CAST LIGHTING LLC

TEST REPORT

SCOPE OF WORK
LED Performance Testing

MODEL NUMBER
SBOL1-MAX, SBOL1-MIN

PROJECT NUMBER
G105521279

REPORT NUMBER
105521279CRT-001

ISSUE DATE
7/28/2023

REVISED DATE
None

TEST DATES
7/27/2023 through 7/28/2023

DOCUMENT CONTROL NUMBER
RTTDS-R-AMER-Test-3407

PAGES
13

REPORT NUMBER
105521279CRT-001

MODEL NUMBER(s)
SBOL1-MAX, SBOL1-MIN

REPORT RENDERED TO:
CAST LIGHTING LLC
1120 GOFFLE ROAD
HAWTHORNE NJ 07506-2024

STATEMENT OF LIMITATION

NVLAP Lab Code 100402-0. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. government.

AUTHORIZATION

The testing performed was authorized by signed quote number Qu-01378246-4.

TEST STANDARDS

ANSI/IES LM-79-19: Optical and Electrical Measurements of Solid State Lighting Products
IES LM-79-08: Electrical and Photometric Measurements of Solid State Lighting
ANSI NEMA ANSLG C78.377: 2017: Specifications for the Chromaticity of Solid State Lighting (SSL) Products

In Charge of Testing:	Reviewer:
Melanie Brittain	Ryan Siddon
Senior Associate Engineer	Operations Manager
Lighting Division	Lighting Division

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SAMPLE INFORMATION

REPORT NO. 105521279CRT-001

ITEMS RECEIVED

Item No.	Control No.	Model No.	Description	Type	Received Date	Sampling Date
1	CRT2307270938-001A	SBOL1-MAX	Bollard Set at Highest Lumen Setting	Production	7/27/2023	N/A
2	CRT2307270938-001B	SBOL1-MIN	Bollard Set at Lowest Lumen Setting			N/A

TESTED SAMPLE CONFIGURATIONS

Config No.	Tested Model No.	Item Nos. Utilized
1	SBOL1-MAX	1
2	SBOL1-MIN	2

SAMPLE PHOTOS

SBOL1-MAX

SBOL1-MIN

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SUMMARY **REPORT NO. 105521279CRT-001**

PRODUCT INFORMATION AND SUMMARY OF DATA

Test Configuration 1	
Product Model No.:	SBOL1-MAX
Product Description:	Bollard Set at Highest Lumen Setting
LED Model No.:	Cree XPGDWT-H1-0000-00H8E
Driver Model No.:	N/A

Test Configuration 2	
Product Model No.:	SBOL1-MAX
Product Description:	Bollard Set at Lowest Lumen Setting
LED Model No.:	Cree XPGDWT-H1-0000-00H8E
Driver Model No.:	N/A

TEST METHODS

SEASONING IN SAMPLE ORIENTATION - LED PRODUCTS

No seasoning was performed in accordance with ANSI/IES LM-79-19

DUT SAMPLING METHOD

For testing plans, program requirements, or shipments requiring sampling of DUTs or components, the selections for each test were random. All samples are marked with control numbers regardless of being tested.

INTEGRATING SPHERE TESTING

A spectroradiometer and integrating sphere were used to measure the spectral power distribution for photometric and colorimetric data of the DUT. Electrical measurements of the unit were measured using a power analyzer. Each DUT was operated at the rated input voltage of the system in its designated orientation. The ambient temperature and relative humidity was measured at 25°C ± 1.2°C and 10-65% respectively at a position inside of the sphere within 1.5m and at equal height of the DUT. Stabilization procedures to LM-79-19 were followed. The DUT was mounted in a 4π configuration.

TYPE C GONIOPHOTOMETER DISTRIBUTION TESTING

A Type C Mirror Goniophotometer system was used to measure the luminous intensity (candela) at each angle of distribution for the DUT. Electrical measurements of the unit were measured using a power analyzer. Each DUT was operated at the rated input voltage of the system in its designated orientation. The ambient temperature and relative humidity was measured at 25°C ± 1.2°C and 10-65% respectively at a position within 1.5m and at equal height of the DUT. Stabilization procedures to LM-79-19 were followed. The test distance was ≥ 5x the longest luminous dimension of the DUT.

ANSI/IES Technical Memorandums (TM) reported are not NVLAP accredited

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INTEGRATING SPHERE TESTING **REPORT NO. 105521279CRT-001**

Test Configuration	Tested Model No.	Pass/Fail/NA
1	SBOL1-MAX	NA

PHOTOMETRIC, RADIOMETRIC, COLORIMETRIC, AND ELECTRICAL MEASUREMENTS

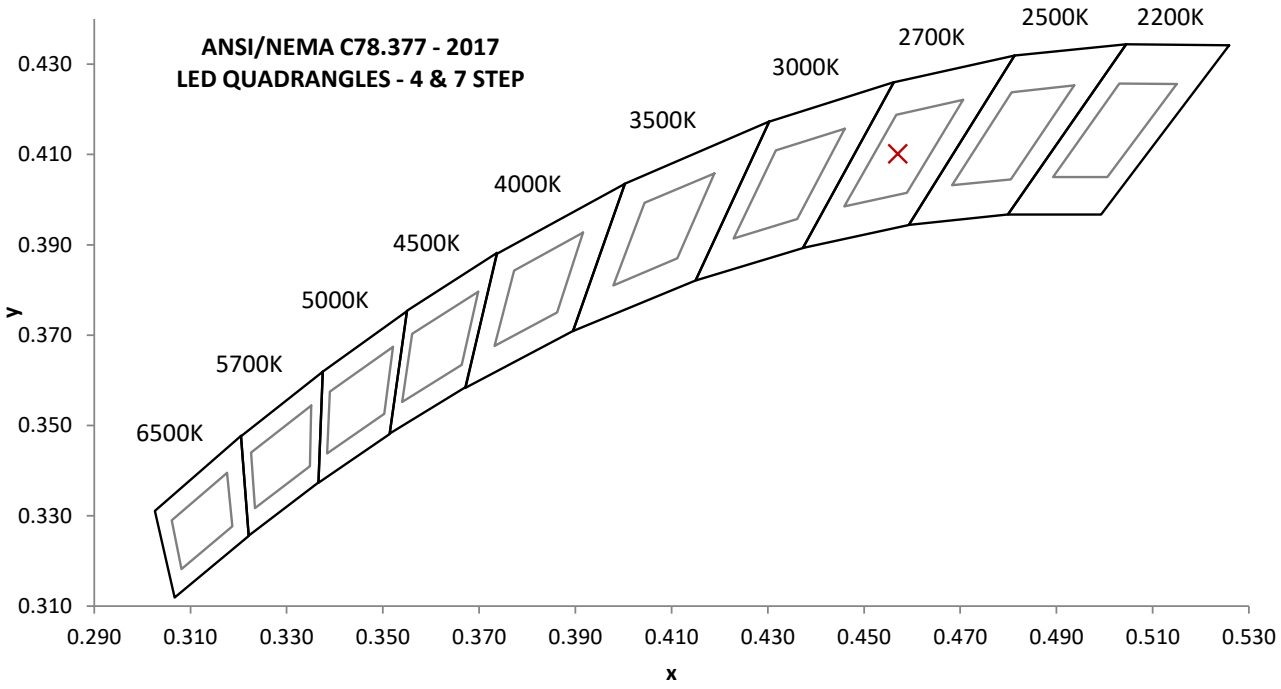
Base Orientation
Down

Input Voltage (Vac)	Input Current (mA)	Input Power (W)	Input Power Factor ()	Input ATHD (%)
12.01	218.3	2.40	0.917	42.10

Measured at 12.01(Vac)

Light Output (lm)	Efficacy (lm/W)	CCT (K)	CRI - Ra ()	CRI - R9 ()
96.8	40.2	2737	83.6	16.7

Duv ()	1931 Chrom (x)	1931 Chrom (y)	1976 Chrom (u')	1976 Chrom (v')
0.0001	0.457	0.410	0.261	0.527



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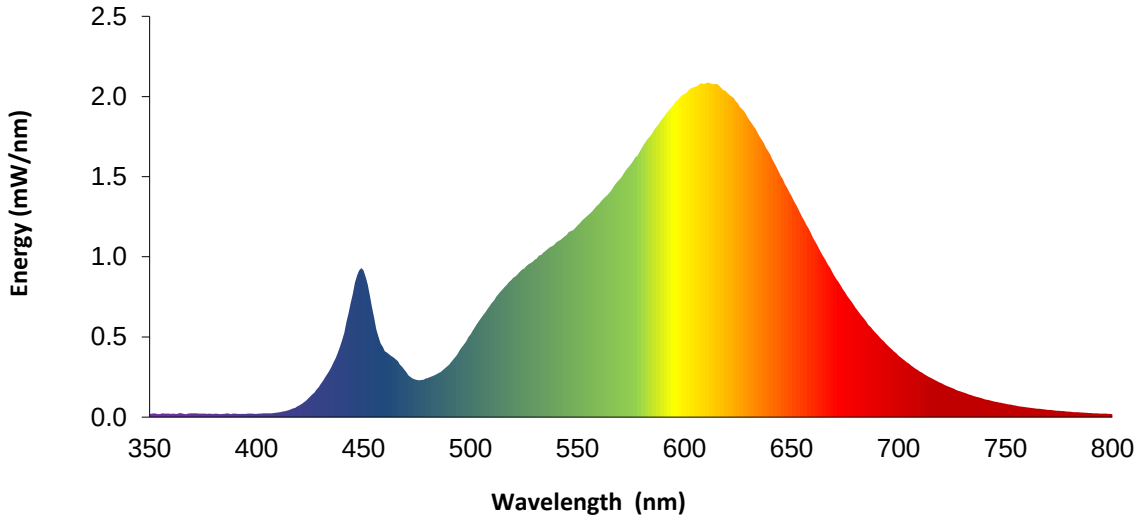
SPECTRAL POWER DISTRIBUTION

nm	mW/nm		nm	mW/nm		nm	mW/nm		nm	mW/nm
350	0.0		460	0.4		570	1.5		680	0.7
355	0.0		465	0.4		575	1.6		685	0.6
360	0.0		470	0.3		580	1.7		690	0.5
365	0.0		475	0.2		585	1.8		695	0.4
370	0.0		480	0.2		590	1.9		700	0.4
375	0.0		485	0.3		595	2.0		705	0.3
380	0.0		490	0.3		600	2.0		710	0.3
385	0.0		495	0.4		605	2.1		715	0.2
390	0.0		500	0.5		610	2.1		720	0.2
395	0.0		505	0.6		615	2.1		725	0.2
400	0.0		510	0.7		620	2.0		730	0.2
405	0.0		515	0.8		625	2.0		735	0.1
410	0.0		520	0.9		630	1.9		740	0.1
415	0.0		525	0.9		635	1.8		745	0.1
420	0.1		530	1.0		640	1.6		750	0.1
425	0.1		535	1.0		645	1.5		755	0.1
430	0.2		540	1.1		650	1.4		760	0.1
435	0.3		545	1.1		655	1.3		765	0.1
440	0.5		550	1.2		660	1.1		770	0.0
445	0.8		555	1.3		665	1.0		775	0.0
450	0.9		560	1.3		670	0.9		780	0.0
455	0.6		565	1.4		675	0.8		---	---

Spectral radiant flux was measured by 1nm increments. 1nm data is on file.



Portrayed color in graphic is estimated by wavelength (nm) and may not be exact - it is a visual representation only

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TYPE C GONIOPHOTOMETER DISTRIBUTION TESTING

REPORT NO. 105521279CRT-001

Test Configuration	Tested Model No.	Pass/Fail/NA
1	SBOL1-MAX	NA

PHOTOMETRIC AND ELECTRICAL MEASUREMENTS

Base Orientation	Input Voltage (Vac)	Input Current (mA)	Input Power (W)	Input Power Factor ()
Down	12.07	217.1	2.41	0.919

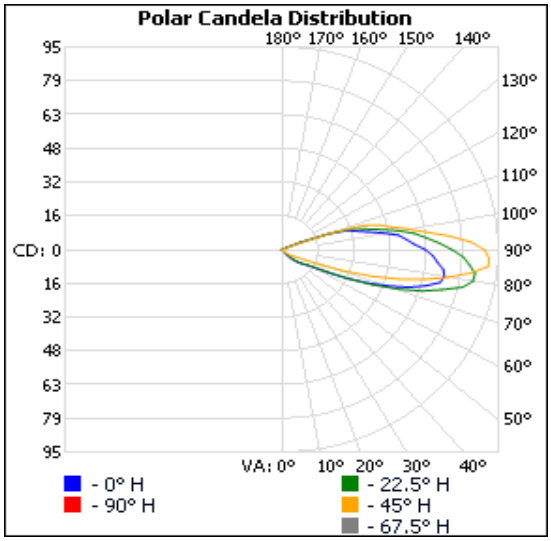
Light Output (lm)	Efficacy (lm/W)
96.8	40.2

LUMINOUS INTENSITY SUMMARY (candela)

Vertical	Horizontal				
Angle (°)	0	22.5	45	67.5	90
0	0	0	0	0	0
5	0	0	0	0	0
10	0	0	0	0	0
15	0	0	0	0	0
20	0	0	0	0	0
25	0	0	0	0	0
30	0	0	0	0	0
35	0	0	0	0	0
40	1	0	0	0	0
45	6	4	0	0	0
50	9	8	2	0	0
55	12	12	5	0	0
60	17	17	6	0	0
65	32	32	12	0	0
70	50	54	30	0	0
75	65	72	53	0	0
80	72	85	74	0	0
85	69	83	91	0	0
90	63	75	89	0	0
95	55	64	74	0	0
100	45	52	56	0	0
105	34	38	44	0	0
110	21	23	22	0	0
115	2	2	1	0	0
120	1	1	0	0	0
125	0	0	0	0	0
130	0	0	0	0	0
135	0	0	0	0	0
140	0	0	0	0	0
145	0	0	0	0	0
150	0	0	0	0	0
155	0	0	0	0	0
160	0	0	0	0	0
165	0	0	0	0	0
170	0	0	0	0	0
175	0	0	0	0	0
180	0	0	0	0	0

Full luminous intensity matrix found in .IES file

Polar Candela Plot



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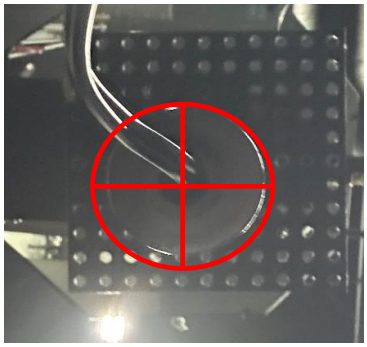
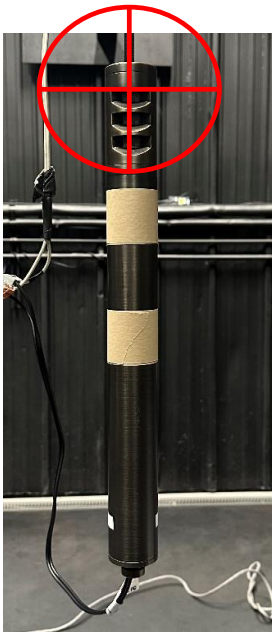
ORIENTATION AND ALIGNMENT OF DUT

Luminous Opening		
Length (ft)	Width (ft)	Height (ft)
0.03	0.10	0.17
0°-180° H	90°-270° H	0°-180° V

Test Distance (ft)
29.2

PHOTOMETRIC CENTER OF DUT





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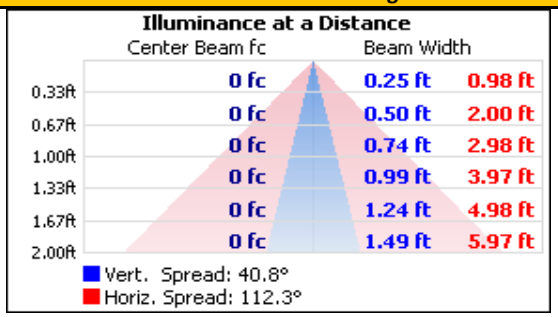
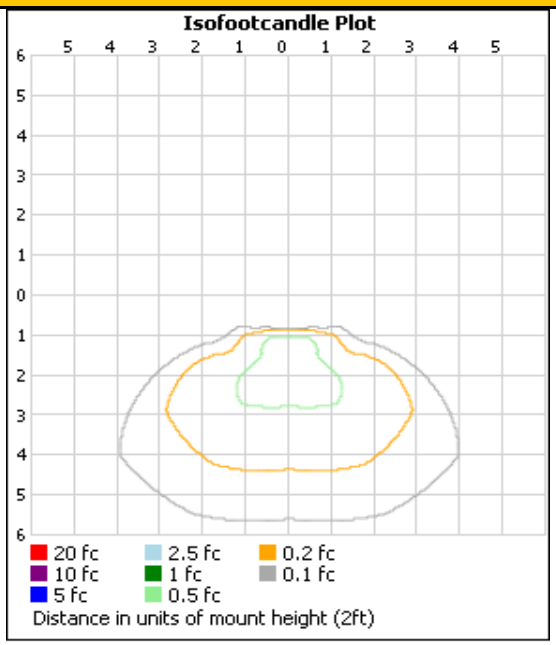
REPORT NO. 105521279CRT-001

ILLUMINANCE SUMMARY

Illuminance - Cone Of Light



Isoillumination Plot



ZONAL LUMENS

Zonal Lumen Summary

Zone (°)	Lumens	Luminaire
0-30	0.0	0.0%
0-40	0.0	0.0%
0-60	3.3	3.4%
60-90	56.4	58.3%
70-100	70.9	73.2%
90-120	37.0	38.3%
0-90	59.7	61.7%
90-180	37.1	38.3%
0-180	96.8	100.0%

Zone (°)	Lumens	Total	Zone (°)	Lumens	Total
0-10	0.0	0.0%	90-100	22.4	23.2%
10-20	0.0	0.0%	100-110	13.0	13.4%
20-30	0.0	0.0%	110-120	1.7	1.7%
30-40	0.0	0.0%	120-130	0.0	0.0%
40-50	0.7	0.7%	130-140	0.0	0.0%
50-60	2.6	2.6%	140-150	0.0	0.0%
60-70	8.0	8.2%	150-160	0.0	0.0%
70-80	20.8	21.5%	160-170	0.0	0.0%
80-90	27.7	28.6%	170-180	0.0	0.0%

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TYPE C GONIOPHOTOMETER DISTRIBUTION TESTING

REPORT NO. 105521279CRT-001

Test Configuration	Tested Model No.	Pass/Fail/NA
2	SBOL1-MIN	NA

PHOTOMETRIC AND ELECTRICAL MEASUREMENTS

Base Orientation	Input Voltage (Vac)	Input Current (mA)	Input Power (W)	Input Power Factor ()
Down	12.06	214.0	2.37	0.918

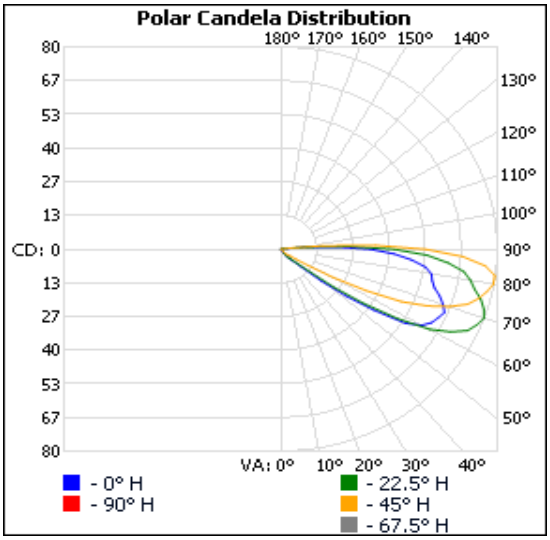
Light Output (lm)	Efficacy (lm/W)
79.2	33.4

LUMINOUS INTENSITY SUMMARY (candela)

Vertical	Horizontal				
Angle (°)	0	22.5	45	67.5	90
0	0	0	0	0	0
5	0	0	0	0	0
10	0	0	0	0	0
15	0	0	0	0	0
20	0	0	0	0	0
25	0	0	0	0	0
30	0	0	0	0	0
35	2	1	0	0	0
40	4	4	1	0	0
45	7	6	3	0	0
50	20	13	4	0	0
55	42	37	7	0	0
60	60	63	22	0	0
65	64	76	49	0	0
70	64	80	66	0	0
75	59	76	76	0	0
80	57	71	80	0	0
85	49	62	76	0	0
90	33	42	54	0	0
95	8	10	16	0	0
100	1	1	0	0	0
105	0	0	0	0	0
110	0	0	0	0	0
115	0	0	0	0	0
120	0	0	0	0	0
125	0	0	0	0	0
130	0	0	0	0	0
135	0	0	0	0	0
140	0	0	0	0	0
145	0	0	0	0	0
150	0	0	0	0	0
155	0	0	0	0	0
160	0	0	0	0	0
165	0	0	0	0	0
170	0	0	0	0	0
175	0	0	0	0	0
180	0	0	0	0	0

Full luminous intensity matrix found in .IES file

Polar Candela Plot



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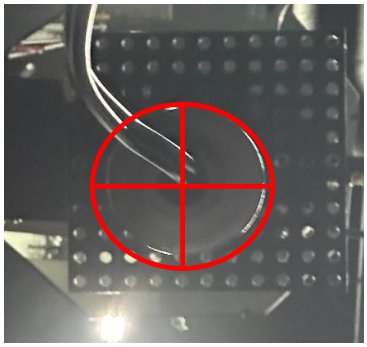
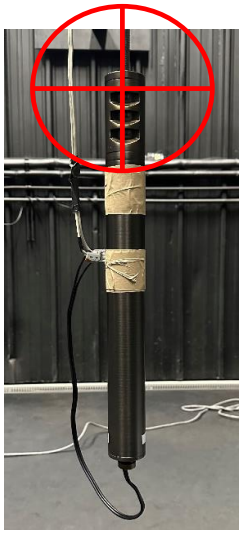
ORIENTATION AND ALIGNMENT OF DUT

Luminous Opening		
Length (ft)	Width (ft)	Height (ft)
0.03	0.10	0.17
0°-180° H	90°-270° H	0°-180° V

Test Distance (ft)
29.2

PHOTOMETRIC CENTER OF DUT





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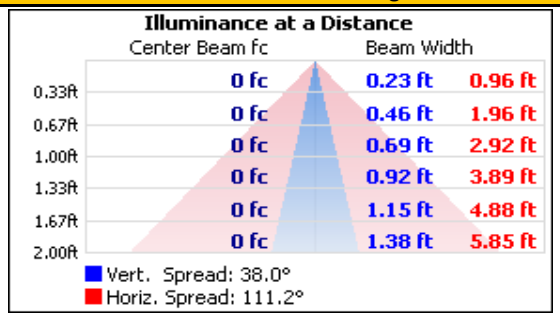
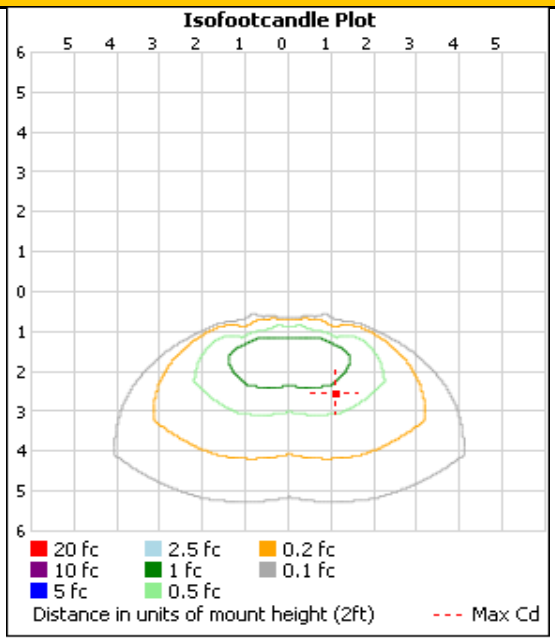
ILLUMINANCE SUMMARY

Illuminance - Cone Of Light



Isoillumination Plot



ZONAL LUMENS

Zonal Lumen Summary

Zone (°)	Lumens	Luminaire
0-30	0.0	0.0%
0-40	0.2	0.3%
0-60	9.3	11.8%
60-90	64.2	81.0%
70-100	50.8	64.2%
90-120	5.7	7.2%
0-90	73.5	92.8%
90-180	5.7	7.2%
0-180	79.2	100.0%

Zone (°)	Lumens	Total	Zone (°)	Lumens	Total
0-10	0.0	0.0%	90-100	5.6	7.1%
10-20	0.0	0.0%	100-110	0.1	0.1%
20-30	0.0	0.0%	110-120	0.0	0.0%
30-40	0.2	0.3%	120-130	0.0	0.0%
40-50	1.4	1.7%	130-140	0.0	0.0%
50-60	7.7	9.7%	140-150	0.0	0.0%
60-70	19.0	24.0%	150-160	0.0	0.0%
70-80	23.9	30.1%	160-170	0.0	0.0%
80-90	21.3	26.9%	170-180	0.0	0.0%

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EQUIPMENT LIST

REPORT NO. 105521279CRT-001

#	Equipment	Model No	Control No.	Last Cal	Cal Due
1	Elgar AC Power Supply	CW1251	---	VBU	VBU
2	Sorenson DC Power Supply	XFR 150-8	---	VBU	VBU
3	Traceable Thermometer	4800	L204	3/7/2023	3/7/2024
4	Yokogawa Power Analyzer	WT1600	E473	8/24/2022	8/24/2023
5	Fluke Thermometer	53 II	N1324	6/28/2023	6/28/2024
6	Fluke Multimeter	87V	D589	4/10/2023	4/10/2024
7	Current Monitor	411	A197	8/26/2021	8/26/2024
8	3M Integrating Sphere Spectrometer System	CDS 2600	L231	6/29/2023	9/29/2023
9	Fisher Scientific Stopwatch	14-649-9	N1132	8/22/2022	8/22/2023
10	LSI Type C Goniophotometer System	6440	---	5/3/2023	8/3/2023
11	Elgar AC Power Supply	CW1251	---	VBU	VBU
12	Yokogawa Power Analyzer	WT210	E464	6/21/2023	6/21/2024
13	Omega Thermometer	DPi8-C24	M263	3/9/2023	3/9/2024
14	Tape Measure	Crescent	---	9/21/2021	9/21/2024
15	Traceable Hygrothermometer	4800	L206	3/7/2023	3/7/2024
The AC power supplies used for testing have a crest factor capable of 0-3.5					

REVISION HISTORY

#	Revision Date	Updated By	Reviewed By	Description of Change
---	None	---	---	---
---	---	---	---	---
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