



## Lamp Flux and Color Quality Test Report

Test Date: August 23, 2010  
LTL Test Number: 20433  
Prepared For: LEDnovation  
Catalog Number: LED-PAR38-90-1WD-INF  
Lamp Description: Cast aluminum heatsink housing, clear patterned plastic optic with frosted center section  
Lamp: One VBU PAR38 LED replacement lamp with one white LED

### Measured Lamp Electrical Values:

Voltage: 120.0 V  
Current: 0.172 A  
Watts: 19.05 W  
Power Factor: 0.925  
Temperature: 24.0 °C



### Measured Lamp Photometric Values:

Radiant Flux: 3156 mW  
Luminous Flux: 955.3 Lumens  
Lamp Efficacy: 50.1 Lumens per Watt  
CCT: 3005 K  
CRI (Ra): 82.2  
Chromaticity (x): 0.4333  
Chromaticity (y): 0.3973  
Chromaticity (u'): 0.2511  
Chromaticity (v'): 0.5181  
Duv: -0.0023

Approved by:

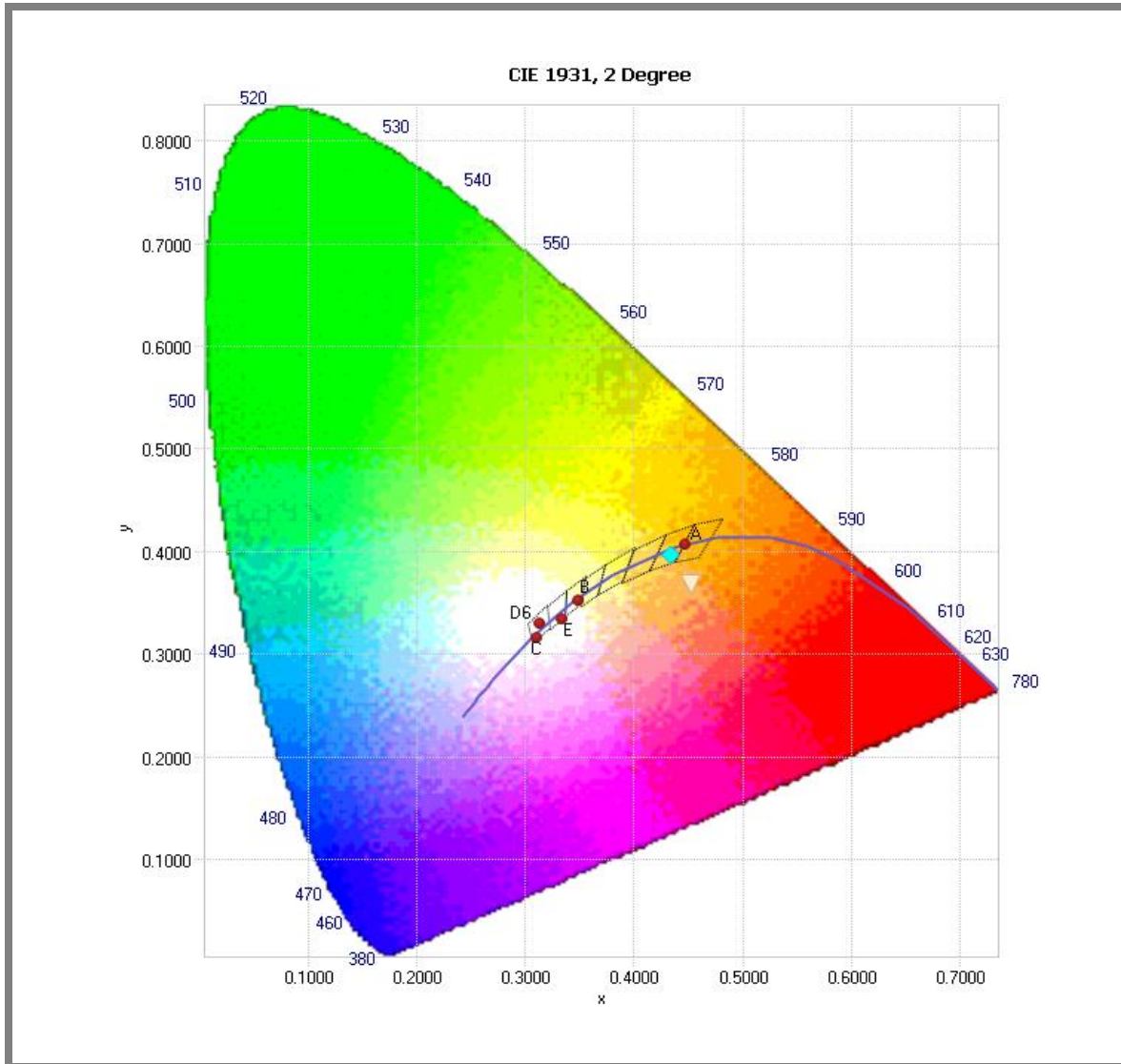
Testing was performed in accordance with IES LM-79-2008



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Chromaticity Coordinates						
x	y	u	v	u'	v'	Duv
0.4333	0.3973	0.2511	0.3454	0.2511	0.5181	-0.0023

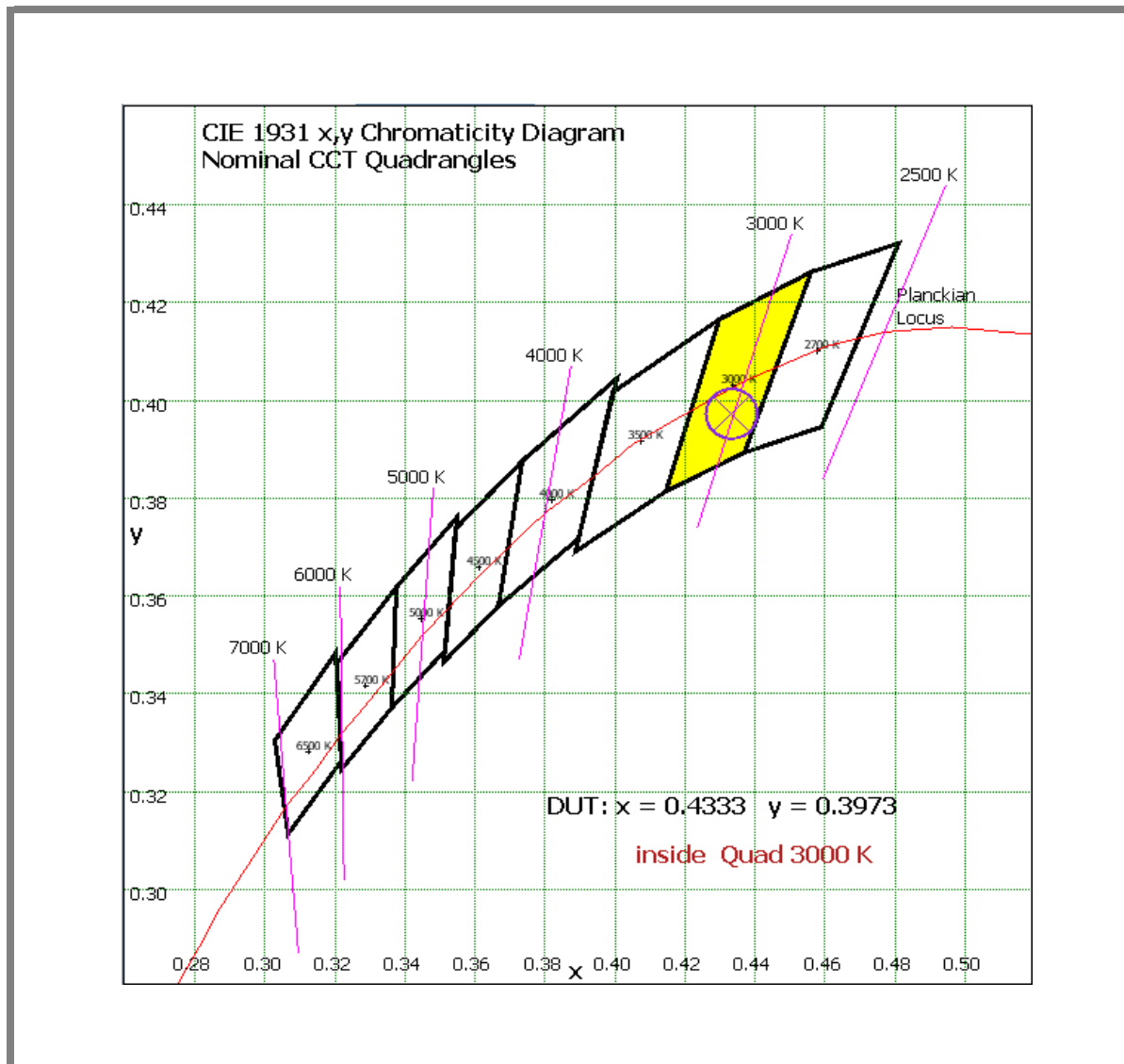




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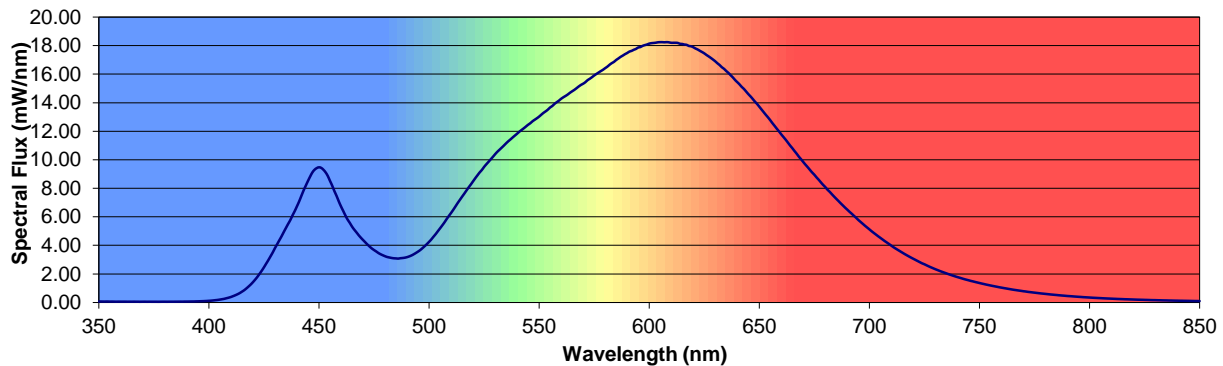
Chromaticity Coordinates							
x	y	u	v	u'	v'	Duv	
0.4333	0.3973	0.2511	0.3454	0.2511	0.5181	-0.0023	





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Spectral Power Distribution table with columns for wavelength (nm) and power (mW) across five groups of data.





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Spectral Power Distribution									
$\lambda$ (nm)	mW	$\lambda$ (nm)	mW	$\lambda$ (nm)	mW	$\lambda$ (nm)	mW	$\lambda$ (nm)	mW
600	18.14	650	13.72	700	5.12	750	1.36	800	0.34
601	18.17	651	13.53	701	4.99	751	1.32	801	0.33
602	18.18	652	13.34	702	4.87	752	1.29	802	0.32
603	18.20	653	13.14	703	4.75	753	1.25	803	0.32
604	18.23	654	12.96	704	4.64	754	1.22	804	0.31
605	18.24	655	12.77	705	4.52	755	1.19	805	0.30
606	18.24	656	12.56	706	4.41	756	1.16	806	0.29
607	18.23	657	12.37	707	4.30	757	1.13	807	0.28
608	18.24	658	12.17	708	4.19	758	1.10	808	0.28
609	18.23	659	11.98	709	4.09	759	1.06	809	0.27
610	18.20	660	11.78	710	3.98	760	1.04	810	0.26
611	18.20	661	11.59	711	3.87	761	1.01	811	0.26
612	18.20	662	11.40	712	3.77	762	0.98	812	0.25
613	18.19	663	11.20	713	3.68	763	0.95	813	0.24
614	18.13	664	11.00	714	3.58	764	0.93	814	0.23
615	18.11	665	10.81	715	3.49	765	0.90	815	0.23
616	18.07	666	10.61	716	3.40	766	0.88	816	0.22
617	18.06	667	10.42	717	3.31	767	0.85	817	0.22
618	17.98	668	10.21	718	3.22	768	0.83	818	0.21
619	17.95	669	10.03	719	3.14	769	0.81	819	0.21
620	17.89	670	9.84	720	3.06	770	0.78	820	0.20
621	17.80	671	9.65	721	2.98	771	0.76	821	0.20
622	17.73	672	9.48	722	2.89	772	0.74	822	0.19
623	17.64	673	9.29	723	2.81	773	0.72	823	0.19
624	17.55	674	9.11	724	2.74	774	0.70	824	0.18
625	17.46	675	8.95	725	2.67	775	0.68	825	0.18
626	17.35	676	8.76	726	2.60	776	0.67	826	0.17
627	17.25	677	8.60	727	2.53	777	0.65	827	0.17
628	17.14	678	8.41	728	2.46	778	0.63	828	0.16
629	17.02	679	8.24	729	2.39	779	0.61	829	0.16
630	16.90	680	8.08	730	2.33	780	0.60	830	0.16
632	16.64	682	7.75	732	2.20	782	0.56	832	0.15
633	16.49	683	7.58	733	2.15	783	0.55	833	0.14
634	16.37	684	7.42	734	2.09	784	0.53	834	0.14
635	16.22	685	7.26	735	2.04	785	0.52	835	0.14
636	16.09	686	7.11	736	1.98	786	0.50	836	0.13
637	15.93	687	6.94	737	1.93	787	0.49	837	0.13
638	15.77	688	6.80	738	1.88	788	0.48	838	0.13
639	15.59	689	6.64	739	1.82	789	0.46	839	0.12
640	15.44	690	6.50	740	1.78	790	0.45	840	0.12
641	15.29	691	6.35	741	1.73	791	0.44	841	0.12
642	15.11	692	6.22	742	1.68	792	0.43	842	0.12
643	14.97	693	6.07	743	1.64	793	0.42	843	0.11
644	14.79	694	5.93	744	1.59	794	0.40	844	0.11
645	14.61	695	5.78	745	1.55	795	0.39	845	0.11
646	14.44	696	5.65	746	1.51	796	0.38	846	0.10
647	14.27	697	5.51	747	1.47	797	0.37	847	0.10
648	14.08	698	5.38	748	1.44	798	0.36	848	0.10
649	13.91	699	5.25	749	1.40	799	0.35	849	0.10
								850	0.09



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Color Rendering Index Detail								
R1	R2	R3	R4	R5	R6	R7	R8	Ra (CRI)
81.3	87.8	91.5	80.5	79.6	82.1	86.7	68.0	82.2

Color Rendering Index Detail (Expanded)								
R9	R10	R11	R12	R13	R14			
24.5	69.4	76.8	63.5	82.4	94.5			

Testing was performed in the LTL two-meter integrating sphere (Labsphere model SLMS7650) using a Labsphere model CDS1100 spectrometer and LightMtrX software.

Testing was performed using the 4π geometry method of measurement.

Absorption correction was employed for this measurement.

Electrical power was supplied to the device under test using a regulated power supply.

The device under test was allowed to reach stability according to appropriate IES standards prior to measurement.



# LUMINAIRE TESTING LABORATORY, INC.

SUSTAINING MEMBER of the IESNA

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LTL NUMBER: 20432 DATE: 08-23-2010  
 PREPARED FOR: LEDNOVATION  
 CATALOG NUMBER: LED-PAR38-90-1WD-INF  
 LUMINAIRE: CAST ALUMINUM HEATSINK HOUSING, CLEAR PATTERNED PLASTIC OPTIC WITH FROSTED CENTER SECTION.  
 LAMP: ONE VBU PAR38 LED REPLACEMENT LAMP WITH ONE WHITE LED  
 LED POWER SUPPLY: INTERNAL  
 ELECTRICAL VALUES: 120.0VAC, 0.1740A, 19.07W, PF=0.913  
 NOTE: THIS TEST WAS PERFORMED USING THE CALIBRATED PHOTODETECTOR METHOD OF ABSOLUTE PHOTOMETRY.\*

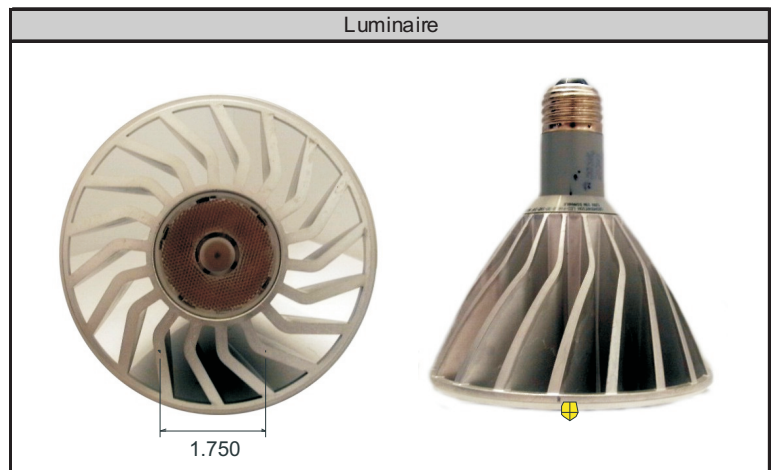
Candela Distribution

	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	Flux
0	3490	3490	3490	3490	3490	3490	3490	3490	3490	3490	3490	3490	3490	3490	3490	3490	
5	3351	3346	3299	3227	3189	3227	3299	3346	3351	3346	3299	3227	3189	3227	3299	3346	279.9
15	1463	1456	1454	1432	1431	1432	1454	1456	1463	1456	1454	1432	1431	1432	1454	1456	396.2
25	337	337	346	339	330	339	346	337	337	337	346	339	330	339	346	337	170.2
35	97	96	95	94	96	94	95	96	97	96	95	94	96	94	95	96	62.1
45	39	40	39	40	40	40	39	40	39	40	39	40	40	40	39	40	30.9
55	16	16	16	17	16	17	16	16	16	16	16	17	16	17	16	16	15.3
65	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9.0
75	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4.4
85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5
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	0.0
105	0	0	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	0.0
125	0	0	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	0.0
145	0	0	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	0.0
165	0	0	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	0.0
180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0

Zonal Lumen Summary

Zone	Lumens	% of Lamp	% of Luminaire
0-30	846.4	N/A	87.4%
0-40	908.5	N/A	93.8%
0-60	954.7	N/A	98.6%
0-90	968.6	N/A	100.0%
90-180	0.0	N/A	0.0%
0-180	968.6	N/A	100.0%

Total lumen Output: 968.6 Lumens  
 Luminaire efficacy: 50.8 Lumens per Watt  
 CIE Type: Direct  
 Spacing Criterion: 0 deg: 0.44    90 deg: 0.43  
                           180 deg: 0.44    270 deg: 0.43  
 Beam Spread 0-180: 26.1  
 Beam Spread 90-270: 25.7  
 Field Spread 0-180: 49.6  
 Field Spread 90-270: 49.4



Approved By: MG

\*DATA WAS ACQUIRED USING THE CALIBRATED PHOTODETECTOR METHOD OF ABSOLUTE PHOTOMETRY. A UDT MODEL #211 PHOTODETECTOR AND UDT MODEL #S370 OPTOMETER COMBINATION WERE USED AS A STANDARD. A SPECTRAL MISMATCH CORRECTION FACTOR WAS EMPLOYED BASED ON THE SPECTRAL RESPONSIVITY OF THE PHOTODETECTOR AND THE SPECTRAL POWER DISTRIBUTION OF THE TEST SUBJECT.

**TESTING WAS PERFORMED IN ACCORDANCE WITH IES LM-79-08.**  
 TEST ANGULAR INCREMENTS AND REPORT FORMATTING WAS BASED ON IES LM-41-98 AND LM-46-04.



Candela Tabulation (5 degree Vertical Increments)

	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	3490	3490	3490	3490	3490	3490	3490	3490	3490	3490	3490	3490	3490	3490	3490	3490
5	3351	3346	3299	3227	3189	3227	3299	3346	3351	3346	3299	3227	3189	3227	3299	3346
10	2333	2328	2320	2308	2288	2308	2320	2328	2333	2328	2320	2308	2288	2308	2320	2328
15	1463	1456	1454	1432	1431	1432	1454	1456	1463	1456	1454	1432	1431	1432	1454	1456
20	795	789	796	783	761	783	796	789	795	789	796	783	761	783	796	789
25	337	337	346	339	330	339	346	337	337	337	346	339	330	339	346	337
30	167	162	165	163	162	163	165	162	167	162	165	163	162	163	165	162
35	97	96	95	94	96	94	95	96	97	96	95	94	96	94	95	96
40	59	60	60	61	59	61	60	60	59	60	60	61	59	61	60	60
45	39	40	39	40	40	40	39	40	39	40	39	40	40	40	39	40
50	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
55	16	16	16	17	16	17	16	16	16	16	16	17	16	17	16	16
60	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
65	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
70	7	7	6	6	6	6	6	7	7	7	6	6	6	6	6	7
75	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
80	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
85	0	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	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

Zonal Lumen Tabulation (5 degree zones)

Zone	Lumens	Zone	Lumens	Zone	Lumens	Zone	Lumens
0-5	81.8	45-50	12.8	90-95	0.0	135-140	0.0
5-10	198.1	50-55	8.8	95-100	0.0	140-145	0.0
10-15	215.7	55-60	6.4	100-105	0.0	145-150	0.0
15-20	180.6	60-65	5.1	105-110	0.0	150-155	0.0
20-25	111.1	65-70	3.9	110-115	0.0	155-160	0.0
25-30	59.2	70-75	2.8	115-120	0.0	160-165	0.0
30-35	36.8	75-80	1.6	120-125	0.0	165-170	0.0
35-40	25.3	80-85	0.5	125-130	0.0	170-175	0.0
40-45	18.2	85-90	0.0	130-135	0.0	175-180	0.0





Utilization of Lumens - Zonal Cavity Method												
Effective Floor Cavity Reflectance 20%												
Ceiling Cavity Reflectance	90				80				70			
Wall Reflectance	70	50	30	10	70	50	30	10	70	50	30	10
Room Cavity Ratio (RCR)	** Values are expressed as Lumens delivered to the task surface **											
0	1181	1181	1181	1181	1153	1153	1153	1153	1126	1126	1126	1126
1	1133	1107	1084	1063	1108	1085	1064	1046	1085	1064	1046	1029
2	1087	1042	1006	975.9	1065	1025	992.6	965	1045	1009	979.5	954.3
3	1044	986.9	943.5	909.4	1025	973.4	933.7	902.1	1007	960.4	924.1	894.9
4	1004	938.5	891.4	856	986.9	927.6	884.1	850.9	971	917.1	877	846
5	966.8	895.8	847.1	811.7	951.8	886.9	841.6	808.1	937.8	878.4	836.2	804.7
6	932.3	857.8	808.8	774	919.1	850.5	804.5	771.5	906.6	843.5	800.3	769
7	900.3	823.7	775	741.4	888.5	817.6	771.7	739.5	877.3	811.7	768.4	737.6
8	870.5	792.8	744.9	712.4	859.9	787.7	742.3	711.1	849.9	782.7	739.6	709.7
9	842.7	764.7	717.8	686.6	833.2	760.3	715.7	685.5	824.2	756.1	713.6	684.5
10	816.8	738.9	693.2	663.2	808.2	735.2	691.4	662.3	800.1	731.5	689.7	661.5

Ceiling Cavity Reflectance	50				30			10			0
Wall Reflectance	70	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	1076	1076	1076	1076	1030	1030	1030	988.3	988.3	988.3	968.6
1	1042	1026	1011	997.8	990	978.7	968.2	957.2	948.5	940.4	923.7
2	1007	978.6	954.5	933.7	950.4	931	914	924.4	908.9	895.2	880.4
3	973.5	936	905.8	880.9	913.4	888.4	867.4	892.4	872	854.4	840.9
4	941.8	897.4	863.3	836.3	879.1	850.3	826.9	862	837.8	817.7	805.1
5	911.9	862.3	825.8	797.8	847.3	815.8	791.1	833.3	806.3	784.6	772.6
6	883.6	830.1	792.3	764	817.7	784.5	759.2	806	777.1	754.4	743
7	856.8	800.6	762	734	790.1	755.9	730.4	780.3	750	726.8	715.9
8	831.5	773.3	734.6	706.9	764.4	729.6	704.2	756.1	724.9	701.6	691
9	807.6	748	709.4	682.4	740.4	705.4	680.3	733.3	701.5	678.3	668.1
10	785.1	724.6	686.3	659.9	718.1	683	658.3	711.9	679.9	656.7	646.9

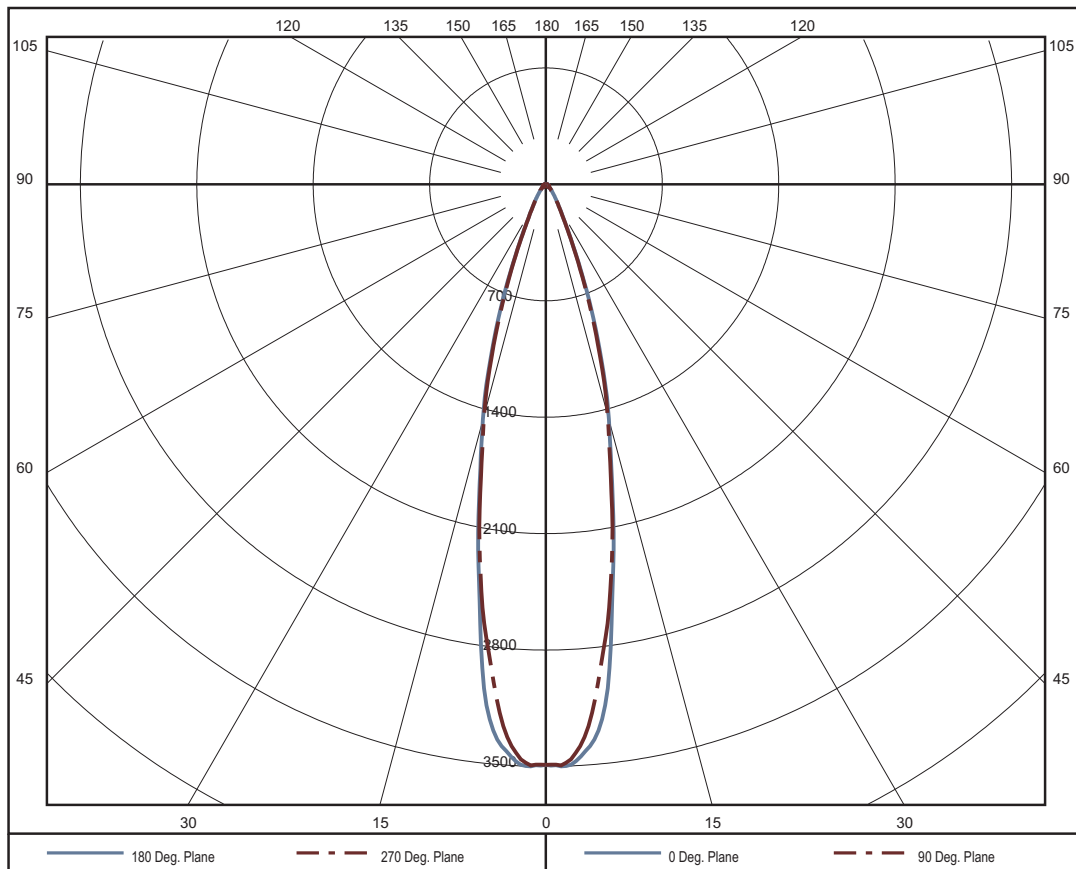
Average Luminance Table (cd/m<sup>2</sup>)

	0	45	90
0	1959223	1959223	1959223
45	30827	31297	31448
55	15725	16002	16025
65	11873	12161	11682
75	9123	8874	8191
85	271	0	0



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THIS TEST WAS CONDUCTED USING PHOTOMETRY TECHNIQUES ACCORDING TO STANDARD IES PROCEDURES. THE USER MUST THEREFORE USE CAUTION IN THE FOLLOWING SITUATIONS: 1) THIS TEST WAS PERFORMED USING A SPECIFIC BALLAST/LAMP COMBINATION. EXTRAPOLATION OF THESE DATA FOR OTHER BALLAST/LAMP COMBINATIONS MAY PRODUCE ERRONEOUS RESULTS. 2) THIS TEST WAS CONDUCTED IN A CONTROLLED LABORATORY ENVIRONMENT WHERE THE AMBIENT TEMPERATURE WAS HELD AT 25°C ±1°C. FIELD PERFORMANCE MAY DIFFER PARTICULARLY IN REGARDS TO CHANGE IN LUMINOUS OUTPUT AS A RESULT OF DIFFERENCE IN AMBIENT TEMPERATURE AND METHOD OF MOUNTING THE LUMINAIRE.



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