



Test Report

Model No. & Name : L017, RAIDEN Light bar
Product Description : Warning Light
Report number (Doc. No.) : 202309-L017-ICAO
Report Date : 2023 December 14
Classification : 

	Department	Name	Title
Tested by	RD	Josh Lin	Senior engineer
	QA	Leo Lin	Senior Engineer
Prepared by	QA	Leo Lin	Senior Engineer
Reviewed by	QA	Kevin Fong	Technical Assistant Manager

The test results relate only to the sample(s) tested.
The report has 19 pages, including this cover page.
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Doc. Name: DVT Report
Rev.: 1.0

Approved by: 
Kevin Fong
Technical Assistant Manager

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GENERAL INFORMATION

1. Sample Information

1.1	Model Name	:	L017
1.2	Commercial Name	:	RAIDEN
1.3	Product Description	:	Warning Light
1.4	Version	:	Not applicable
1.5	Marking on the device	:	No marking

2. Application information

2.1	Application date	:	2023 September 8
2.2	Receipt date of test sample	:	2023 September 8
2.3	Date of testing	:	2023 September 8 to 19
2.4	No. of test samples	:	2

3. Test laboratory

3.1	JULUEN Test Laboratory
	No. 88, Section 1, Zhonghua Road, Tucheng District, New Taipei City, 236029, Taiwan



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SUMMARY OF TEST RESULT

1. Summary of test result

- 1.1 ICAO Aerodrome Design and operations Annex 14 (eighth edition), EASA
Certification specifications and guidance material for aerodromes design
(Issue 4)
 - 1.1.1 Photometric test (ICAO & EASA)
Type C – Amber (FP # 24)..... PASS
 - 1.1.2 Color test (ECE R65)..... PASS

2. Document & Reference

Not applicable

3. Remark

- 1. The photometric requirement of obstacle lights in ICAO's document (ISBN: 978-92-9258-483-2) is the same as the requirement listed in EASA document.
ICAO: International Civil Aviation Organization
EASA: European Aviation Safety Agency

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DESCRIPTION SHEET

1. Specification of the test object

Material of lens	:	Polycarbonate
Material of housing	:	Aluminum alloy and plastic
Method to secure the lens & housing	:	The lens & the housing are fixed by screws
Method of mounting the test object to the vehicle	:	The lamp is mounted on the vehicle with bracket by screws
Rated voltage of the test object	:	12-24 VDC

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2. Flash pattern

FP #	Name of flash patterns	Remark
1	Double	2Hz
2	Single	2Hz
3	Triple	2Hz
4	Quad	2Hz
5	Single-SAE	SAE
6	Double-SAE	SAE
7	Triple-SAE	SAE
8	Quad-SAE	SAE
9	Quint	
10	Mega	
11	Giga	
12	Ultra-SAE	SAE
13	Single-Quad	
14	Single H/L	
15	Single-Triple-Quint	
16	Single-Single	
17	Double Double	
18	Triple-Triple Fast	
19	Triple-Triple Mid	
20	Quint-Triple	
21	7-1 Flash	
22	Quad-Single	
23	Quint-Quint	
24	ICAO flash	
25	Random	
26	Steady Max	
27	Steady 100%	

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FP #	Name of flash patterns	Remark
28	Steady 75%	
29	Steady 50%	
30	Steady 25%	
31	Steady 5%	
32	Steady 1%	

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PHOTO OF TEST OBJECT



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TEST PLAN

- The test has one group:
 - ICAO and EASA relevant relevant test;
- ICAO and EASA relevant test has two test items. The test standard is listed below:

Test item	Test standard
Photometric test	ICAO Annex 14, Chapter 6 (Table 6-1, Table 6-2) EASA, CS-ADR-DSN – Book1, Chapter Q (Table Q-1, Table Q-2)
Color test	ECE Regulation No. 65, Annex 3

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NO. OF TEST SAMPLE

Test item	Sample No.
Photometric test	Sample No. A
Color test	Sample No. B

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TEST RECORD SUMMARY

Item	Q'ty	Test Date	Result	Test By	Remark
ICAO & EASA relevant tests					
Photometry	1	Sept. 19	PASS	Josh Lin	
Color test	1	Sept. 8	PASS	Leo Lin	

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PHOTOMETRIC TEST

Test Date: 2023 September 19

Purpose:

To evaluate if the product meets the requirement of obstacle light for ICAO & EASA design guideline.

Test Method:

- i. The device is mounted in its normal operating position and the measurement is made with the geometric center of the device, at 25 meters from the photometer sensor.
- ii. The test is performed according to Chapter 18 of Aerodrome Design Manual (Doc 9157), Part 4.
- iii. The geometric center of the device is set as the reference point ($H = 0^\circ$ and $V = 0^\circ$). Measure the horizontal light distribution at $V = +2.5^\circ$ to find out the angle of the max. and the min. luminous intensity. Then measure the luminous intensity at max. & min. angle to verify if the device fulfills the requirement of vertical beam spread.
- iv. FP #24 (ICAO Flashing) flash pattern is selected as the representative pattern for present the test result.

Test Equipment:

Equipment	Manufacturer	Model	Next calibration date
Goniometer	Lucidbright	GOAC	2024 May 3

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Test Result

No.	Requirement	Status	Remark
1	The photometric performance fulfills the requirement of low-intensity light type, Type C (mobile obstacle) of ICAO design requirement (Table 6-1, Table 6-2)	☒ PASS ☐ FAIL	Amber
2	The photometric performance fulfills the requirement of low-intensity light type, type C (mobile obstacle) of EASA specification (Table Q-1, Table Q-2)	☒ PASS ☐ FAIL	Amber
3	The flashing rate of the device is within 60-90 fpm.	☒ PASS ☐ FAIL	

Remark:

1. The frequency is 1.263 Hz (Flash rate of the device is around 76 fpm)

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Photometric test result (amber color)

Flash pattern: ICAO flashing		Photometric result, Cd		Requirement, Cd (Je)	
Point on measuring screen		1 min.	Stability	Min	Max
2.5U	180R	178.4	177.9	40	400
2.5U	170R	209.2	208.6	40	400
2.5U	160R	212.7	212.1	40	400
2.5U	150R	223.6	222.9	40	400
2.5U	140R	216.9	216.2	40	400
2.5U	130R	220.6	219.2	40	400
2.5U	120R	196.9	196.3	40	400
2.5U	110R	233.5	232.9	40	400
2.5U	100R	232.8	232.1	40	400
2.5U	90R	242.8	242.1	40	400
2.5U	80R	234.2	233.5	40	400
2.5U	70R	232.5	231.9	40	400
2.5U	60R	201.6	201.0	40	400
2.5U	50R	234.1	233.4	40	400
2.5U	40R	231.2	230.6	40	400
2.5U	30R	236.4	235.7	40	400
2.5U	20R	227.0	226.3	40	400
2.5U	10R	215.6	215.0	40	400
2.5U	V	198.8	198.2	40	400
2.5U	10L	242.4	241.7	40	400
2.5U	20L	252.4	251.7	40	400
2.5U	30L	260.9	260.1	40	400
2.5U	40L	253.8	253.1	40	400
2.5U	50L	245.3	244.6	40	400
2.5U	60L	209.6	209.0	40	400
2.5U	70L	230.0	229.3	40	400
2.5U	80L	227.7	227.0	40	400
2.5U	90L	241.0	240.3	40	400
2.5U	100L	230.9	230.2	40	400
2.5U	110L	230.3	229.7	40	400
2.5U	120L	198.4	197.8	40	400
2.5U	130L	222.7	222.0	40	400
2.5U	140L	222.4	221.7	40	400
2.5U	150L	228.2	227.6	40	400
2.5U	160L	219.0	218.3	40	400
2.5U	170L	186.6	186.1	40	400
2.5U	180L	178.9	178.4	40	400

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Flash pattern: ICAO flashing		Photometric result (locating Max. Je)		Requirement, Cd (Je)	
Point on measuring screen		1 min.	Stability	Min.	Max
12U	30L	37.7	37.6	20	400
10U	30L	74.3	74.1	40	400
8U	30L	118.3	118.0	40	400
6U	30L	163.7	163.2	40	400
4U	30L	216.1	215.5	40	400
2U	30L	273.5	272.7	40	400
H	30L	275.8	275.0	40	400

Flash pattern: ICAO flashing		Photometric result (locating Min. Je)		Requirement, Cd (Je)	
Point on measuring screen		1 min.	Stability	Min.	Max
12U	180R	37.2	37.1	20	400
10U	180R	64.5	64.3	40	400
8U	180R	86.3	86.0	40	400
6U	180R	110.8	110.5	40	400
4U	180R	144.7	144.3	40	400
2U	180R	189.2	188.6	40	400
H	180R	225.7	225.1	40	400

Verdict : Passed

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Color test

Test Date: 2023 September 8

Purpose:

To verify if the color emitted by the device falls within the color boundary.

Test Method:

- The Tristimulus method stated in SAE J578 is used as the test method.
- The device is mounted on the goniometer and the colorimetric detector is located in the front of device at 3.16m.
- The device is operated at 13.5 VDC and FP #1 (Double) flash patter is used for color test.
- The chromaticity coordinates of HV point are measured when the light intensity reaches stable.

Test Equipment:

Equipment	Manufacturer	Model	Next calibration date
Goniometer	Lucidbright	GOAC	2024 May 3

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Test Result:

No.	Requirement	Status	Remark
1	The chromaticity coordinates are within the color boundaries in SAE J578.	☒ PASS ☐ FAIL	Amber

Color	Lens color	Measured value (x, y)	Boundary eq.
Amber	Outer lens: clear	x = 0.5868 y = 0.4038	y = 0.39 y = 0.79-0.67x y = x-0.12

Verdict : Passed

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