



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

Photometric Test Report

Relevant Standards
IES LM-79-2008
ANSI C78.377-2011, ANSI C82.77-2002
CIE 13.3-1995, CIE 15-2004, IES TM-30-15

Prepared For
B-K LIGHTING INC

Chris McCarthy
40429 Brickyard Dr
Madera, CA 93636-9515
United States

Catalog Number
HP2-LED-x45-NFL-9 CO2-LED-x45-NFL-9

Order Number
11353040
Test Number
11353040.06

Test Date

2016-09-01 - 2016-09-02

Prepared By

Khang Nguyen, Technician

Approved By

Eric Gaudreau, Senior Engineering Associate

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: Circular formed black aluminum cylinder housing with an internal gray plastic reflector and a clear glass lens

Lamp: One (1) White LED

Mounting: Surface

Ballast/Driver: One (1) POWERSELECT PS60U700C21T

Luminaire



Luminaire Characteristics
Luminous Diameter: 3.75 in.

Summary of Results

Integrating Sphere

Luminous Flux: 1841 Lumens
Efficacy: 61.4 lm/w
CCT: 4121 K
CRI (Ra): 81.6

Distribution

Total Luminaire Output: 1797 Lumens
Luminaire Efficacy: 59.8 lm/w
Maximum Candela: 5316 Candela

Electrical Data at 120 VAC

Test Temperature: 25.2 °C
Voltage: 120.1 VAC
Current: 0.2520 A
Power: 29.96 W
Power Factor: 0.986
Frequency: 60 Hz
Current THD: 13.5 %



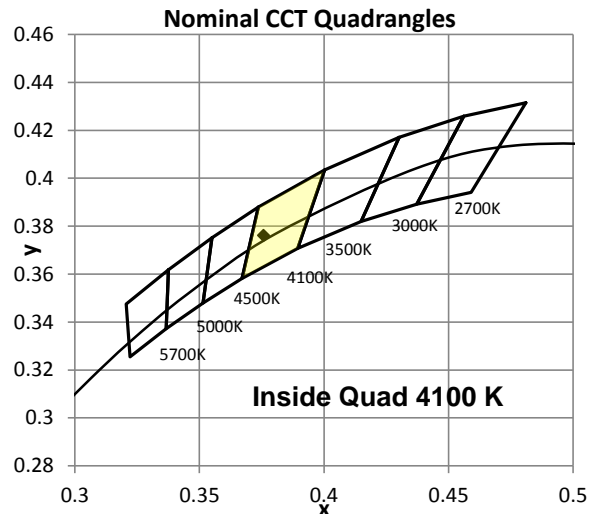
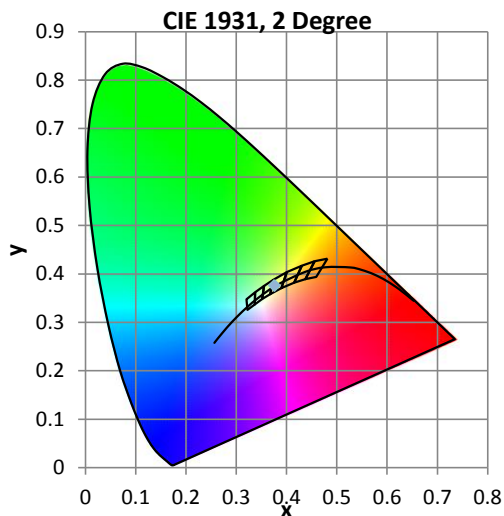
Color Quality - Integrating Sphere

Integrating Sphere Test Conditions

Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
25.2 °C	120.1 VAC	0.2520 A	29.96 W	0.986	60 Hz	13.5 %

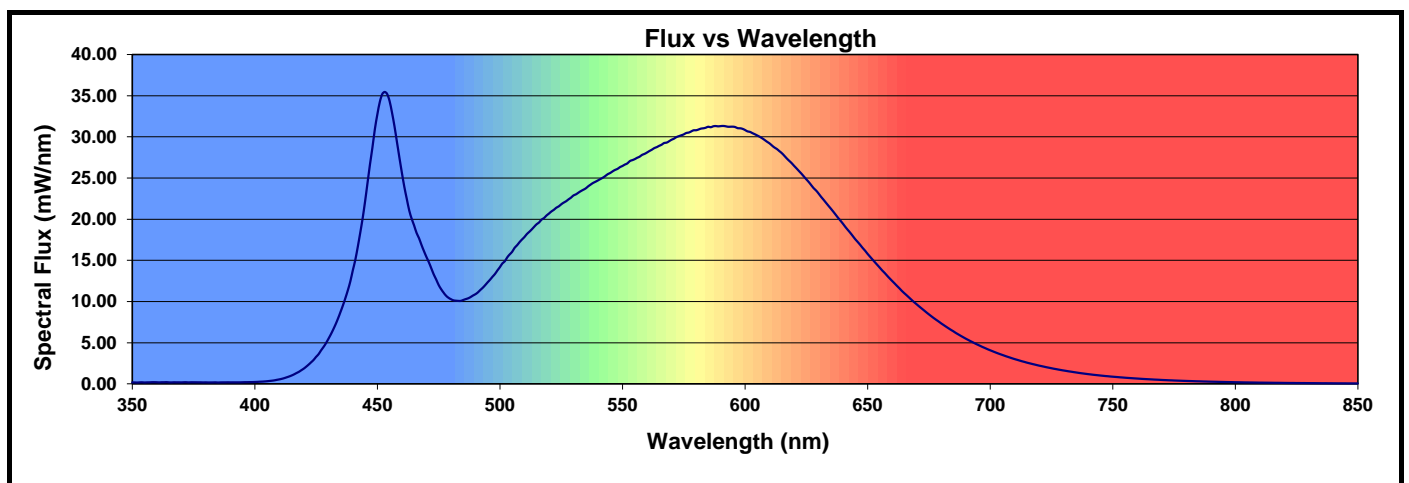
Summary of Results

Total Output:	1841 Lumens	Chromaticity (x):	0.3758
Efficacy:	61.4 lm/w	Chromaticity (y):	0.3761
CCT:	4121 K	Chromaticity (u'):	0.2223
CRI (Ra):	81.6	Chromaticity (v'):	0.5006
CRI (R9):	4.8	TM-30 R _f :	80.7
Peak Wavelength:	453 nm	TM-30 R _g :	94.0
Dominant Wavelength:	578 nm	Duv:	0.0006
S/P Ratio:	1.709		



Color Rendering Index Detail

Ra (CRI)	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
81.6	79.5	88.4	94.1	79.2	79.2	83.1	85.9	63.5	4.8	71.6	76.7	58.0	81.7	96.8





Distribution - Goniophotometer

Distribution Test Conditions

Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
25.0 °C	120.0 VAC	0.2537 A	30.05 W	0.987	60 Hz	13.4 %

Summary of Results

Spacing Criteria

0-180: 0.52

90-270: 0.40

Total Lumen Output:

1797 Lumens

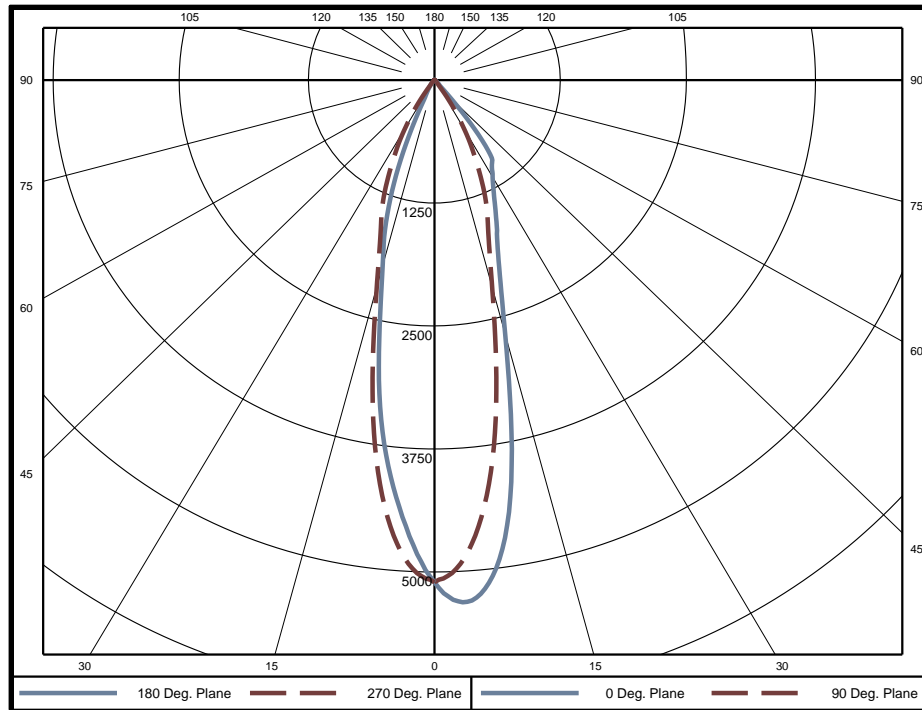
Luminaire Efficacy:

59.8 lm/w

Maximum Candela:

5316 Candela

Polar Plot



Zonal Lumen Summary

Zone	Lumens	% of Luminaire	Zone	Lumens	% of Luminaire	Zone	Lumens	% of Luminaire
0-5	117.2	6.5%	60-65	1.6	0.1%	120-125	0	0.0%
5-10	296.2	16.5%	65-70	1.0	0.1%	125-130	0	0.0%
10-15	337.7	18.8%	70-75	0.7	0.0%	130-135	0	0.0%
15-20	304.3	16.9%	75-80	0.4	0.0%	135-140	0	0.0%
20-25	264.4	14.7%	80-85	0.2	0.0%	140-145	0	0.0%
25-30	204.3	11.4%	85-90	0.1	0.0%	145-150	0	0.0%
30-35	146.2	8.1%	90-95	0	0.0%	150-155	0	0.0%
35-40	81.7	4.5%	95-100	0	0.0%	155-160	0	0.0%
40-45	23.1	1.3%	100-105	0	0.0%	160-165	0	0.0%
45-50	10.2	0.6%	105-110	0	0.0%	165-170	0	0.0%
50-55	5.4	0.3%	110-115	0	0.0%	170-175	0	0.0%
55-60	2.8	0.2%	115-120	0	0.0%	175-180	0	0.0%

Zone	Lumens	% of Luminaire
0-40	1752	97.5%
0-60	1794	99.8%
0-90	1798	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	5106	5106	5106	5106	5106	5106	5106	5106	5106	5106	5106	5106	5106	5106	5106
	5	5242	5110	4974	4818	4650	4507	4411	4365	4256	4365	4411	4507	4650	4818	4974
	10	4304	4071	3930	3720	3501	3339	3252	3233	3098	3233	3252	3339	3501	3720	3930
	15	2702	2546	2472	2358	2224	2092	2050	2032	1936	2032	2050	2092	2224	2358	2472
	20	1822	1747	1685	1631	1550	1465	1372	1314	1203	1314	1372	1465	1550	1631	1685
	25	1414	1350	1314	1281	1086	922	719	556	423	556	719	922	1086	1281	1314
	30	1147	1113	1048	848	639	406	232	162	148	162	232	406	639	848	1048
	35	994	838	644	435	244	98	92	89	81	89	92	98	244	435	644
	40	404	286	211	90	56	52	49	46	40	46	49	52	56	90	211
	45	66	58	48	36	28	24	21	18	15	18	21	24	28	36	48
	50	37	34	26	20	14	10	8	7	6	7	8	10	14	20	26
	55	19	17	14	10	7	5	3	3	2	3	3	5	7	10	14
	60	9	8	7	5	3	2	2	2	2	2	2	3	5	7	8
	65	5	4	3	3	2	2	1	1	1	1	1	2	3	3	4
	70	3	3	2	2	1	1	1	1	1	1	1	1	2	2	3
	75	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	80	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1
	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	90	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
	100	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
	110	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
	120	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
	130	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
	140	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
	150	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
	160	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
	170	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
	180	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	716500	716500
	45	13010	9524
	55	4602	3308
	65	1642	1150
	75	842	634
	85	502	475



Utilization of Lumens - 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 Lumens delivered to the task surface **																	
0	2140	2140	2140	2140	2090	2090	2090	2090	1997	1997	1997	1912	1912	1912	1834	1834	1834	1797
1	2055	2012	1973	1938	2012	1973	1938	1907	1901	1874	1849	1835	1814	1794	1774	1758	1742	1711
2	1972	1897	1835	1782	1934	1867	1810	1763	1810	1764	1724	1758	1721	1688	1709	1680	1653	1626
3	1893	1795	1719	1659	1859	1771	1701	1645	1725	1667	1620	1683	1635	1595	1644	1604	1571	1545
4	1818	1703	1619	1555	1788	1684	1606	1546	1647	1581	1528	1612	1556	1511	1580	1533	1494	1470
5	1746	1620	1532	1467	1719	1604	1522	1461	1574	1503	1448	1546	1484	1436	1519	1466	1424	1401
6	1679	1545	1455	1390	1655	1531	1447	1386	1506	1432	1377	1483	1418	1368	1461	1404	1359	1337
7	1615	1476	1386	1322	1594	1465	1380	1319	1444	1368	1312	1424	1356	1306	1405	1345	1299	1278
8	1556	1413	1323	1262	1536	1403	1318	1259	1385	1309	1254	1369	1300	1249	1353	1291	1244	1224
9	1500	1355	1266	1207	1482	1347	1262	1205	1331	1255	1201	1317	1247	1197	1303	1240	1194	1173
10	1447	1302	1215	1157	1431	1295	1211	1155	1281	1205	1152	1269	1199	1149	1257	1193	1147	1127

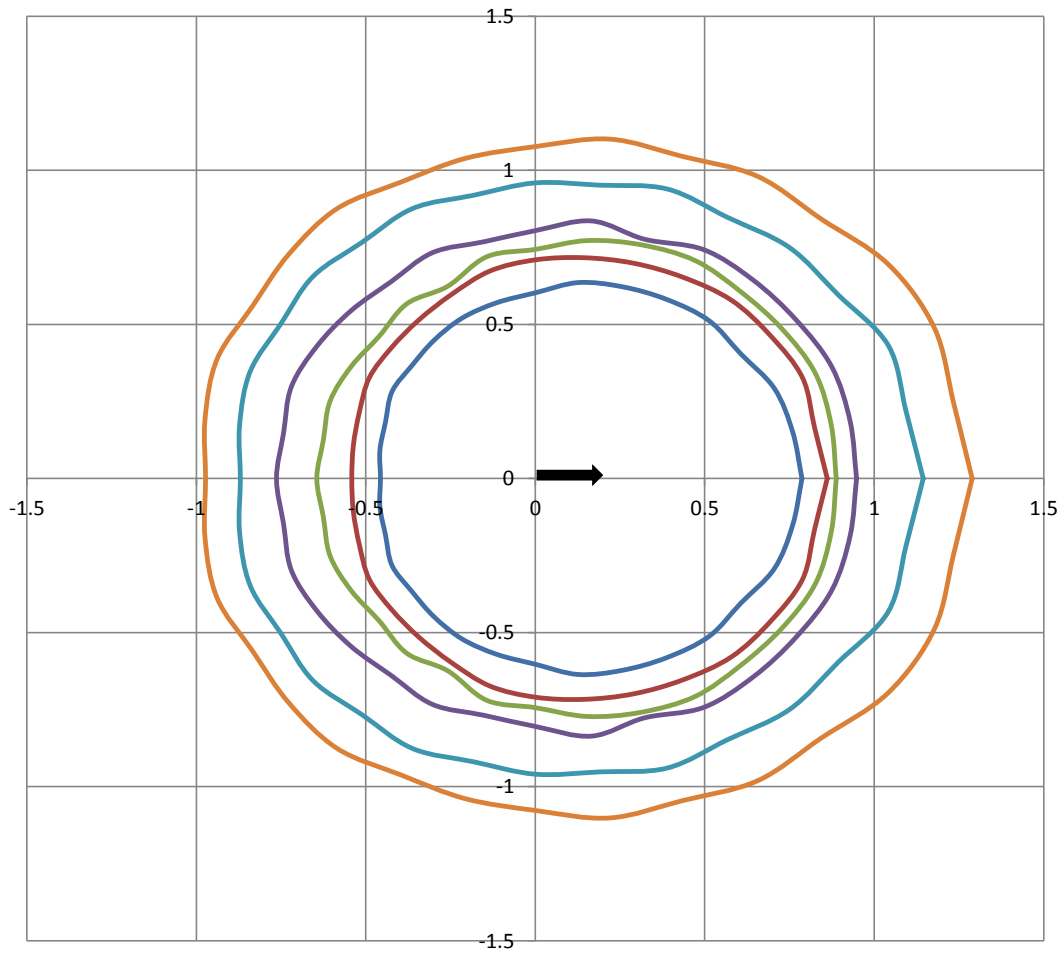
Beam and Field Information	
CIE Type:	Direct
Center Beam Intensity:	5106 Candela
Central Cone Intensity:	4961 Candela
Beam Flux:	668.6 Lumens
Beam Angle (0-180):	27.6 Degrees
Beam Angle (90-270):	27.0 Degrees
Field Angle (0-180):	63.6 Degrees
Field Angle (90-270):	63.0 Degrees

Cone of Light Tabulation			
Mounting Height (Feet)		Footcandles at Nadir	Diameter (Feet)
4.00		319	1.83
6.00		142	2.75
8.00		79.8	3.67
10.0		51.1	4.58
12.0		35.5	5.50
14.0		26.0	6.42
16.0		19.9	7.33



ISOFootcandle Plot

Mounting Height - 8 Feet



Grid Lines in Units of Mounting Height

— 5 fc — 2 fc — 1 fc — 0.5 fc — 0.2 fc — 0.1 fc