



UL LLC
1075 W Lambert Rd Suite B
Brea, CA 92821

Photometric Test Report

Relevant Standards
IES LM-79-2008, ANSI C82.77-10-2014, CIE 13.3-1995
CIE 15-2004, ANSI C78.377-2017, IES TM-30-2018

Prepared For
B-K Lighting INC

Daniel Carrejo
40429 Brickyard Dr.
Madera, CA 93636
United States

Catalog Number
HU-LED-TR-X116-NFL-WHP-9-C-1-INC-120-PROTOTYPE(4000K)

Order Number

13244408

Test Number

13244408.10B

Revised Date:

2020-03-17

Test Date

2020-03-03 - 2020-03-04

Prepared By

Khang Nguyen, Technician

Approved By

Eric Gaudreau, Engineering Leader

The results contained in this report pertain only to the tested sample.
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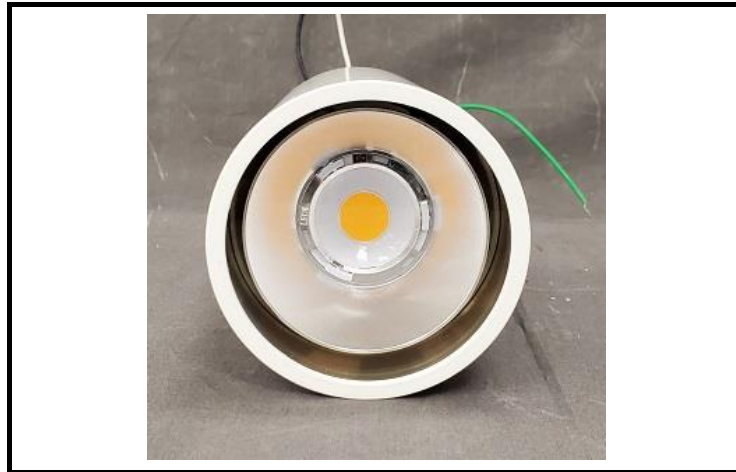
Laboratory results may not be representative of field performance
Ballast factors have not been applied

Testing was performed in a 2-meter integrating sphere using the 4π geometry method.
Absorption correction was employed for Sphere measurement



Luminaire Description: White metal cylindrical housing and clear glass lens
Lamp: One (1) White LED with optic below
Mounting: Pendant
Ballast/Driver: One (1) ERP ESS040W-0900-42

Luminaire



Luminaire Characteristics

Luminous Diameter: 3.50 in.

Summary of Results

Integrating Sphere

Luminous Flux: 3846 Lumens
Efficacy: 112.23 lm/w
CCT: 4164 K
CRI (Ra): 84.4

Distribution

Total Luminaire Output: 3682 Lumens
Luminaire Efficacy: 107.4 lm/w
Maximum Candela: 9271 Candela

Electrical Data at 120 VAC

Test Temperature: 25.1 °C
Voltage: 120.0 VAC
Current: 0.2899 A
Power: 34.27 W
Power Factor: 0.985
Frequency: 60 Hz
Current THD: 12.2 %



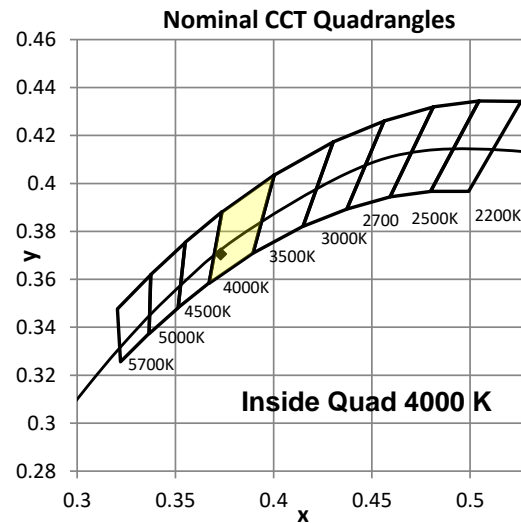
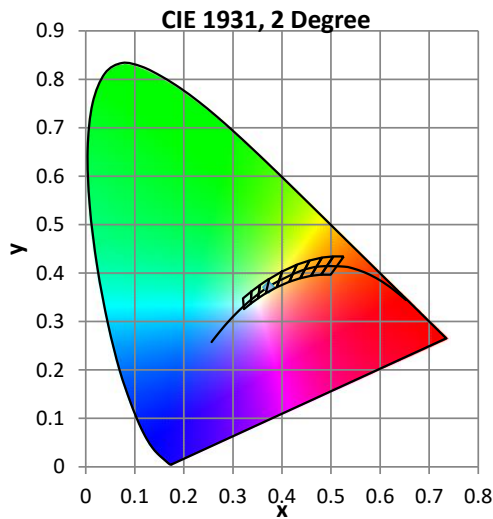
Color Quality - Integrating Sphere

Integrating Sphere Test Conditions

Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
25.1 °C	120.0 VAC	0.2899 A	34.27 W	0.985	60 Hz	12.2 %

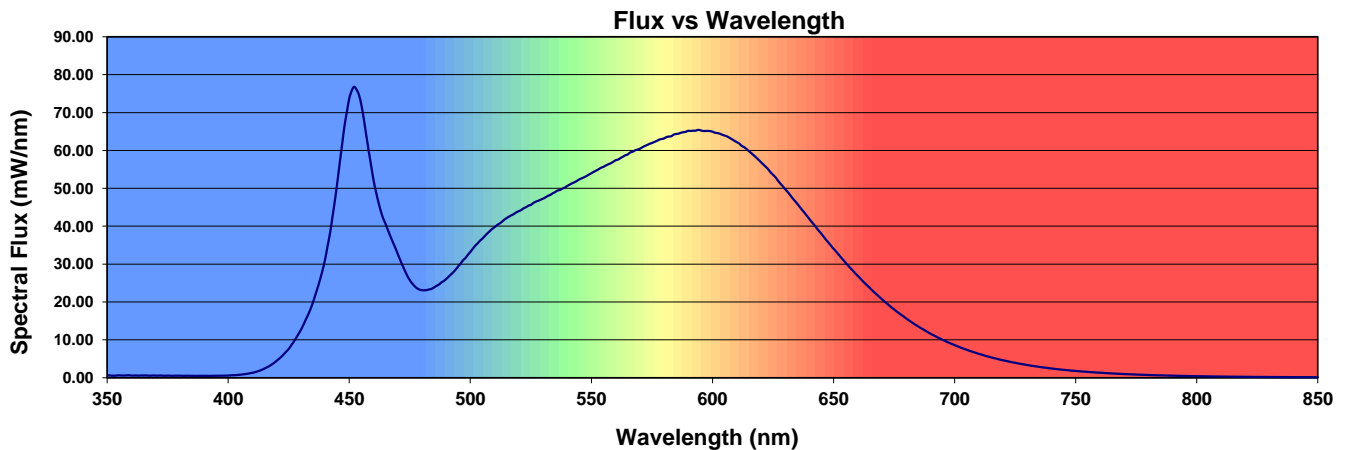
Summary of Results

Total Output:	3846 Lumens	Chromaticity (x):	0.3730
Efficacy:	112.2 lm/w	Chromaticity (y):	0.3706
CCT:	4164 K	Chromaticity (u'):	0.2226
CRI (Ra):	84.4	Chromaticity (v'):	0.4977
CRI (R9):	15.0	TM-30 Rf:	84.7
Peak Wavelength:	452 nm	TM-30 Rg:	95.4
Dominant Wavelength:	579 nm	Duv:	-0.0010
S/P Ratio:	1.76		



Color Rendering Index Detail

Ra (CRI)	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
84.4	83.0	90.8	95.3	82.6	83.0	86.5	86.6	67.0	15.0	77.5	81.3	64.3	85.1	97.7	77.8





Distribution - Goniophotometer

Distribution Test Conditions

Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
24.7 °C	120.1 VAC	0.2904 A	34.28 W	0.983	60 Hz	12.6 %

Summary of Results

Spacing Criteria

0-180: 0.42

90-270: 0.42

Total Lumen Output:

3682 Lumens

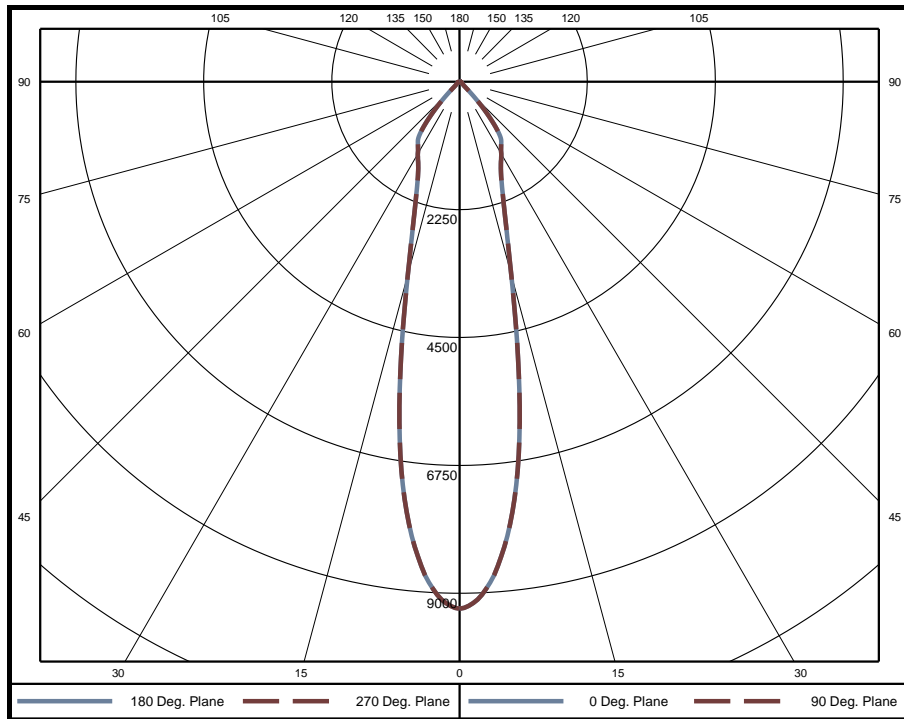
Luminaire Efficacy:

107.4 lm/w

Maximum Candela:

9271 Candela

Polar Plot



Zonal Lumen Summary

Zone	Lumens	% of Luminaire	Zone	Lumens	% of Luminaire	Zone	Lumens	% of Luminaire
0-5	211.1	5.7%	60-65	18.3	0.5%	120-125	0	0.0%
5-10	517.0	14.0%	65-70	15.1	0.4%	125-130	0	0.0%
10-15	548.9	14.9%	70-75	13.3	0.4%	130-135	0	0.0%
15-20	455.9	12.4%	75-80	12.1	0.3%	135-140	0	0.0%
20-25	408.1	11.1%	80-85	11.2	0.3%	140-145	0	0.0%
25-30	399.8	10.9%	85-90	6.1	0.2%	145-150	0	0.0%
30-35	400.8	10.9%	90-95	0	0.0%	150-155	0	0.0%
35-40	365.7	9.9%	95-100	0	0.0%	155-160	0	0.0%
40-45	194.4	5.3%	100-105	0	0.0%	160-165	0	0.0%
45-50	49.6	1.3%	105-110	0	0.0%	165-170	0	0.0%
50-55	31.2	0.8%	110-115	0	0.0%	170-175	0	0.0%
55-60	23.7	0.6%	115-120	0	0.0%	175-180	0	0.0%

Zone	Lumens	% of Luminaire
0-40	3307	89.8%
0-60	3606	97.9%
0-90	3682	100.0%
90-180	0	0.0%



Candela Tabulation

Horizontal Angle (Degrees)

Vertical Angle (Degrees)

	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5
0	9271	9271	9271	9271	9271	9271	9271	9271	9271	9271	9271	9271	9271	9271	9271	9271
5	8386	8386	8386	8386	8386	8386	8386	8386	8386	8386	8386	8386	8386	8386	8386	8386
10	6088	6088	6088	6088	6088	6088	6088	6088	6088	6088	6088	6088	6088	6088	6088	6088
15	3509	3509	3509	3509	3509	3509	3509	3509	3509	3509	3509	3509	3509	3509	3509	3509
20	2262	2262	2262	2262	2262	2262	2262	2262	2262	2262	2262	2262	2262	2262	2262	2262
25	1719	1719	1719	1719	1719	1719	1719	1719	1719	1719	1719	1719	1719	1719	1719	1719
30	1467	1467	1467	1467	1467	1467	1467	1467	1467	1467	1467	1467	1467	1467	1467	1467
35	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277	1277
40	837	837	837	837	837	837	837	837	837	837	837	837	837	837	837	837
45	245	245	245	245	245	245	245	245	245	245	245	245	245	245	245	245
50	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83
55	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61
60	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
65	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
70	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
75	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
80	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
85	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Average Luminance (cd/m²)

Horizontal Angle (Degrees)

Vertical Angle (Degrees)

	0	45	90
0	1494000	1494000	1494000
45	55890	55890	55890
55	17230	17230	17230
65	12620	12620	12620
75	14790	14790	14790
85	35440	35440	35440



Coefficients of Utilization - Zonal Cavity Method

Effective Floor Cavity Reflectance 20%																		
Ceiling Cavity Reflectance	80				70				50			30			10			0
Wall Reflectance	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio (RCR)	** Values are expressed as percent of total lumen output delivered to the task surface **																	
0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	100
1	113	111	108	106	111	108	106	104	104	103	101	101	99	98	97	96	95	93
2	108	103	99	96	106	101	98	95	98	95	93	95	93	91	92	90	89	87
3	103	96	92	88	101	95	91	87	92	89	86	90	87	84	88	85	83	81
4	98	91	85	81	96	89	84	81	87	83	80	85	82	79	83	80	78	76
5	93	85	80	75	92	84	79	75	83	78	74	81	77	74	79	76	73	72
6	89	80	75	71	88	80	74	70	78	73	70	77	73	69	76	72	69	68
7	85	76	70	66	84	76	70	66	74	69	66	73	69	66	72	68	65	64
8	81	72	67	63	80	72	66	63	71	66	62	70	65	62	69	65	62	61
9	78	69	63	59	77	68	63	59	67	63	59	67	62	59	66	62	59	58
10	75	66	60	57	74	65	60	56	64	60	56	64	59	56	63	59	56	55

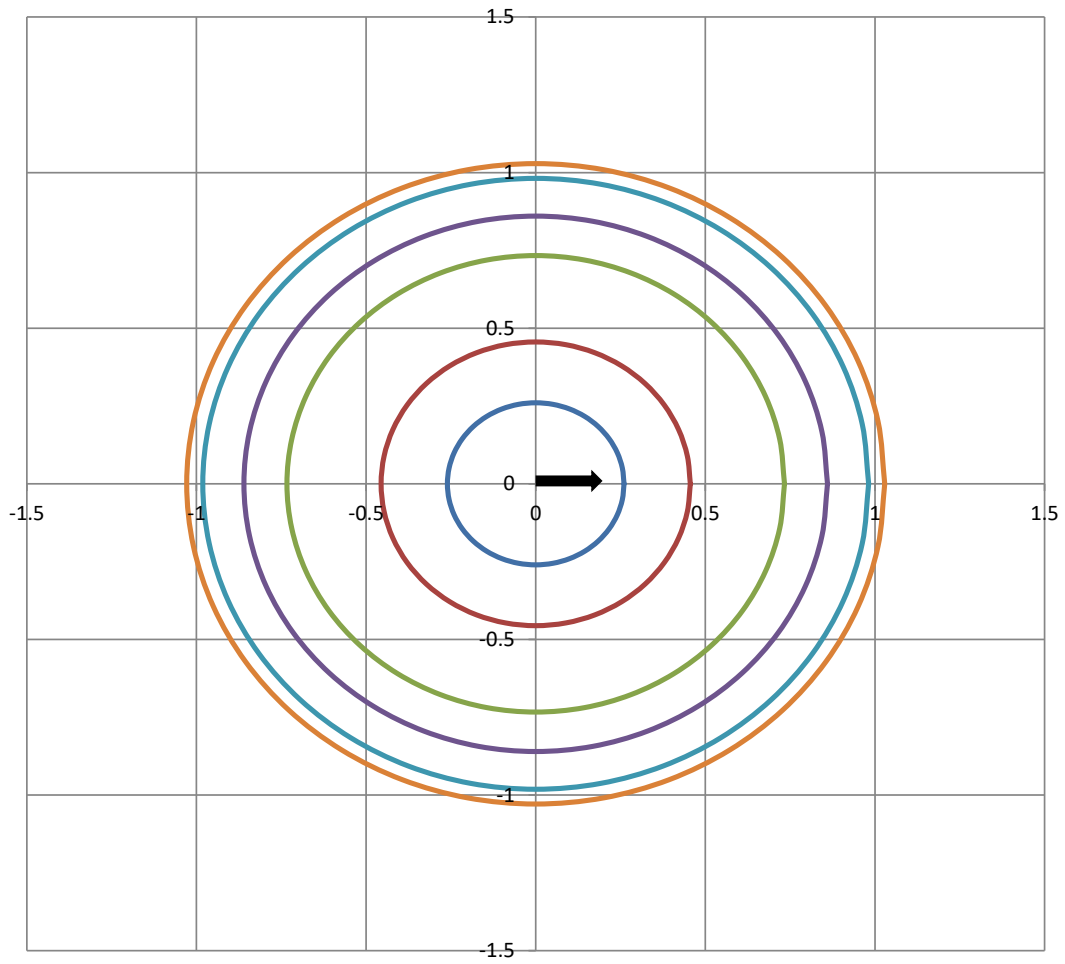
Beam and Field Information	
CIE Type:	Direct
Center Beam Intensity:	9271 Candela
Central Cone Intensity:	8952 Candela
Beam Flux:	1018.5 Lumens
Beam Angle (0-180):	25.1 Degrees
Beam Angle (90-270):	25.1 Degrees
Field Angle (0-180):	78.5 Degrees
Field Angle (90-270):	78.5 Degrees

Cone of Light Tabulation			
Mounting Height (Feet)		Footcandles at Nadir	Diameter (Feet)
4.00		579	1.70
6.00		258	2.55
8.00		145	3.39
10.0		92.7	4.24
12.0		64.4	5.09
14.0		47.3	5.94
16.0		36.2	6.79



ISOFootcandle Plot

Mounting Height - 8 Feet



Grid Lines in Units of Mounting Height

50 fc 20 fc 10 fc 5 fc 2 fc 1 fc