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CERTIFICATION TEST REPORT

APPROVED
Subject to conditions in
Commandant (CG-ENG-4) Certificate of Approval
16714/161.110/30/0 dated 16 AUG 2019

CERTIFICATION TEST REPORT
21419-1
FLOATING ELECTRIC WATERLIGHT
TO
UL1196
FOR
LIFESAVING SYSTEMS CORPORATION

CUSTOMER:

LIFESAVING SYSTEMS CORP.
220 ELSBERRY RD.
APOLLO BEACH, FL 33572

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MANUFACTURER OF TEST ARTICLE: LIFESAVING SYSTEMS CORP.

DATE: August 16, 2019

REPORT NO.:	21419-1
IMANNA JOB NO.:	21419
CUSTOMER P.O. NO.:	3066
CONTRACT:	N/A
PAGES IN REPORT:	15

STATE OF FLORIDA
COUNTY OF BREVARD

ROBERT L. WHITE, being duly sworn, deposes and says: The information contained in this report is the result of complete and carefully conducted tests and is to the best of his knowledge true and correct in all respects.

Robert L White

SUBSCRIBED and sworn to before me this 16th day of August, 2019

RACHEL SANCHEZ
Commission # GG 141542
Expires September 6, 2021
Bonded Thru Troy Fain Insurance 800-385-7019

IMANNA shall have no liability for damages of any kind to person or property, including special or consequential damages resulting from IMANNA's providing the service covered by the report.

IMANNA LABORATORY, Inc.
TEST BY

Robert L. White
PROJ. MANAGER

1. TEST ARTICLE

The test article is a Floating Electric Waterlight received from Lifesaving Systems. The light is powered by two 2 D removable alkaline batteries. The device consists of two sections. One section contains the LED light assembly which is attached to the power supply. The LED light assembly and lens is part of the cap which screws onto the housing of the light. The light snaps and locks into a mounting/holding bracket to keep it in its designed storage position, and in a “power-off” configuration.



Figure 1: view of tested buoy light

2. MODEL NUMBER

Prototype

3. REQUIREMENTS

The Requirements for this effort are to perform item approval tests in accordance with the requirements of 46 CFR 161.010, & 46 CFR 161.110.

4. PROCEDURES

The tests were conducted in accordance with the recommendations specified in UL 1196:1998.

5. TESTING SEQUENCE

- Receiving Inspection
- Endurance Tests
- Drop Test
- Bracket Tests
- Float Test
- Temperature-Humidity Test
- Watertightness Test

- Light Output Test
- Impact Test
- Pull Test
- Tests on Gasket Materials
- Light-and-Water Exposure Test
- Salt Spray Corrosion Test
- Battery Contact Test

6. RESULTS

The results of the tests performed indicate that the test article meets the USCG (UL1196) requirements as received. Specific results of the various tests follow.

6.1 RECEIVING INSPECTION

Multiple buoy lights with batteries and mounting brackets were received. Each light consisted of a plastic case, which housed the battery, electronic flashing circuit, and lens assembly. The lens was an elongated, clear globe that housed a LED light source. The light is activated by pointing the lens upward.

6.2 ENDURANCE TESTS

Two samples, complete with batteries were subjected to 1000 on and off cycles of operation. The tests were conducted at an ambient temperature of -34° C ±2° C on sample one and +85°C ±2° C ambient temperature on sample two.

One sample was operated at 100% of its rated voltage for 500 hours.

No malfunction of any sample was observed during these tests. The light meets the Endurance Test requirements of the standard.

6.3 DROP TEST

One of the lights was dropped into the water from a height of 30 meters. The light was dropped twice; first by itself, and then attached to a lifebuoy. The light which was attached to the lifebuoy and the light which was dropped by itself operated satisfactorily after each drop.

No malfunction of any sample was observed during these tests. The light meets the Drop Test requirements of the standard.

6.4 BRACKET TESTS

6.4.1 INCLINING TEST

One light was mounted in a manner simulating intended installation and tilted 90° for 360 cycles (45° to 45°). The tilts were conducted in sets of 5 tilts at each 5° increment around the light (72 increments starting at 0°).

The light did not flash on nor dislodge from the mounting bracket during any of the 360 tilts, and meets the UL 1196 requirements of the inclining test.

6.4.2 REMOVAL TEST

A force of 5.4 LBS was required to remove the light from its mounting bracket.

This is less than the maximum allowable 20 lb force and meets the requirements of the UL 1196 Standard.

6.5 FLOAT TEST

One of the lights was positioned to float for 24 hours such that its vertical axis was within 5 degrees of vertical and the flashtube and lens was not less than 2 inches above the surface of the water. The light was dismantled at the end of the test and there was no evidence of water inside the light.

Following the 24-hour float test, the light met the photometric requirements as stated in the Light Output Test.

These results indicate that the lights meet the watertightness (floating) requirements of the standard.

6.6 TEMPERATURE-HUMIDITY TEST

One sample, complete with battery was subjected to the following temperature-humidity sequence.

Sequence	Time (hours)	Temperature	Humidity %
1	24	85±2°C	85-90
2	24	-34±2°C	N/A
3	24	85±2°C	0-5
4	24	85±2°C	85-90
5	24	-34±2°C	N/A
6	48	85±2°C	0-5
7	48	21±1°C	45-55

There was no moisture or fog inside the waterlight, clouding of the globe, evidence of cracking, shrinkage, loosening, material flow, or distortion, or loosening, separation, or damage of threaded connections, following the temperature-humidity sequence.

These results indicate that the lights meet the temperature-humidity requirements of the standard.

6.7 WATERTIGHTNESS TEST

The light, which had undergone the Temperature-Humidity test, was disassembled and reassembled five times. After each of the four reassembly operations, the light was submerged under 305mm for five minutes and rotated 360°. After the final reassembly the light was submerged for 24 hours in a vertical upright position then released and allowed to come to the surface.

The light was dismantled at the end of the test and there was no evidence of water inside the light. The light meets the watertightness requirements of the standard.

6.8 LIGHT OUTPUT TEST

The intensity recorded in all directions of the upper hemisphere was above the 2.0 candela intensity specified in the UL 1196 Standard.

The flash rate of light at 2-hours was 60/min and at 15-hours was 61/min.
These results indicate that the light meets the UL 1196 light output test requirements.

6.9 IMPACT TEST

6.9.1 DOME DROP

One of the lights was cooled to -18°C and dropped twice from a height of 1 meter onto a concrete surface. The light struck the concrete surface on the top center of the lens at impact. The lens showed no damage from the impact.

These results indicate that the lights meet the lens strength requirements of the UL 1196 Standard.

6.9.2 CASE RESISTANCE

One of the lights which was cooled to -18°C was placed on its side on a rigid surface and a steel sphere having a mass of 540 grams was dropped onto the case 3 times from a height of 1.3 meters. The sphere struck the case near its center on one drop, approximately 12mm from one end of the case on another drop, and approximately 12mm from the other end of the case on the third drop. The case did not sustain any damage as a result of the case resistance tests.

These results indicate that the lights meet the body strength requirements of the UL 1196 Standard.



Figure 2: view of case following case resistance tests

6.10 PULL TEST

A force of 220 Newtons was applied to the fitting that attaches the light to a lifebuoy. Neither the fitting nor the light was damaged as a result of this test.

These results indicate that the lights meet the attachment fitting strength requirements of the UL 1196 Standard.

6.11 TESTS ON GASKET MATERIALS (Nonfoamed elastomeric materials)

After subjecting the gasket material, that is used to seal off the water from entering the electronics / battery storage area, to the material testing procedures listed in UL1196, Section 16.1.1, 16.1.2, 16.1.3, and 16.1.4, the following material properties were found:

Tensile Strength of the material was 1,697 PSI in the as-received condition and 1,387 PSI after accelerated aging.

Elongation of the material was 435% in the as-received condition and 419% after accelerated aging.

Tensile Set was 26.23mm in the as-received condition and 26.49mm after accelerated aging. The Compression set was below measurable limits.

All of these material properties meet the specified minimum requirements and therefore the gasket material passes the Nonfoamed Elastomeric Materials Test.

6.12 LIGHT AND WATER EXPOSURE TEST

One light was subjected to an equivalent of 240 hours of Carbon-Arc and water exposure. No cracking, crazing, shrinkage, or significant discoloration of the light was observed following the exposure. The loss of light output associated with the exposure was less than the allowable 10%.

The light meets the requirements of the Light and Water Exposure Test.

6.13 SALT-SPRAY CORROSION TEST

One sample light was subjected to 240 hours of salt spray in accordance with ASTM B117. Following the exposure periods, the light was inspected for signs of corrosion or deterioration. No signs of corrosion or deterioration were visible.

The light meets the requirements of the Salt-Spray CorrosionTest.

6.14 BATTERY CONTACT TEST

One of the lights was modified to allow an outside power source to feed current through the battery contacts with an electrical load substituted for the electronic circuit. The power supply was adjusted to a potential in the range of 6-12 volts DC, and the electrical load adjusted to provide a continuous current of 5 amperes through the battery contacts. The

contacts taken are to be made to carry the current until the temperature stabilizes. At no point during this test was the temperature rise greater than 30°C.

These results indicate that the lights meet the battery contact requirements of the standard.

INSTRUMENTATION EQUIPMENT SHEET

DATE: May-June 2019 **JOB NO.:** 21354

CUSTOMER: Lifesaving Systems

TECHNICIAN: White **TEST AREA:** Photometric Chamber

TEST ITEM DESCRIPTION: Lifebuoy Light

INSTRUMENT	MFG.	MODEL	RANGE	ACCURACY	CAL/DATE	CAL/DUE
Photometer	EG&G GAMMA SCIENTIFIC	DR2000	0 to 2000 Candela	±0.5% FS	05-24-19	05-24-20
Temperature Indicator	Omega Eng'ring	DP-41-TL-52A	Multi	±0.03%	4-18-18	4-18-19
Data Acquisition System	IO Tech	Daqbook 3000	Multi	Mfg.	Not Required	Not Required
Temperature Chamber	Tenney	Tenney Jr.	-73 to +150°C	±1°C	Each use	Each use
Weighing Scale	Setra	5000G	0 to 5000g	±0.01g	Each Use	Each Use
Spectropho-tometer	StellarNet	Spectrometer	Multi	±2nm	7/5/2018	7/5/2019

Instrumentation Information Verified by: R White

APPENDIX
SUPPORTING DATA

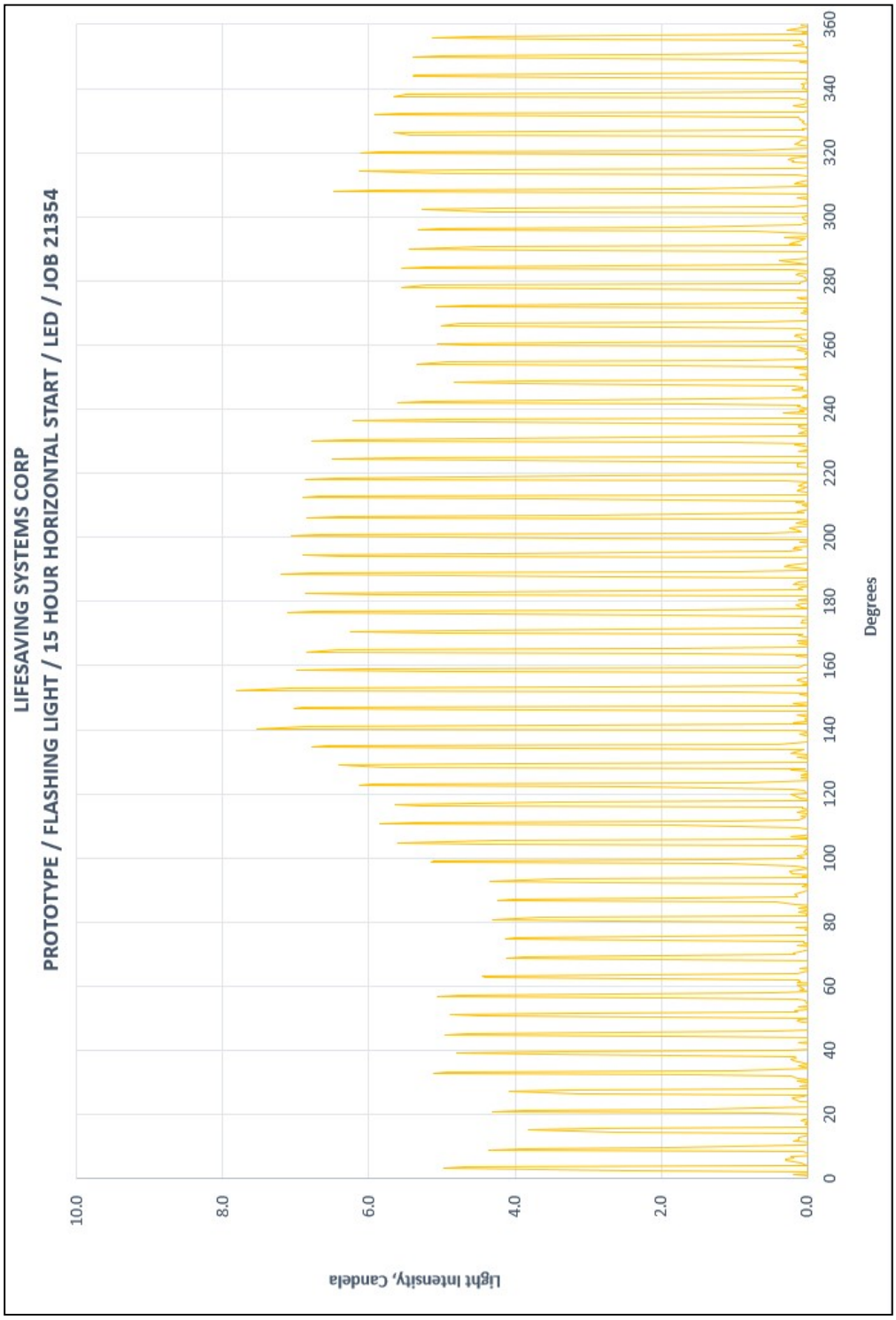

Figure 4: chart of light horizontal intensity at the beginning of the 15 hour test

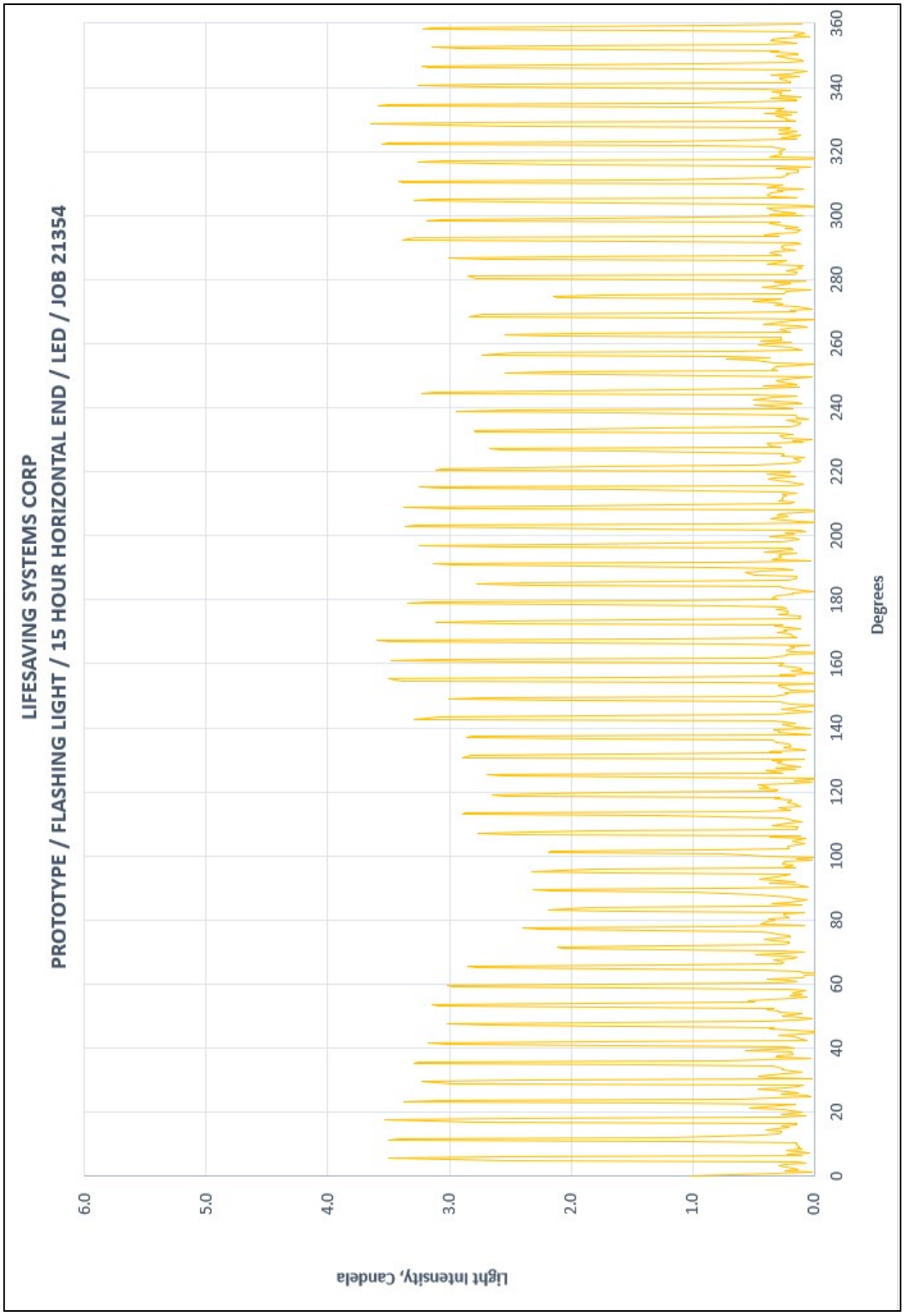

Figure 5: chart of horizontal light intensity at the end of the 15 hour test

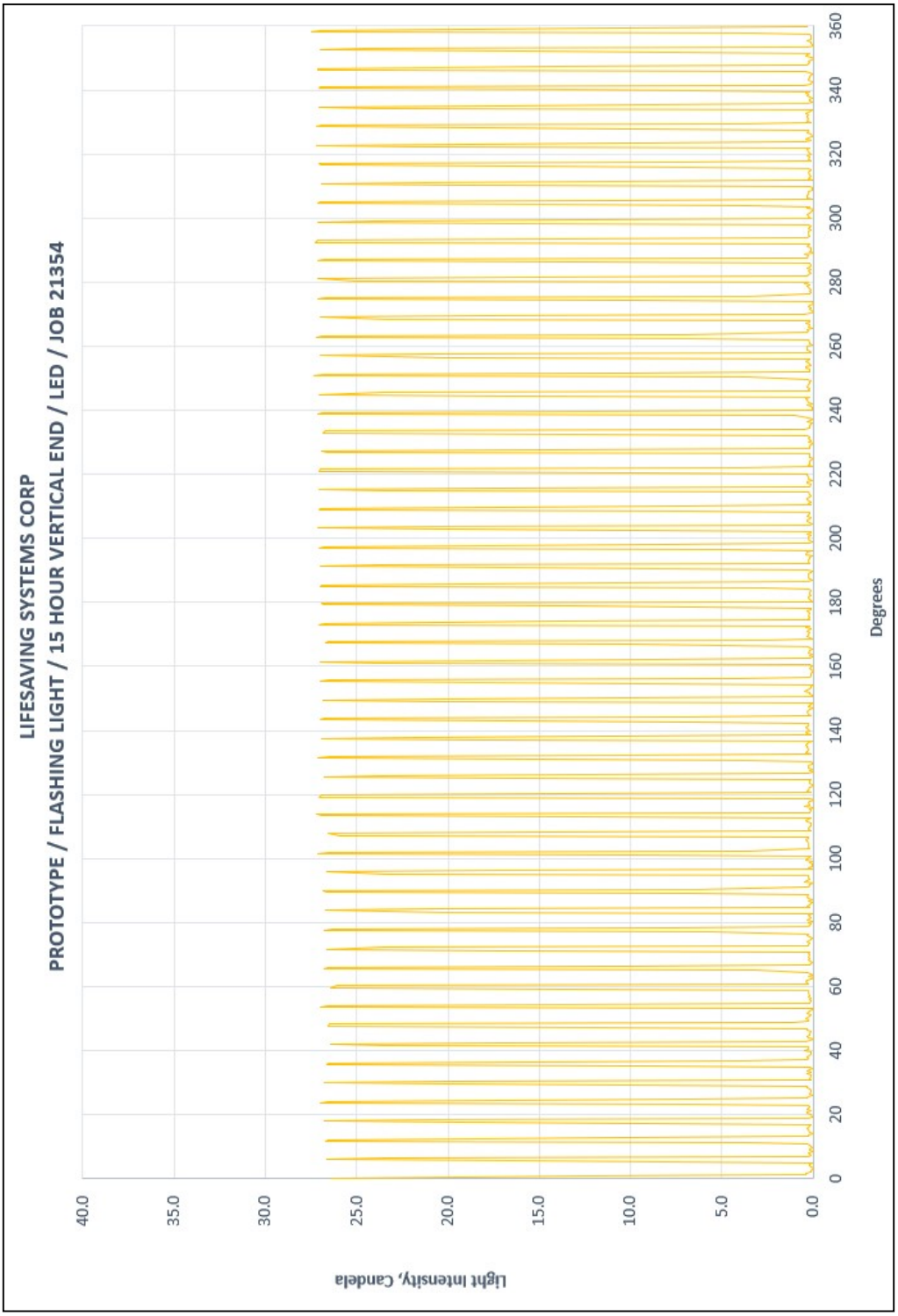

Figure 6: chart of vertical light intensity at the beginning of the 15 hour test

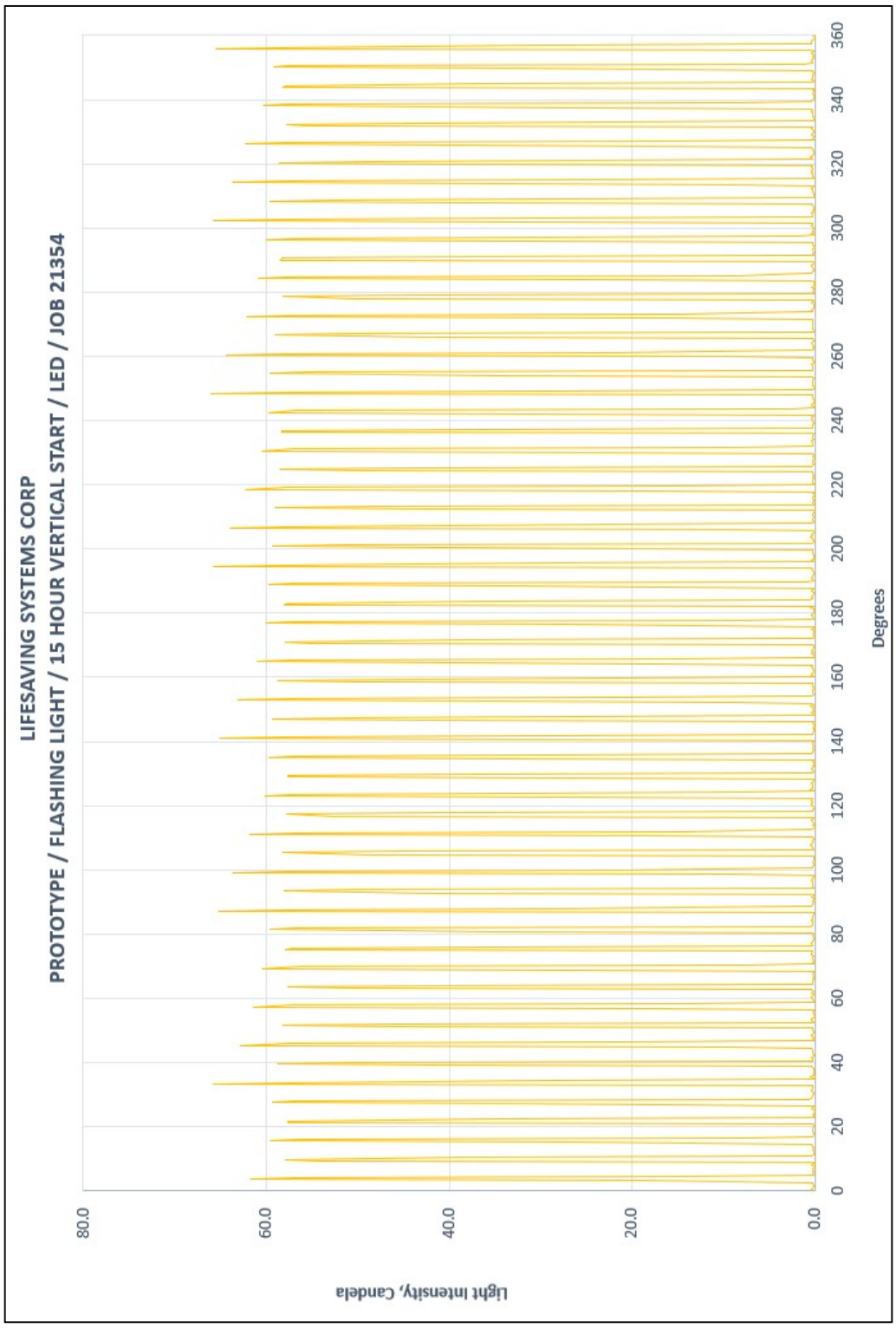

Figure 7: chart of vertical light intensity at the end of the 15 hour test

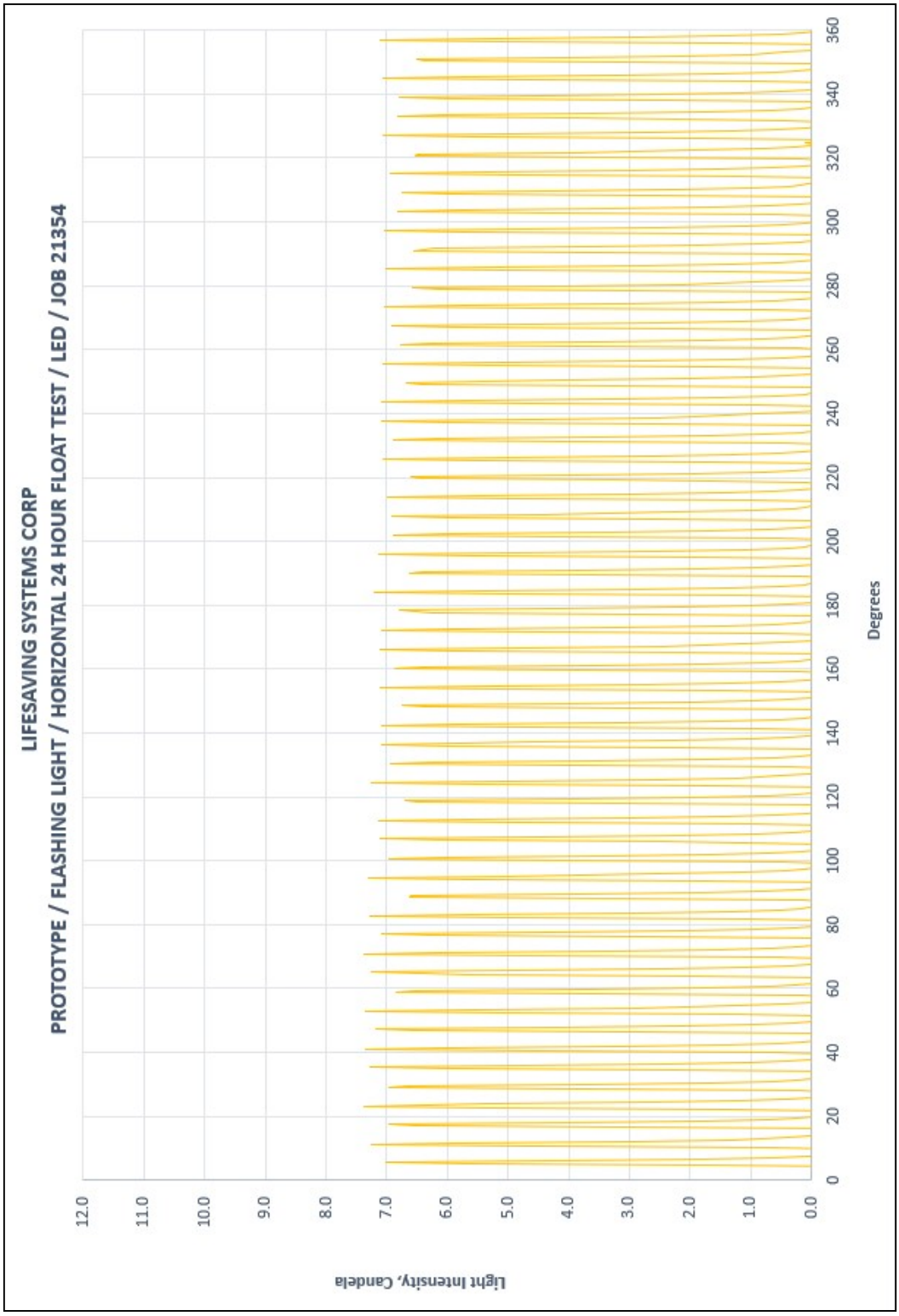

Figure 8: chart of light intensity at the end of the 24 hour float test