

Scaled data based on original data using
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-State
Lighting Products

Test Report Prepared for

Cooper Lighting Solutions

(formerly Eaton)

Brand: METALUX

Report Number: P860031

Luminaire Tested: **SPHB-24SE-N-L935-CD**

Issue Date: 7/11/2024



Test Information

Test Method: LM-79-08
Report Number: P860031
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G3-2404-343-7)
Test Lab: INNOVATION CENTER
Issue Date: 7/11/2024
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)
Product Line: METALUX
Catalog Number: SPHB-24SE-N-L935-CD
Description: 24000 Lumen Standard Efficacy Select Pro High Bay with Narrow Lens
and, 3500K 90CRI LEDs
Light Source: -
Ballast/Driver: -

Luminaire Equipment: Sample No. Condition Description

Summary

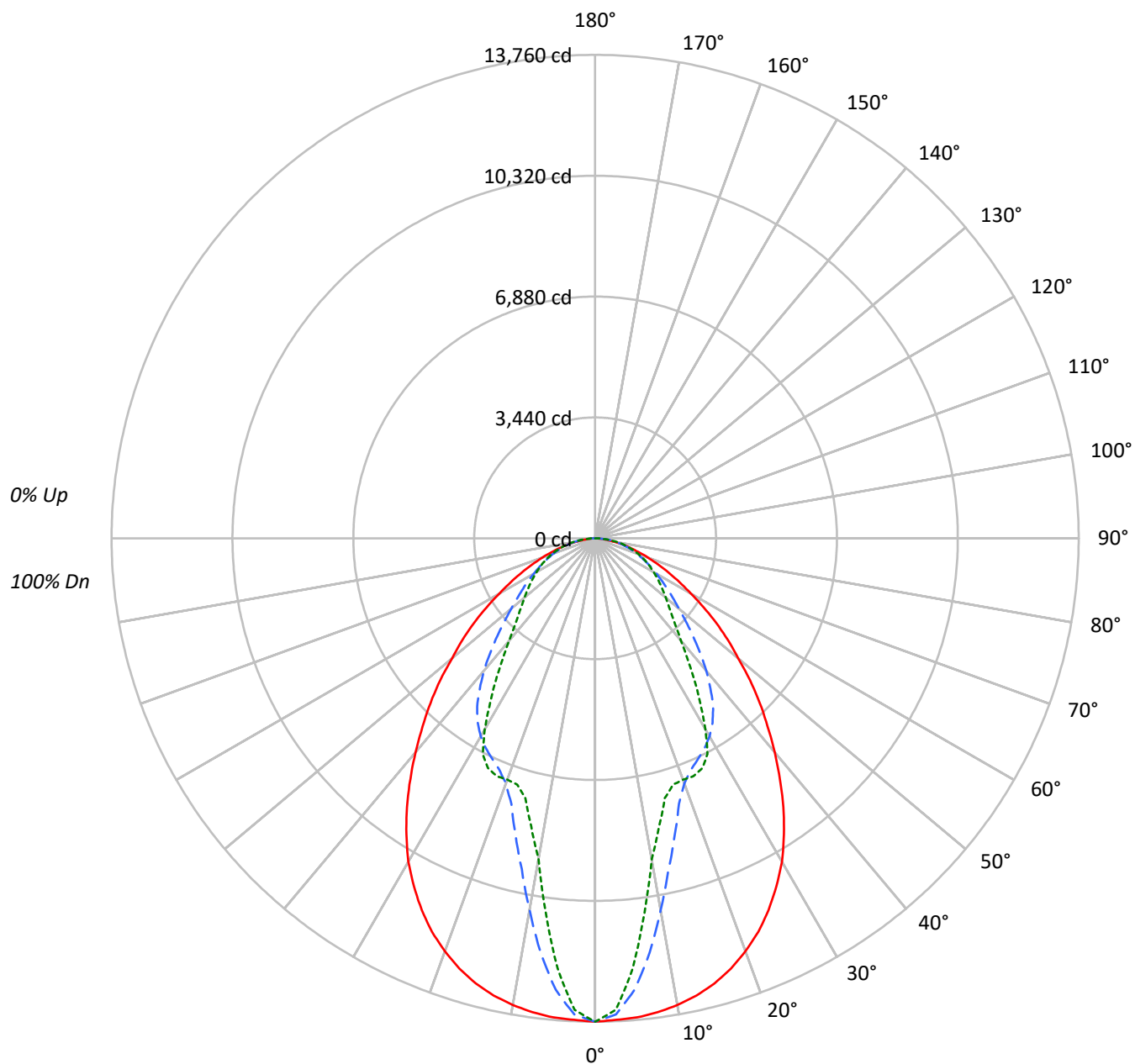
Lumens per Lamp: N/A
Luminaire Lumens: 20167.0 lumens
Efficiency: N/A
Efficacy: 127.2 lumens/watt
Spacing Criteria (0/90/45): 1.16 / 0.54 / 0.94
Luminous Opening: Rectangular (W 1' x L: 1.38' x H: 0')
CIE Type: Direct

Input Watts (W): 158.6
Input Voltage (V): NR
Input Current (Ain): NR
Voltage Rise (V): NR
Power Factor: NR
Total Harmonic Distortion (THDi): NR
Frequency (hertz): 60
Stabilization Time: NR
Operation Time: NR
Ambient Temperature (°C): NR
Test Distance: 25 FT

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CATALOG NUMBER: SPHB-24SE-N-L935-CD

Luminous Intensity Polar Plot





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COEFFICIENT OF UTILIZATION - ZONAL CAVITY METHOD:

RF	20				20					20					20					20
RC	80				70					50					30					0
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10
RCR																				
0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	100		
1	110	106	102	98	107	103	100	97	99	96	94	95	93	91	92	90	88	86		
2	101	94	88	83	99	92	86	82	88	84	80	85	81	78	82	79	76	74		
3	93	84	76	71	91	82	75	70	79	73	69	77	72	68	74	70	66	64		
4	86	75	67	61	84	74	67	61	72	65	60	69	64	59	67	62	58	56		
5	80	68	60	54	78	67	59	54	65	58	53	63	57	53	61	56	52	50		
6	74	62	54	48	73	61	54	48	60	53	47	58	52	47	56	51	47	45		
7	70	57	49	43	68	56	49	43	55	48	43	53	47	43	52	46	42	40		
8	65	53	45	39	64	52	44	39	51	44	39	49	43	39	48	43	38	37		
9	61	49	41	36	60	48	41	36	47	40	36	46	40	35	45	39	35	34		
10	58	45	38	33	56	45	38	33	44	37	33	43	37	33	42	37	33	31		

AVERAGE LUMINANCE (cd/sqm):

	0°	45°	90°
0°	107329	107329	107329
5°	107205	100986	96208
10°	106839	85123	73384
15°	105949	70661	61839
20°	103815	61595	60706
25°	100479	59597	62128
30°	95729	58641	56541
35°	88884	55724	46853
40°	80937	50026	38688
45°	73060	43407	33964
50°	64475	37745	31805
55°	57213	34042	30614
60°	49030	31481	29989
65°	42440	29585	29838
70°	36318	28461	29802
75°	30486	27638	29537
80°	23263	26708	28923
85°	15232	23689	22284



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ZONAL LUMENS:

Zone	Lumens	% Fixture
0°-10°	1173.2	5.8
10°-20°	2693.8	13.4
20°-30°	3640.5	18.1
30°-40°	3831.4	19.0
40°-50°	3251.1	16.1
50°-60°	2518.5	12.5
60°-70°	1754.0	8.7
70°-80°	1004.4	5.0
80°-90°	292.3	1.4
90°-100°	7.8	0.0
100°-110°	0.0	0.0
110°-120°	0.0	0.0
120°-130°	0.0	0.0
130°-140°	0.0	0.0
140°-150°	0.0	0.0
150°-160°	0.0	0.0
160°-170°	0.0	0.0
170°-180°	0.0	0.0
0°-30°	7507.5	37.2
0°-40°	11338.9	56.2
0°-60°	17108.5	84.8
0°-90°	20159.2	100.0
90°-120°	7.8	0.0
90°-150°	7.8	0.0
90°-180°	8.0	0.0
0°-180°	20167.0	100.0

CANDELA DISTRIBUTION:

	0°	22.5°	45°	67.5°	90°	Flux
0°	13760	13760	13760	13760	13760	
5°	13692	13441	12898	12403	12288	###
15°	13120	11136	8750	7876	7658	3692
25°	11675	8247	6925	7125	7219	5360
35°	9335	6343	5852	5286	4920	5819
45°	6623	4763	3935	3233	3079	5101
55°	4207	3208	2503	2275	2251	3761
65°	2300	1882	1603	1603	1617	2297
75°	1012	899	917	975	980	1079
85°	170	221	265	249	249	216
90°	1	20	39	49	52	9
95°	1	3	6	6	5	0
105°	0	0	0	0	0	0
115°	0	0	0	0	0	0
125°	0	0	0	0	0	0
135°	0	0	0	0	0	0
145°	0	0	0	0	0	0
155°	0	0	0	0	0	0
165°	0	0	0	0	0	0
175°	0	0	0	0	0	0
180°	0	0	0	0	0	



TEST NUMBER: P860031

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CANDELA DISTRIBUTION (FULL):

	0°	22.5°	45°	67.5°	90°
0°	13760.3	13760.3	13760.3	13760.3	13760.3
2.5°	13720.4	13675.2	13564.9	13493.5	13437.8
5°	13692.0	13440.9	12897.8	12403.1	12287.5
7.5°	13606.9	13055.4	11894.6	10979.7	10748.6
10°	13489.3	12501.8	10747.5	9601.4	9265.3
12.5°	13332.7	11910.4	9648.7	8568.8	8403.9
15°	13120.5	11136.2	8750.5	7876.5	7658.0
17.5°	12845.3	10335.7	7921.7	7416.4	7355.5
20°	12507.1	9601.4	7420.6	7248.3	7313.5
22.5°	12126.8	8888.1	7129.6	7202.1	7324.0
25°	11675.1	8247.4	6924.8	7125.4	7218.9
27.5°	11167.7	7668.5	6736.8	6920.6	6920.6
30°	10628.8	7186.4	6510.9	6494.1	6277.7
32.5°	9999.6	6776.7	6215.7	5882.7	5561.3
35°	9334.6	6342.8	5852.2	5286.0	4920.5
37.5°	8637.1	5939.4	5392.1	4645.2	4304.9
40°	7949.0	5541.3	4913.1	4069.6	3799.6
42.5°	7264.1	5135.8	4414.1	3603.2	3389.9
45°	6623.3	4762.9	3935.1	3233.4	3079.0
47.5°	5972.0	4366.9	3492.9	2936.1	2829.0
50°	5313.3	3965.6	3110.5	2699.7	2621.0
52.5°	4758.7	3591.6	2785.9	2476.0	2428.7
55°	4207.2	3208.2	2503.3	2275.3	2251.2
57.5°	3659.9	2851.0	2244.9	2091.5	2086.3
60°	3143.0	2517.0	2018.0	1933.9	1922.4
62.5°	2702.9	2185.0	1802.6	1762.7	1768.0
65°	2299.5	1882.5	1603.0	1603.0	1616.7
67.5°	1925.5	1604.1	1420.3	1444.4	1463.3
70°	1592.5	1352.0	1248.0	1290.0	1306.8
72.5°	1277.4	1117.7	1083.0	1129.3	1142.9
75°	1011.6	899.2	917.1	974.8	980.1
77.5°	750.0	708.0	754.2	817.3	828.8
80°	517.9	522.1	594.6	638.7	643.9
82.5°	334.1	364.5	445.4	468.5	460.1
85°	170.2	220.6	264.7	249.0	249.0
87.5°	65.1	95.6	112.4	132.4	139.7
90°	1.1	20.0	38.9	49.4	51.5
92.5°	1.1	5.3	8.4	9.5	8.4
95°	1.1	3.2	6.3	6.3	5.3
97.5°	0.0	0.0	0.0	0.0	0.0
100°	0.0	0.0	0.0	0.0	0.0
102.5°	0.0	0.0	0.0	0.0	0.0
105°	0.0	0.0	0.0	0.0	0.0



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CANDELA DISTRIBUTION (continued):

	0°	22.5°	45°	67.5°	90°
112.5°	0.0	0.0	0.0	0.0	0.0
115°	0.0	0.0	0.0	0.0	0.0
117.5°	0.0	0.0	0.0	0.0	0.0
120°	0.0	0.0	0.0	0.0	0.0
122.5°	0.0	0.0	0.0	0.0	0.0
125°	0.0	0.0	0.0	0.0	0.0
127.5°	0.0	0.0	0.0	0.0	0.0
130°	0.0	0.0	0.0	0.0	0.0
132.5°	0.0	0.0	0.0	0.0	0.0
135°	0.0	0.0	0.0	0.0	0.0
137.5°	0.0	0.0	0.0	0.0	0.0
140°	0.0	0.0	0.0	0.0	0.0
142.5°	0.0	0.0	0.0	0.0	0.0
145°	0.0	0.0	0.0	0.0	0.0
147.5°	0.0	0.0	0.0	0.0	0.0
150°	0.0	0.0	0.0	0.0	0.0
152.5°	0.0	0.0	0.0	0.0	0.0
155°	0.0	0.0	0.0	0.0	0.0
157.5°	0.0	0.0	0.0	0.0	0.0
160°	0.0	0.0	0.0	0.0	0.0
162.5°	0.0	0.0	0.0	0.0	0.0
165°	0.0	0.0	0.0	0.0	0.0
167.5°	0.0	0.0	0.0	0.0	0.0
170°	0.0	0.0	0.0	0.0	0.0
172.5°	0.0	0.0	0.0	0.0	0.0
175°	0.0	0.0	0.0	0.0	0.0
177.5°	0.0	0.0	0.0	0.0	0.0
180°	0.0	0.0	0.0	0.0	0.0



Report Generated By 670246072 / DESKTOP-50001EG





— 0°-180° - - 45°-225° - - - 90°-270°







107.5°	0.0	0.0	0.0	0.0	0.0
110°	0.0	0.0	0.0	0.0	0.0



LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

METALUX

Report Number: SP1-2404-343-6

Test Date: 05/20/2024

Luminaire Tested: SPHB-24SE-M-UNV-L935-CD

Data in this report applies to families of products SPHB-24SE-M-UNV-L935-CD.

Test Information

Test Method: LM-79-2019
 Report Number: SP1-2404-343-6
 Test Lab: COOPER LIGHTING SOLUTIONS
 Photometer: SP1 - 76IN SPHERE
 Measurement Geometry: 4π
 Issue Date: 05/21/2024
 Manufacturer: COOPER LIGHTING SOLUTIONS
 Product Line: METALUX
 Catalog Number: **SPHB-24SE-M-UNV-L935-CD**
 Description: 18IN SPHB WITH MEDIUM LENS, 3500K/90CRI, 24K LUMENS, SE

Spectral Parameters

CCT (K):	3445	CRI (Ra):	92.0		
CIE u':	0.2377	R1:	92.3	R9:	57.8
CIE v':	0.5104	R2:	95.3	R10:	88.0
Duv:	-0.0014	R3:	96.5	R11:	92.4
CIE x:	0.4068	R4:	92.1	R12:	77.1
CIE y:	0.3882	R5:	91.9	R13:	93.2
CIE z:	0.2050	R6:	93.1	R14:	97.7
Peak Wavelength (nm):	614	R7:	92.3		
Dominant Wavelength (nm):	581	R8:	82.3		
Purity:	38.8				
Rf:	90.8				
Rg:	99.6				



Test Conditions

Stabilization Time: 23M
 Operation Time: 12H
 Room Temperature (°C) / RH%: 25.0/41%
 Sphere Temperature (°C): 25.2

REPORT NUMBER: SP1-2404-343-6

Measurement and Test Equipment			
Instrument	Identification Number	Calibration Date	Calibration Due Date
Photometer	76INCH SPHERE IN0058	2/12/2024	8/12/2024
Power Meter	XITRON 2801 IN0071	10/23/2023	10/23/2024
AC Power Source	CHROMA 61603 IN0063	10/24/2023	10/24/2024
DC Power Source	AGILENT E3634A IN0208	10/24/2023	10/24/2024
Sphere Thermometer	ONSET IN0085	10/24/2023	10/24/2024
Room Thermometer	ONSET IN0046	10/24/2023	10/24/2024

REPORT NUMBER: SP1-2404-343-6

Photopic Flux vs. Wavelength



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λ (nm)	Power (μW/nm)	Lumens (φ/nm)	λ (nm)	Power (μW/nm)	Lumens (φ/nm)	λ (nm)	Power (μW/nm)	Lumens (φ/nm)	λ (nm)	Power (μW/nm)	Lumens (φ/nm)	λ (nm)	Power (μW/nm)	Lumens (φ/nm)
360	6608	NR	490	95882	NR	620	272111	NR	750	22724	NR	880	8210	NR
365	5968	NR	495	110394	NR	625	267640	NR	755	20819	NR	885	8584	NR
370	6141	NR	500	125530	NR	630	261387	NR	760	19107	NR	890	6953	NR
375	6490	NR	505	138883	NR	635	253186	NR	765	16362	NR	895	6911	NR
380	6281	NR	510	151313	NR	640	242950	NR	770	14584	NR	900	7614	NR
385	5653	NR	515	160559	NR	645	230526	NR	775	13087	NR	905	6456	NR
390	5175	NR	520	168580	NR	650	217775	NR	780	11846	NR	910	6986	NR
395	4645	NR	525	175526	NR	655	204121	NR	785	11170	NR	915	6699	NR
400	4238	NR	530	181259	NR	660	188308	NR	790	10159	NR	920	7916	NR
405	4239	NR	535	186588	NR	665	173111	NR	795	9458	NR	925	7542	NR
410	5216	NR	540	193033	NR	670	157670	NR	800	8763	NR	930	8857	NR
415	7451	NR	545	198025	NR	675	141674	NR	805	8171	NR	935	7570	NR
420	12009	NR	550	203458	NR	680	127668	NR	810	7675	NR	940	5702	NR
425	20175	NR	555	208893	NR	685	114046	NR	815	8064	NR	945	7444	NR
430	32707	NR	560	213680	NR	690	100719	NR	820	8022	NR	950	8763	NR
435	54257	NR	565	219195	NR	695	88799	NR	825	6713	NR	955	6220	NR
440	94651	NR	570	224227	NR	700	78338	NR	830	6323	NR	960	7929	NR
445	167774	NR	575	230703	NR	705	69183	NR	835	6448	NR	965	9591	NR
450	223443	NR	580	237812	NR	710	61192	NR	840	7345	NR	970	8406	NR
455	190007	NR	585	244571	NR	715	54406	NR	845	7577	NR	975	10655	NR
460	143244	NR	590	251975	NR	720	48466	NR	850	7199	NR	980	7914	NR
465	121274	NR	595	258244	NR	725	42357	NR	855	8506	NR	985	8392	NR
470	97823	NR	600	264266	NR	730	37283	NR	860	6832	NR	990	9320	NR
475	81329	NR	605	269805	NR	735	32885	NR	865	6943	NR	995	12022	NR
480	79757	NR	610	272859	NR	740	29034	NR	870	7847	NR	1000	7260	NR
485	86584	NR	615	274216	NR	745	26001	NR	875	6739	NR			

REPORT NUMBER: SP1-2404-343-6

Scotopic Flux vs. Wavelength



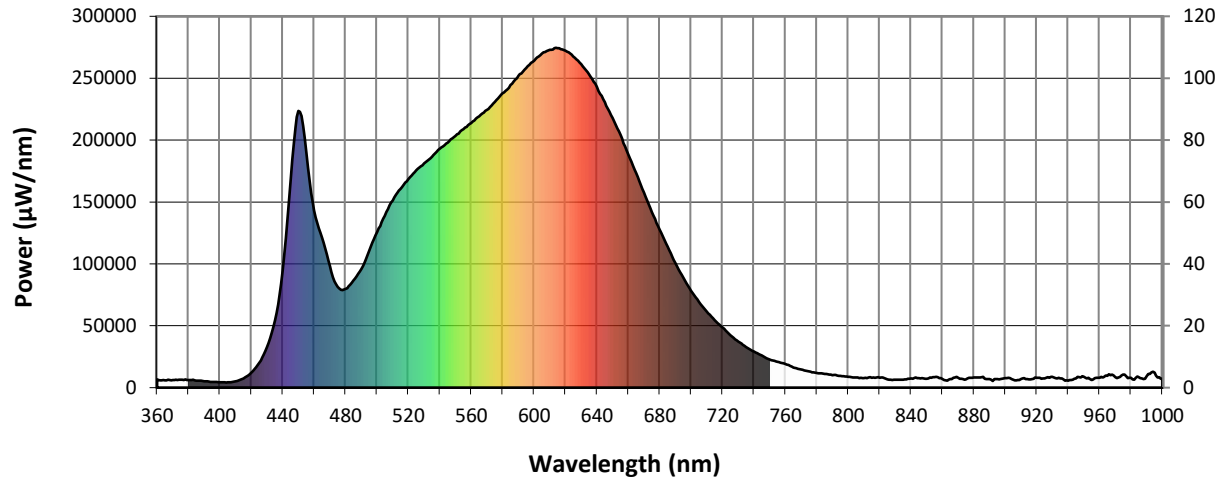
Scotopic Lumens: 24124.7

S/P: 1.59

λ (nm)	Power ($\mu\text{W}/\text{nm}$)	Lumens (ϕ/nm)	λ (nm)	Power ($\mu\text{W}/\text{nm}$)	Lumens (ϕ/nm)	λ (nm)	Power ($\mu\text{W}/\text{nm}$)	Lumens (ϕ/nm)	λ (nm)	Power ($\mu\text{W}/\text{nm}$)	Lumens (ϕ/nm)	λ (nm)	Power ($\mu\text{W}/\text{nm}$)	Lumens (ϕ/nm)
360	6608	NR	490	95882	NR	620	272111	NR	750	22724	NR	880	8210	NR
365	5968	NR	495	110394	NR	625	267640	NR	755	20819	NR	885	8584	NR
370	6141	NR	500	125530	NR	630	261387	NR	760	19107	NR	890	6953	NR
375	6490	NR	505	138883	NR	635	253186	NR	765	16362	NR	895	6911	NR
380	6281	NR	510	151313	NR	640	242950	NR	770	14584	NR	900	7614	NR
385	5653	NR	515	160559	NR	645	230526	NR	775	13087	NR	905	6456	NR
390	5175	NR	520	168580	NR	650	217775	NR	780	11846	NR	910	6986	NR
395	4645	NR	525	175526	NR	655	204121	NR	785	11170	NR	915	6699	NR
400	4238	NR	530	181259	NR	660	188308	NR	790	10159	NR	920	7916	NR
405	4239	NR	535	186588	NR	665	173111	NR	795	9458	NR	925	7542	NR
410	5216	NR	540	193033	NR	670	157670	NR	800	8763	NR	930	8857	NR
415	7451	NR	545	198025	NR	675	141674	NR	805	8171	NR	935	7570	NR
420	12009	NR	550	203458	NR	680	127668	NR	810	7675	NR	940	5702	NR
425	20175	NR	555	208893	NR	685	114046	NR	815	8064	NR	945	7444	NR
430	32707	NR	560	213680	NR	690	100719	NR	820	8022	NR	950	8763	NR
435	54257	NR	565	219195	NR	695	88799	NR	825	6713	NR	955	6220	NR
440	94651	NR	570	224227	NR	700	78338	NR	830	6323	NR	960	7929	NR
445	167774	NR	575	230703	NR	705	69183	NR	835	6448	NR	965	9591	NR
450	223443	NR	580	237812	NR	710	61192	NR	840	7345	NR	970	8406	NR
455	190007	NR	585	244571	NR	715	54406	NR	845	7577	NR	975	10655	NR
460	143244	NR	590	251975	NR	720	48466	NR	850	7199	NR	980	7914	NR
465	121274	NR	595	258244	NR	725	42357	NR	855	8506	NR	985	8392	NR
470	97823	NR	600	264266	NR	730	37283	NR	860	6832	NR	990	9320	NR
475	81329	NR	605	269805	NR	735	32885	NR	865	6943	NR	995	12022	NR
480	79757	NR	610	272859	NR	740	29034	NR	870	7847	NR	1000	7260	NR
485	86584	NR	615	274216	NR	745	26001	NR	875	6739	NR			

REPORT NUMBER: SP1-2404-343-6

Melanopic Flux vs. Wavelength



Melanopic Lumens: 9607.6

M/P: 0.63

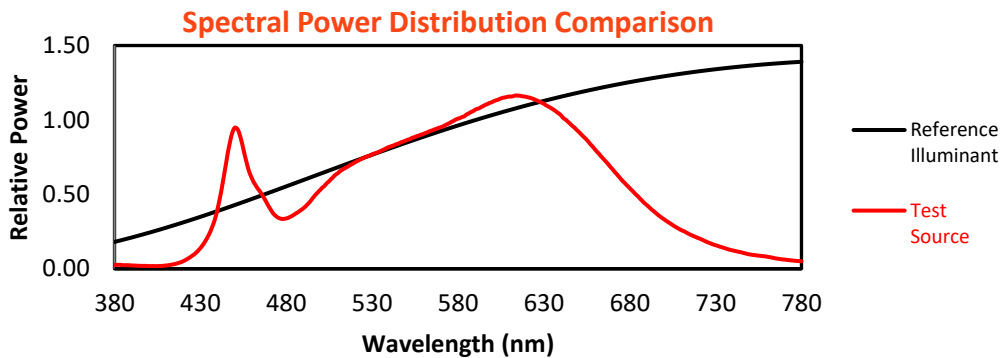
λ (nm)	Power (μW/nm)	Lumens (φ/nm)	λ (nm)	Power (μW/nm)	Lumens (φ/nm)	λ (nm)	Power (μW/nm)	Lumens (φ/nm)	λ (nm)	Power (μW/nm)	Lumens (φ/nm)	λ (nm)	Power (μW/nm)	Lumens (φ/nm)
360	6608	NR	490	95882	NR	620	272111	NR	750	22724	NR	880	8210	NR
365	5968	NR	495	110394	NR	625	267640	NR	755	20819	NR	885	8584	NR
370	6141	NR	500	125530	NR	630	261387	NR	760	19107	NR	890	6953	NR
375	6490	NR	505	138883	NR	635	253186	NR	765	16362	NR	895	6911	NR
380	6281	NR	510	151313	NR	640	242950	NR	770	14584	NR	900	7614	NR
385	5653	NR	515	160559	NR	645	230526	NR	775	13087	NR	905	6456	NR
390	5175	NR	520	168580	NR	650	217775	NR	780	11846	NR	910	6986	NR
395	4645	NR	525	175526	NR	655	204121	NR	785	11170	NR	915	6699	NR
400	4238	NR	530	181259	NR	660	188308	NR	790	10159	NR	920	7916	NR
405	4239	NR	535	186588	NR	665	173111	NR	795	9458	NR	925	7542	NR
410	5216	NR	540	193033	NR	670	157670	NR	800	8763	NR	930	8857	NR
415	7451	NR	545	198025	NR	675	141674	NR	805	8171	NR	935	7570	NR
420	12009	NR	550	203458	NR	680	127668	NR	810	7675	NR	940	5702	NR
425	20175	NR	555	208893	NR	685	114046	NR	815	8064	NR	945	7444	NR
430	32707	NR	560	213680	NR	690	100719	NR	820	8022	NR	950	8763	NR
435	54257	NR	565	219195	NR	695	88799	NR	825	6713	NR	955	6220	NR
440	94651	NR	570	224227	NR	700	78338	NR	830	6323	NR	960	7929	NR
445	167774	NR	575	230703	NR	705	69183	NR	835	6448	NR	965	9591	NR
450	223443	NR	580	237812	NR	710	61192	NR	840	7345	NR	970	8406	NR
455	190007	NR	585	244571	NR	715	54406	NR	845	7577	NR	975	10655	NR
460	143244	NR	590	251975	NR	720	48466	NR	850	7199	NR	980	7914	NR
465	121274	NR	595	258244	NR	725	42357	NR	855	8506	NR	985	8392	NR
470	97823	NR	600	264266	NR	730	37283	NR	860	6832	NR	990	9320	NR
475	81329	NR	605	269805	NR	735	32885	NR	865	6943	NR	995	12022	NR
480	79757	NR	610	272859	NR	740	29034	NR	870	7847	NR	1000	7260	NR
485	86584	NR	615	274216	NR	745	26001	NR	875	6739	NR			

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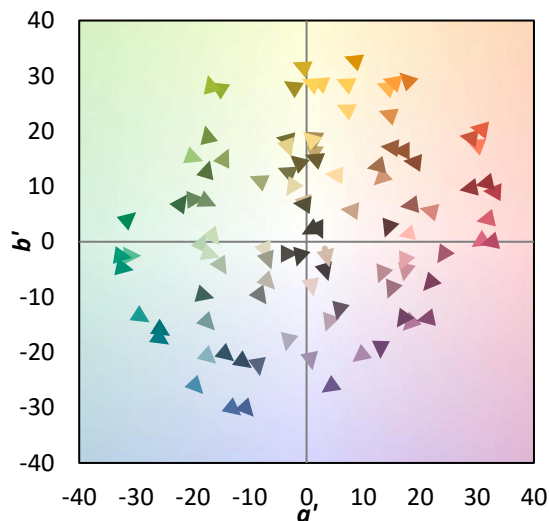
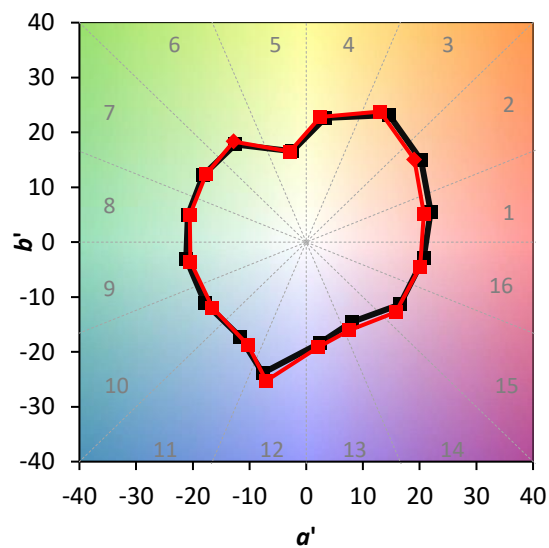
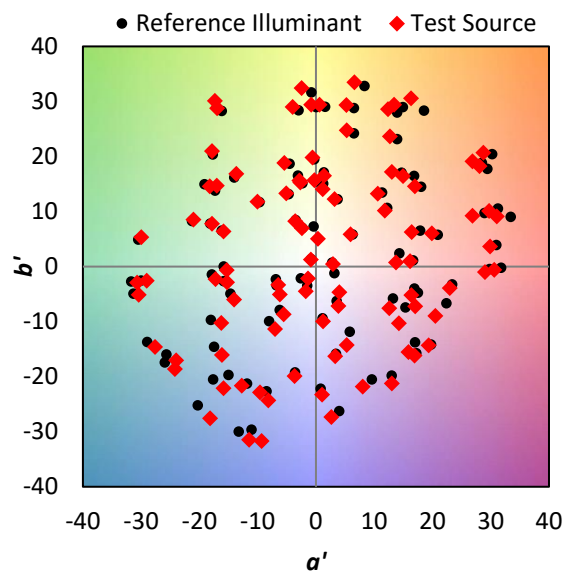
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Summary

$R_f = 90.8$
 $R_g = 99.6$
 $CIE R_a = 92.0$
 $R_9 = 57.8$



Color Vector Graphics

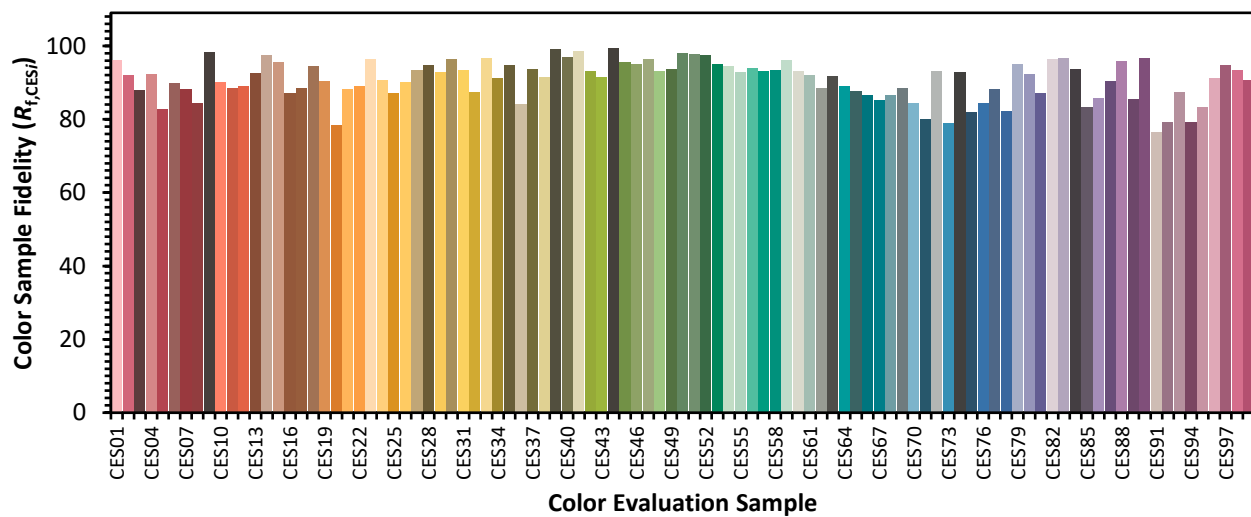


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Individual Sample Fidelity Index ($R_{f,i}$)

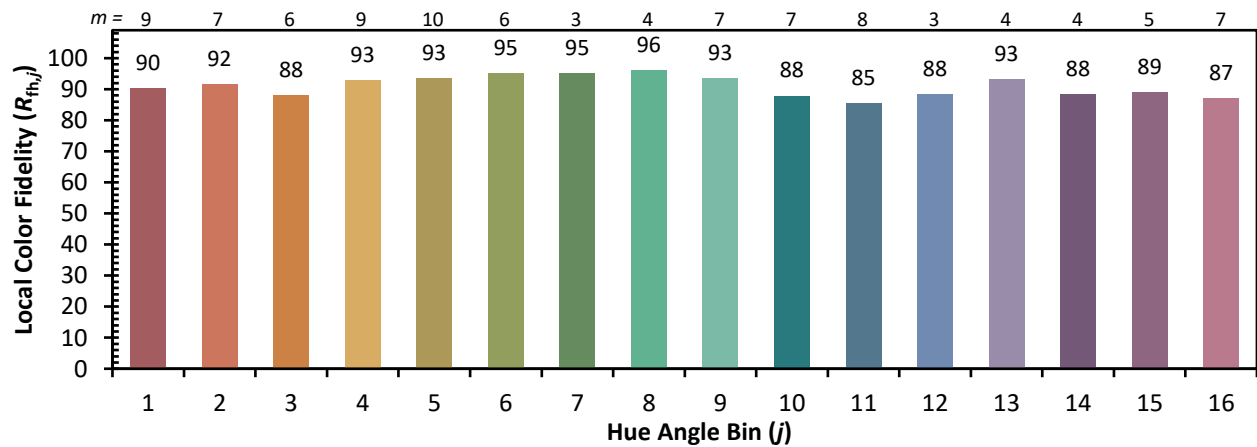
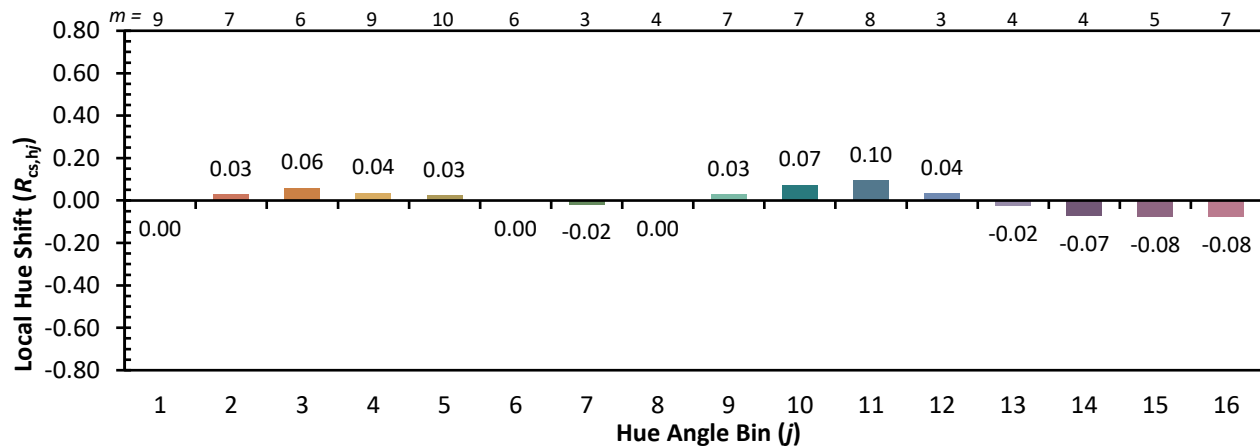
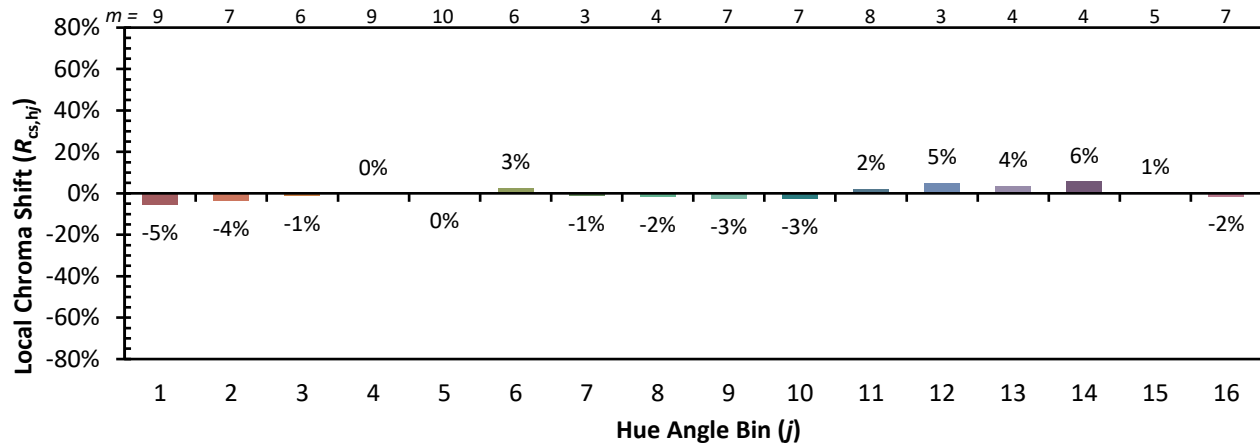
CES01 = 86	CES26 = 90	CES51 = 98	CES76 = 84
CES02 = 62	CES27 = 93	CES52 = 97	CES77 = 88
CES03 = 31	CES28 = 95	CES53 = 95	CES78 = 82
CES04 = 70	CES29 = 93	CES54 = 94	CES79 = 95
CES05 = 50	CES30 = 96	CES55 = 93	CES80 = 92
CES06 = 51	CES31 = 93	CES56 = 94	CES81 = 87
CES07 = 42	CES32 = 87	CES57 = 93	CES82 = 96
CES08 = 41	CES33 = 97	CES58 = 93	CES83 = 97
CES09 = 29	CES34 = 91	CES59 = 96	CES84 = 94
CES10 = 75	CES35 = 95	CES60 = 93	CES85 = 83
CES11 = 58	CES36 = 84	CES61 = 92	CES86 = 86
CES12 = 64	CES37 = 94	CES62 = 89	CES87 = 90
CES13 = 43	CES38 = 91	CES63 = 92	CES88 = 96
CES14 = 74	CES39 = 99	CES64 = 89	CES89 = 86
CES15 = 71	CES40 = 97	CES65 = 88	CES90 = 97
CES16 = 47	CES41 = 99	CES66 = 86	CES91 = 76
CES17 = 50	CES42 = 93	CES67 = 85	CES92 = 79
CES18 = 56	CES43 = 91	CES68 = 87	CES93 = 87
CES19 = 71	CES44 = 99	CES69 = 88	CES94 = 79
CES20 = 66	CES45 = 95	CES70 = 84	CES95 = 83
CES21 = 86	CES46 = 95	CES71 = 80	CES96 = 91
CES22 = 78	CES47 = 96	CES72 = 93	CES97 = 95
CES23 = 91	CES48 = 93	CES73 = 79	CES98 = 93
CES24 = 90	CES49 = 94	CES74 = 93	CES99 = 91
CES25 = 71	CES50 = 98	CES75 = 82	



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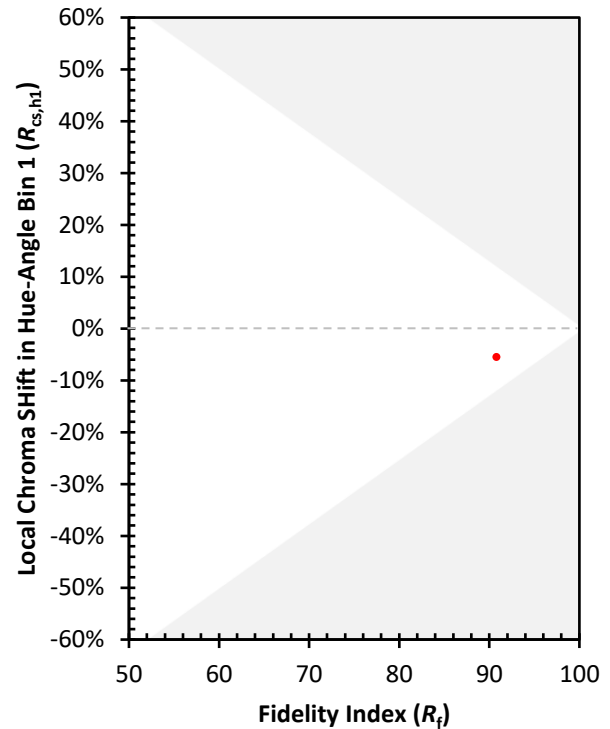
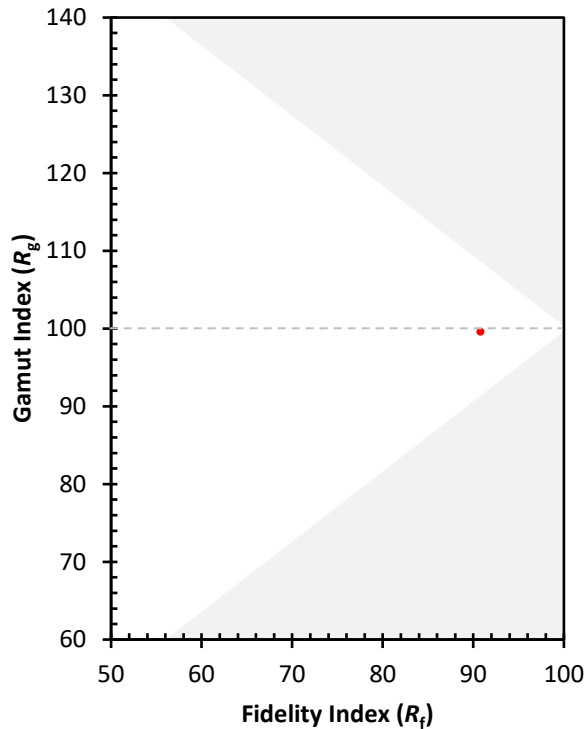
Color Rendition by Hue-Angle Bin



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Measure Comparisons



(END OF REPORT)