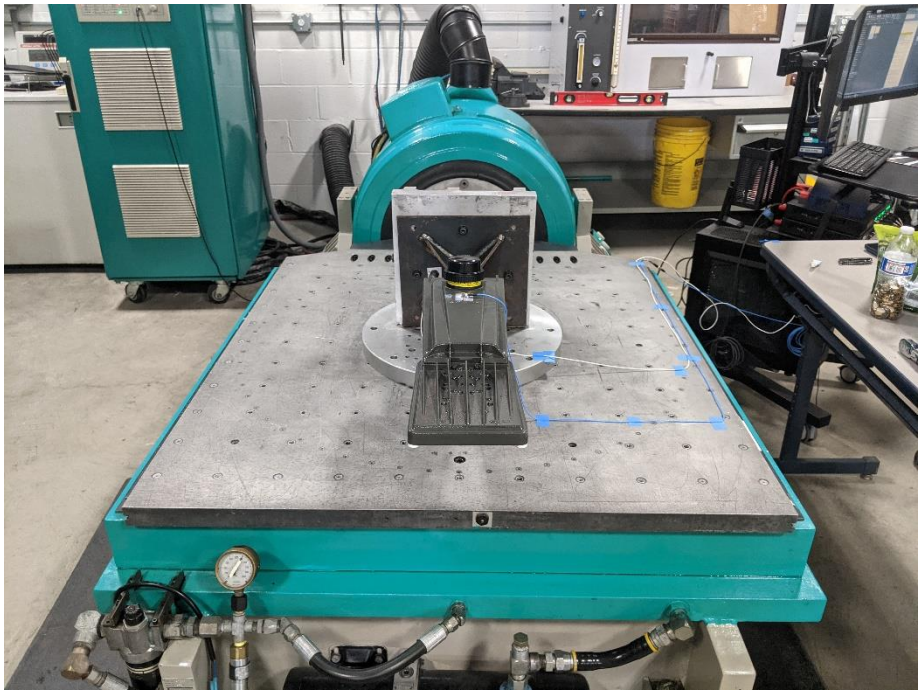
Vibration
X-Axis Testing Set-Up



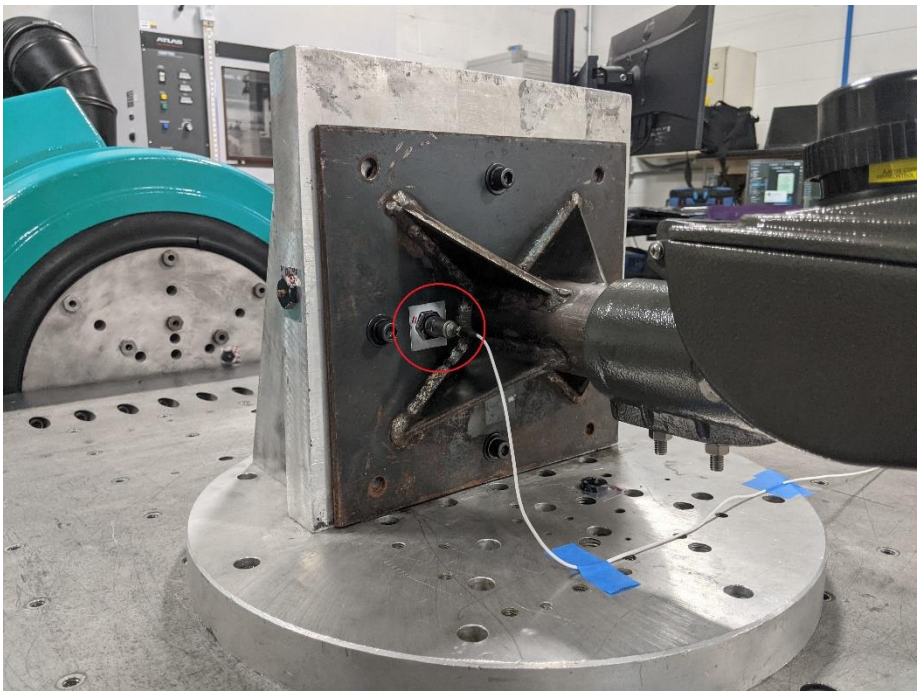
Vibration
X-Axis (Control) Location



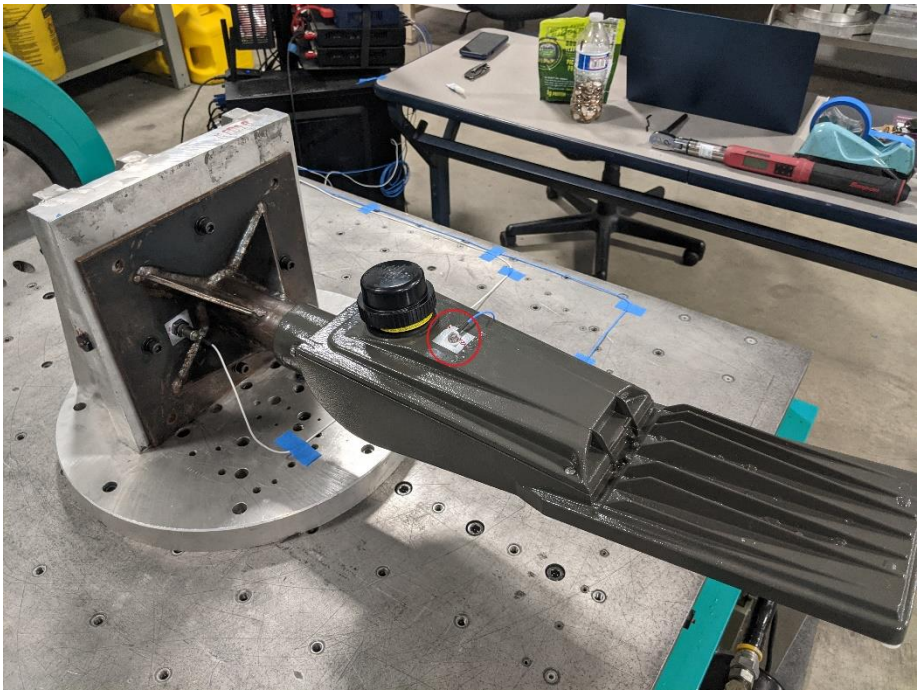
Vibration
X-Axis (Response) COG Location



Vibration
Y-Axis Testing Set-Up

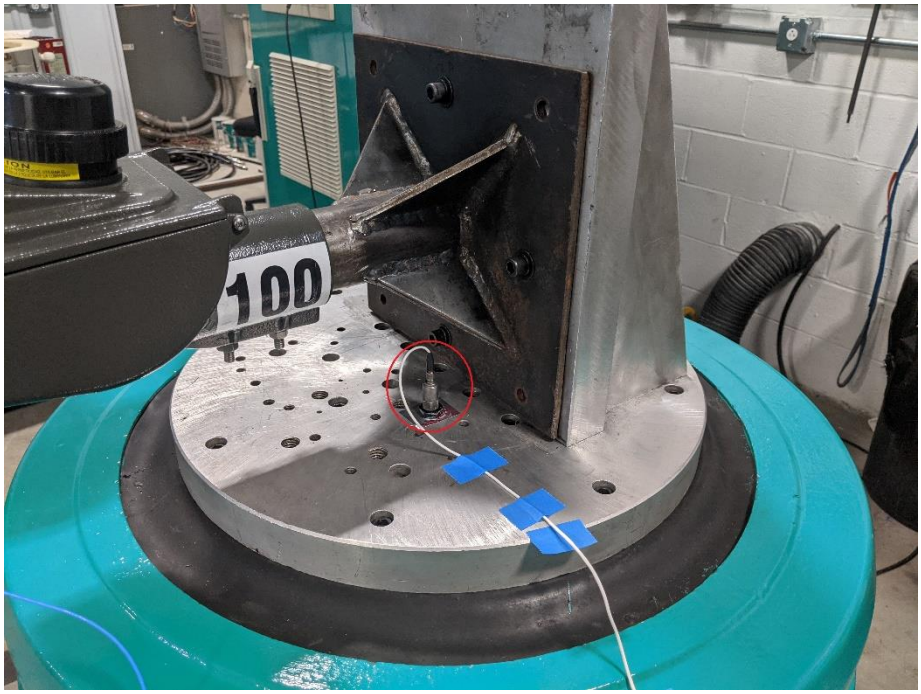


Vibration
Y-Axis (Control) Location

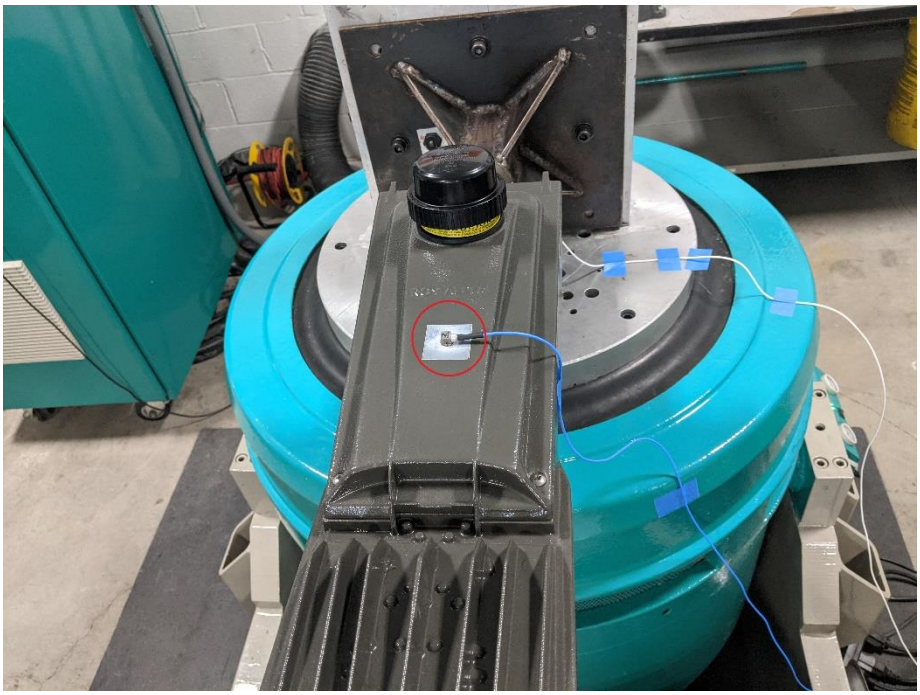


Vibration
Y-Axis (Response) COG Location

Vibration
Z-Axis Testing Set-Up



Vibration
Z-Axis (Control) Location



Vibration
Z-Axis (Response) COG Location

Vibration
Post-Testing Functional Verification - RALED I Plus

Section 4 – Conclusion

a) The LED Luminaire, Model Number: RALED I Plus; Part Number: N/A; Serial Number: N/A, was subjected to the following Environmental Tests in accordance with ANSI 136.31:2023 and the specifications as shown in Table 2:

Table 2 Tests Performed & Results

Test Description	Specification	Results
Vibration	**ANSI C136.31-2023**	**ANSI C136.31-2023 Sinusoidal Vibration Complete. No signs of damage, deterioration, and/or functional anomalies were discovered. Unit Under Testing met the acceptance criteria of the specification.**

b) The LED Luminaire was returned to ROY ALPHA after completion of the Environmental Test.

APPENDIX A: POST-TESTING INSPECTION PHOTOGRAPHS


RALED I PLUS


100