

VISUAL COMFORT AND COMPANY TEST REPORT

SCOPE OF WORK

LED Performance Testing

MODEL NUMBER

700BLT43B-LED930

PROJECT NUMBER

G104941221

REPORT NUMBER

104941221CRT-002

ISSUE DATE

7/28/2022

REVISED DATE

None

TEST DATES

7/13/2022 through 7/28/2022

DOCUMENT CONTROL NUMBER

RTTDS-R-AMER-Test-3407

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REPORT NUMBER

104941221CRT-002

MODEL NUMBER(s)

700BLT43B-LED930

REPORT RENDERED TO:

VISUAL COMFORT AND COMPANY
7400 LINDER AVE
SKOKIE, IL 60077

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 federal government.

AUTHORIZATION

The testing performed was authorized by signed quote number Qu-01236637-1.

TEST STANDARDS

ANSI/IES LM-79-19: Optical and Electrical Measurements of Solid State Lighting Products

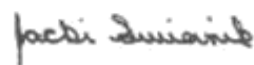
ANSI NEMA ANSLG C78.377: 2017: Specifications for the Chromaticity of Solid State Lighting (SSL) Products

In Charge of Testing:

Reviewer:



Melanie Brittain
Senior Associate Engineer
Lighting Division



Jacki Swiernik
Staff Engineer
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SAMPLE INFORMATION

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ITEMS RECEIVED

Item No.	Control No.	Model No.	Description	Type	Received
1	CRT2206301053-007	700BLT43B-LED930	Belterra 43 Chandelier	Production	6/30/2022

SAMPLE PHOTOS - TESTED CONFIGURATIONS



SUMMARY

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PRODUCT INFORMATION AND SUMMARY OF DATA

Product Model No.:	700BLT43B-LED930
Product Description:	Belterra 43 Chandelier
LED Model No.:	SEOUL STW9A12D-E1
Driver Model No.:	LTF DA45W1200C2036-301 (X2)
Light Source:	LED

Criteria	Results	
	Goniophotometer	Integrating Sphere
Light Output (lumens)	5880.9	6096.2
Input Power (W) @ 120 (Vac)	84.82	85.78
Luminous Efficacy (lm/W)	69.33	71.07
Input Power Factor (I) @ 120 (Vac)	0.996	0.994

Criteria	Results
Input ATHD (%) @ 120 (Vac)	9.42
Correlated Color Temperature (K)	2979
Color Rendering Index - Ra (I)	93.3
Color Rendering Index - R9 (I)	65.3
Duv (I)	-0.0017
Chromaticity Coordinate (x)	0.436
Chromaticity Coordinate (y)	0.400
Chromaticity Coordinate (u')	0.252
Chromaticity Coordinate (v')	0.519

TEST METHODS

SEASONING IN SAMPLE ORIENTATION - LED PRODUCTS

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

INTEGRATING SPHERE TESTING

A spectroradiometer and integrating sphere were used to measure the spectral power distribution for photometric and colorimetric data of the EUT. Electrical measurements of the unit were measured using a power analyzer. Each EUT was operated at the rated input voltage of the system in its designated orientation. The ambient temperature and relative humidity was measured at $25^{\circ}\text{C} \pm 1.2^{\circ}\text{C}$ and 10-65% respectively at a position inside of the sphere within 1.5m and at equal height of the EUT. Stabilization procedures to LM-79-19 were followed. The EUT 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 EUT. Electrical measurements of the unit were measured using a power analyzer. Each EUT was operated at the rated input voltage of the system in its designated orientation. The ambient temperature and relative humidity was measured at $25^{\circ}\text{C} \pm 1.2^{\circ}\text{C}$ and 10-65% respectively at a position within 1.5m and at equal height of the EUT. Stabilization procedures to LM-79-19 were followed. The test distance was $\geq 5x$ the longest luminous dimension of the EUT.

TYPE C GONIOPHOTOMETER DISTRIBUTION TESTING

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PHOTOMETRIC AND ELECTRICAL MEASUREMENTS

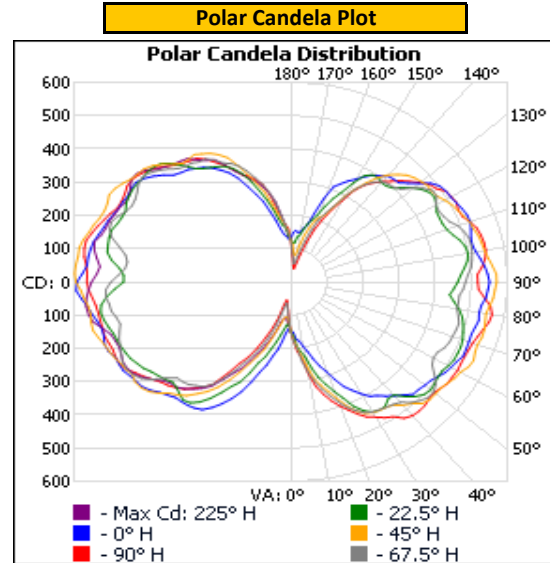
Base Orientation	Input Voltage (Vac)	Input Current (mA)	Input Power (W)	Input Power Factor ()
UP	120.06	709.6	84.82	0.996

Light Output (lm)	Efficacy (lm/W)
5880.9	69.3

LUMINOUS INTENSITY SUMMARY (candela)

Angle (°)	0	22.5	45	67.5	90
0	149	149	149	149	149
5	174	193	198	200	210
10	196	228	257	276	281
15	240	298	321	333	350
20	286	350	372	382	397
25	347	413	428	427	438
30	388	452	453	452	469
35	417	456	460	460	495
40	446	444	483	472	525
45	478	487	516	506	526
50	484	506	524	517	518
55	497	498	530	486	531
60	513	504	542	456	533
65	527	510	559	469	531
70	525	507	550	477	536
75	528	494	555	482	552
80	530	473	549	467	566
85	542	442	563	468	538
90	550	462	570	484	518
95	539	483	560	502	532
100	521	498	545	510	548
105	516	485	538	511	545
110	529	460	528	493	529
115	523	455	510	467	512
120	512	465	492	464	513
125	504	470	476	480	491
130	462	441	471	440	466
135	423	400	454	403	431
140	417	390	420	394	394
145	392	393	363	358	356
150	356	343	296	293	280
155	326	276	222	229	207
160	266	214	199	167	128
165	178	180	147	91	56
170	153	143	90	56	43
175	156	118	86	71	67
180	128	128	128	128	128

Entire luminous intensity matrix found in .IES file



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ORIENTATION AND ALIGNMENT OF EUT

Luminous Opening		
Length (ft)	Width (ft)	Height (ft)
3.58	3.58	3.21
0°-180° H	90°-270° H	0°-180° V

Test Distance (ft)
29.6

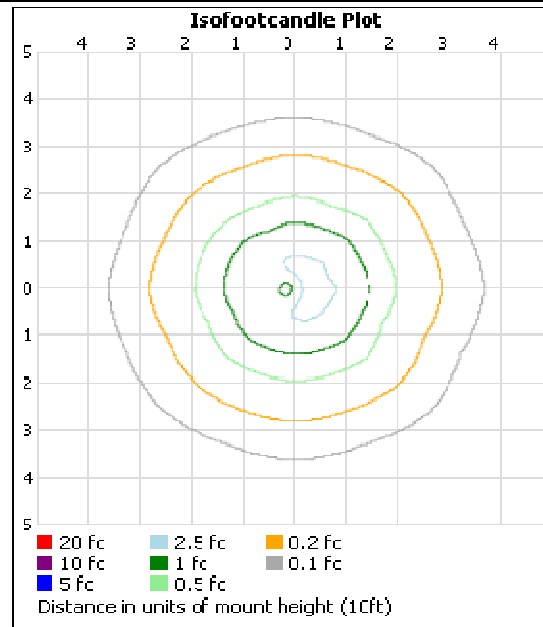
PHOTOMETRIC CENTER OF EUT



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ILLUMINANCE SUMMARY

Mounting Height: 10ft	
Isoillumination Plot	



ZONAL LUMENS

Zonal Lumen Summary					
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Zone	Lumens	Luminaire
0-30	246.0	4.2%
0-40	515.4	8.8%
0-60	1,331.6	22.6%
60-90	1,639.2	27.9%
70-100	1,694.1	28.8%
90-120	1,634.4	27.8%
0-90	2,970.8	50.5%
90-180	2,910.2	49.5%
0-180	5,880.9	100.0%

Zone	Lumens	Total	Zone	Lumens	Total
0-10	15.7	0.3%	90-100	568.3	9.7%
10-20	68.7	1.2%	100-110	555.7	9.4%
20-30	161.7	2.7%	110-120	510.4	8.7%
30-40	269.4	4.6%	120-130	448.4	7.6%
40-50	366.0	6.2%	130-140	353.3	6.0%
50-60	450.2	7.7%	140-150	253.4	4.3%
60-70	513.4	8.7%	150-160	147.2	2.5%
70-80	553.9	9.4%	160-170	60.1	1.0%
80-90	571.8	9.7%	170-180	13.3	0.2%

INTEGRATING SPHERE TESTING

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PHOTOMETRIC, RADIOMETRIC, COLORIMETRIC, AND ELECTRICAL MEASUREMENTS

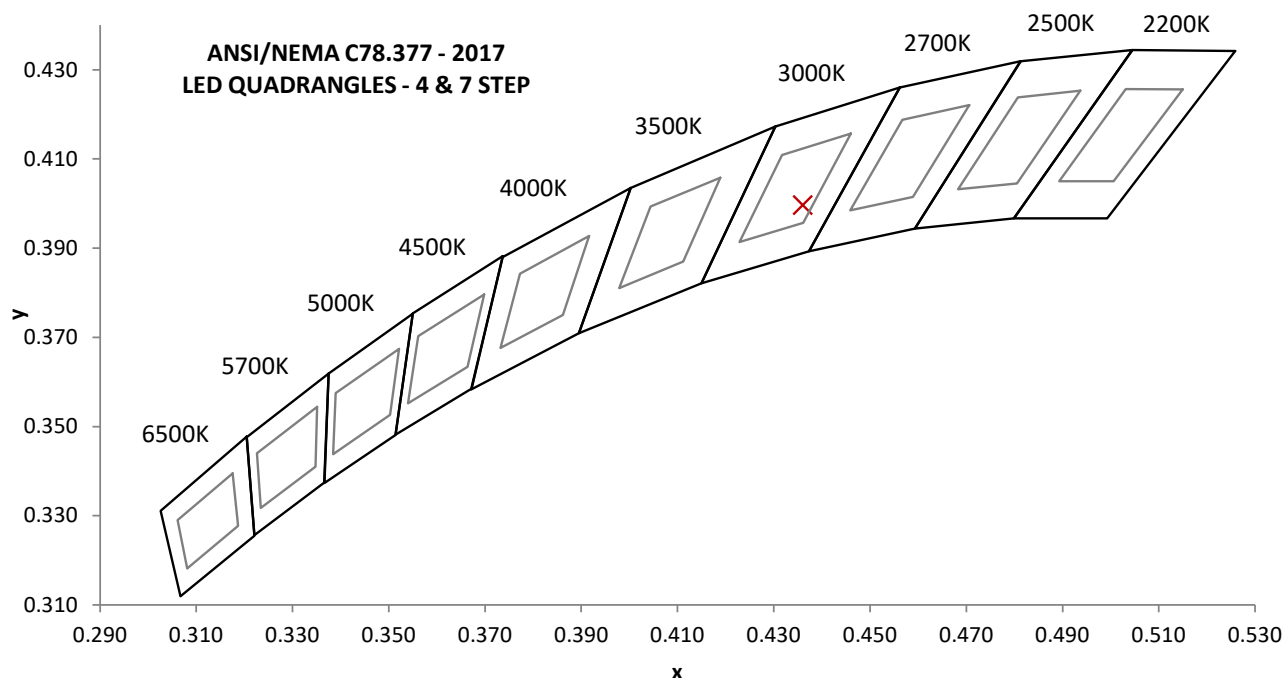
Base Orientation
UP

Input Voltage (Vac)	Input Current (mA)	Input Power (W)	Input Power Factor (l)	Input ATHD (%)
120.03	718.9	85.78	0.994	9.42

Measured at 120.03(Vac)

Light Output (lm)	Efficacy (lm/W)	CCT (K)	CRI - Ra (l)	CRI - R9 (l)
6096.2	71.1	2979	93.3	65.3

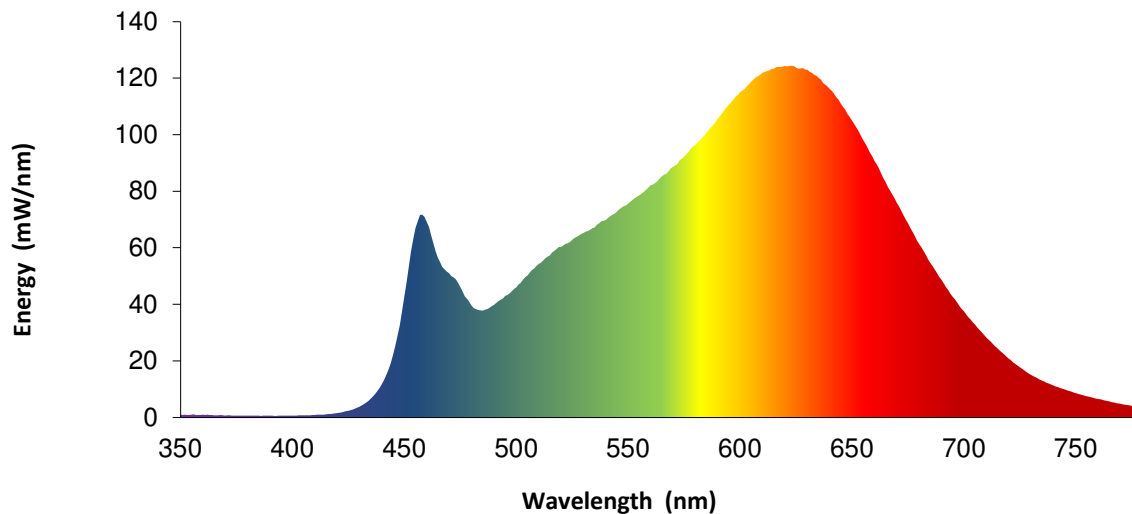
Duv (l)	1931 Chrom (x)	1931 Chrom (y)	1976 Chrom (u')	1976 Chrom (v')
-0.0017	0.436	0.400	0.252	0.519



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SPECTRAL POWER DISTRIBUTION

nm	mW/nm		nm	mW/nm		nm	mW/nm		nm	mW/nm
350	1.0		460	69.2		570	88.7		680	61.3
355	1.0		465	56.4		575	92.3		685	54.6
360	0.9		470	51.0		580	96.5		690	48.6
365	0.8		475	46.1		585	100.8		695	42.6
370	0.7		480	39.6		590	105.7		700	37.5
375	0.7		485	37.7		595	110.8		705	32.7
380	0.6		490	39.8		600	115.1		710	28.2
385	0.6		495	42.9		605	118.9		715	24.4
390	0.6		500	46.1		610	121.9		720	20.8
395	0.6		505	50.2		615	123.3		725	17.7
400	0.7		510	54.3		620	124.4		730	15.1
405	0.8		515	57.4		625	123.6		735	13.0
410	0.9		520	60.3		630	122.9		740	11.2
415	1.1		525	62.9		635	120.1		745	9.9
420	1.6		530	65.3		640	116.0		750	8.6
425	2.4		535	67.2		645	111.0		755	7.5
430	3.8		540	70.0		650	104.9		760	6.6
435	6.7		545	72.8		655	98.1		765	5.6
440	11.8		550	75.7		660	90.7		770	4.8
445	22.2		555	78.6		665	83.2		775	4.1
450	42.7		560	82.1		670	75.9		780	3.5
455	67.1		565	85.3		675	68.7		---	---



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

EQUIPMENT LIST

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#	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 Hygrothermometer	200110913	L206	2/21/2022	2/21/2023
4	Yokogawa Power Analyzer	WT1600	E462	5/21/2022	5/21/2023
5	Fluke Thermometer	53 II	D588	6/13/2022	6/13/2023
6	Current Monitor	411	A197	8/26/2021	8/26/2024
7	3M Integrating Sphere Spectrometer System	CDS 2600	L231	7/1/2022	10/1/2022
8	LSI High Speed Mirror Goniophotometer	6440	---	4/4/2022	7/4/2022
9	Elgar AC Power Supply	CW1251	---	VBU	VBU
10	Yokogawa Power Analyzer	WT210	307-E464	6/21/2022	6/21/2023
11	Traceable Hygrothermometer	4800	L204	2/21/2022	2/21/2023
12	Sorenson DC Power Supply	XG 150-10	---	VBU	VBU
13	Omega Thermometer	DPi8-C24	M263	3/1/2022	3/1/2023
14	Multi Channel Spectroradiometer	OL 770	O230	6/1/2022	9/1/2022
15	Bosch Distance Laser	Pro GLM 20	L210	3/21/2022	3/15/2023
16	Tape Measure	Crescent	--	9/21/2021	9/21/2024

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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ANNEX A - TM-30 CALCULATIONS

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TM-30 REPORT

