

# IESNA LM-79: 2008

## Measurement and Test Report

for

### Philips (China) Investment Co., Ltd.

No.2 Bld. No.9, Laue 888, Tian Lin Road, Shanghai, CHINA

Aug 29, 2011

Product Name:	LED Integral Lamp
Model No:	7E26PAR20D-1
Test Engineer:	David Zhang 
Report No.:	BTR66.180.10.259.01
Sample Received Date:	Aug 26, 2011
Test Performed Date:	Aug 26, 2011 to Aug 29, 2011
Reviewed By:	Steven Hsu 
Prepared By:	<b>BEST Test Service Shenzhen Co., Ltd.</b> 1st Floor, 1st Building, Weitai Industrial Park, Yingrenshi, Shiyao, Baoan, Shenzhen, China TEL: +86-755-28236006 FAX: +86-755-23467087-811 Email: <a href="mailto:certification@bestcert.cn">certification@bestcert.cn</a>



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## 1 - GENERAL INFORMATION

### 1.1 Product Description for Equipment under Test (EUT)

Applicant	:	Philips (China) Investment Co., Ltd.
Product Name	:	LED Integral Lamp
Model No	:	7E26PAR20D-1
Input Rating	:	AC120V/60Hz
Power Rating	:	7W
Shape of Bulb	:	PAR20
Date of Receiving Sample	:	Aug 26, 2011
Quantity of samples	:	1 pcs
Test Requested	:	1. Electrical and Photometric Test; 2. Luminous Intensity Distribution Test;

### 1.2 Objective

The following test report is prepared on behalf of Philips (China) Investment Co., Ltd. in accordance with IESNA LM-79-08, used the following American National Standards or illumination Engineering Society of North America test guides:

ANSI C78.377-2008: Specifications for the Chromaticity of Solid State Lighting Products;  
ANSI C79.1- 2002: American National Standard for Electric Lamps – Nomenclature for Glass Bulbs Intended for Use with Electric Lamps;  
ANSI C78.20 – 2003: American National Standard for Electric Lamps – A, G, PS, and Similar Shapes with E26 Medium Screw Bases;  
ANSI C78.21 – 2003: American National Standard for Electric Lamps – PAR and R Shapes;  
ANSI C78.24 – 2001: American National Standard for Electric Lamps – Two-inch (51 mm); Integral-reflector Lamps with Front Covers and GU5.3 or GX 5.3 Bases;  
ANSI/IEC C81.61-2003: American National Standard for Electric Lamp Bases;  
ANSI/IEEE C62.41 – 1991 (01-May-1991): Surge Voltages in Low-Voltage AC Power Circuits, Recommended Practice for;  
CIE Publication No. 13.3 – 1995: Method of Measuring and Specifying Color Rendering of Light Sources;  
CIE Publication No. 18.2 – 1983: The Basis of Physical Photometry;  
IESNA LM-16-1993: Practical Guide to Colorimetry of Light Sources;  
IESNA LM-28-89 – 1989: Guide for the Selection, Care, and Use of Electrical Instruments in the Photometric Laboratory;  
IESNA LM-79-08 Electrical and Photometric Measurement of Solid State Lighting Products  
UL 1993 – 1999: Standard for Self-Ballasted Lamps and Lamp Adapters;  
UL 8750 – 2009: Light Emitting Diode (LED) Equipment for Use in Lighting Products.

### 1.3 Test Facility Description

The Energy Efficiency Lab used by BEST to collect energy efficiency measurement data is located in 1st Floor, 1st Building, Weitai Industrial Park, Yingrenshi, Shiyan, Baoan, Shenzhen, China. BEST Test Service Shenzhen Co., Ltd is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200770-0). BEST Test Service Shenzhen Co., Ltd is also an ELI accredited lab for lighting products (ELI Certificate No. ELI-L04-2010) and UL accredited lab for lighting products

**1.4 Test Equipment List**

Device	Manufacture	Model No	Serial No	Cal. Date	Cal Due Date
Integral Sphere	Everfine	1.5M SPEKTRON	608040T	Oct 20, 2010	Oct 20, 2011
Integral Sphere	Everfine	1.5M SPEKTRON	906025	Oct 20, 2010	Oct 20, 2011
Integral Sphere	Labsphere	LMS-650	6101002416	Mar 10, 2011	Mar 09, 2012
Spectro Meter Assy	Labsphere	CDS 2100	217101416	Mar 10, 2011	Mar 09, 2012
Plus UV-VIS-Near IR Spectrophotometer Colorimeter	Everfine	PMS-80-V1 (380nm-800nm)	608033	Oct 20, 2010	Oct 20, 2011
Plus UV-VIS-Near IR Spectrophotometer Colorimeter	Everfine	PMS-700 (200nm-800nm)	908001	Oct 20, 2010	Oct 20, 2011
Goniophotometer	Everfine	GOR-5000	1009001	Nov 20, 2010	Nov 19, 2011
6 <sup>1/2</sup> Digital Multimeter	Agilent	34401A	MY4702386	Oct 18, 2010	Oct 17, 2011
AC Power Source	California Instrument	1501I	S13093	N/A	N/A
AC Power Source	California Instrument	1501L	L03572	N/A	N/A
Standard Light Source	OSRAM	24V/50W	NO.1	Sep 17, 2010	Sep 16, 2011
Standard Light Source	OSRAM	24V/50W	NO.2	Sep 17, 2010	Sep 16, 2011
Multi-Function AC standard Meter	Everfine	PF2010S	605010	Oct 18, 2010	Oct 17, 2011
Digital Power Meter	Everfine	PF9811	902029	Oct 18, 2010	Oct 17, 2011
Digital Power Meter	YOKOGAWA	WT210	91K310009	Oct 18, 2010	Oct 17, 2011
Digital Power Meter	YOKOGAWA	WT210	91K310017	Oct 18, 2010	Oct 17, 2011
Digital Power Meter	YOKOGAWA	WT210	91K310016	Oct 18, 2010	Oct 17, 2011
Ballast Parameter Analyzer	Everfine	PF9821	905050	Oct 18, 2010	Oct 17, 2011
Second Meter	TIANFU	PC 396	N/A	Oct 18, 2010	Oct 17, 2011
Digital Storage Oscilloscope	Tektronix	TDS2012B	C051911	Oct 18, 2010	Oct 17, 2011

**Statement of Traceability:** BEST Test Service Shenzhen Co., Ltd. certifies that all calibration has been performed using suitable standards traceable to the NIM China.

## 2 - Test Method

### 2.1 Photometric and Electrical Measurement (Integrated Sphere Method)

Total light output (luminous flux) for the  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$  ambient temperature conditions is measured using an integrating sphere. Temperature is measured at a position inside the sphere. Spectral radiant flux measurements are made using Everfine PMS-80-V1 to the detector port of the integrating sphere. Each lamp is operated at rated voltage in its designated orientation. Each lamp should be stable before measurements are made. The determining method of stable is as follows:

Step 1 Take 3 measurements of the lamp light output at 15 minute interval (total time=30 minutes.) This time period is in addition to the recommended pre-burning time.

Step 2 Calculate the percent difference between the maximum measured value and the minimum measured value for the three consecutive measurements.

Step 3 If the value calculated in Step 2 does not exceed 0.5 percent, the lamp is considered stable.

Luminous flux, chromaticity coordinates, correlated color temperature and color rendering index for each lamp are calculated from the spectral radiant flux measurements taken at 2 nm intervals over the range 350 to 1050 nm. The calibration of the sphere photometer-spectrometer system is traceable to the NIST USA. Lamp efficacy (lumens per watt) for each lamp model is computed based on the revised luminous flux result. Electrical measurements including voltage, current, power and power factor are measured using the YOKOGAWA WT210 digital power Meter.

The total uncertainty of the light output measurements is estimated, at the 95% confidence level, not to exceed  $\pm 1.12\%$  over the wavelength range 350-1050 nm.

### 2.2 Photometric and Electrical Measurement (Gonio Photometer Method)

Before each measurement, the method below should be used to determine if the lamp is stable or not.

Step 1 Take 3 measurements of the lamp intensity at 15 minute interval (total time=30 minutes.) This time period is in addition to the recommended pre-burning time.

Step 2 Calculate the percent difference between the maximum measured value and the minimum measured value for the three consecutive measurements.

Step 3 If the value calculated in Step 2 does not exceed 0.5 percent, the lamp is considered stable.

A Everfine GOR-5000 Goniometer was used to measure the intensity (candelas) at each angle of distribution for each sample. Ambient temperature was measured equal to the height of the sample mounted on the Goniometer equipment. Each sample was operated at input rated voltage in its designated orientation. Each sample was allowed to be stable before measurement was made. Electrical measurements including voltage, current, power and power factor were measured using the YOKOGAWA Power Analyzer.

Some graphics were created with Photometric Plus software.

### 3 –Executive Summary

Brand Name= EnduraLED Dimmable PAR20 2700K 25D

12NC number= 929000202104

SKU number= 046677418571

Model Number=7E26PAR20D-1

Input Power (Watts)	Power Factor	Luminous Flux (Lumens)	Luminous Efficiency (Lumens/Watt)	CCT (K)	CRI	Stabilization Time (Hours) ( Light & Power)
6.82	0.716	274.42	40.25	2818	81.5	1.5



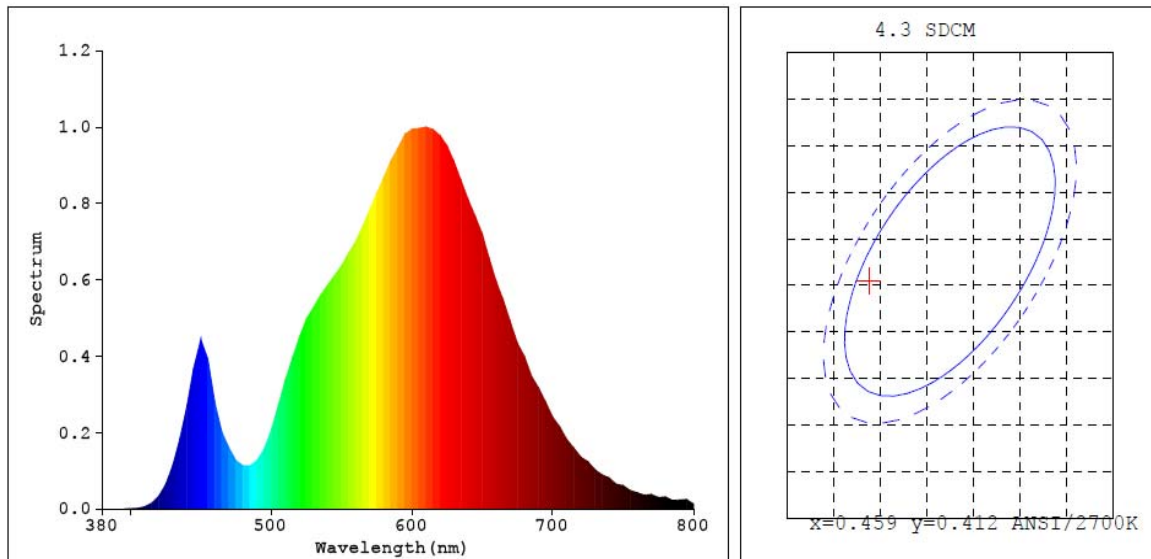
## 4 – Test Result

Item	Test Result	Accreditation
Input Voltage	120.0	NVLAP/EPA
Input Current	0.0779	NVLAP/EPA
Power Factor	0.7306	NVLAP/EPA
Input Power	6.83	NVLAP/EPA
Lumen Output (Lumens)	274.12	NVLAP/EPA
Luminous Efficacy (lm/w)	40.15	NVLAP/EPA
Maximum Luminous Intensity (cd)	1056	NVLAP/EPA
Beam Angle (°)	23.0	NVLAP/EPA
Correlated Color Temperature (CCT)	2818	NVLAP/EPA
x	0.4515	NVLAP/EPA
y	0.4103	NVLAP/EPA
u'	0.2573	NVLAP/EPA
v'	0.5260	NVLAP/EPA
Duv	0.0007	NVLAP/EPA
Color Rendering Index– CRI	81.5	NVLAP/EPA
R9	16	NVLAP/EPA

## 5 – Spectral Flux Plots

BEST Test Service Shenzhen Co., Ltd.

### Light Source Test Report



#### Color Parameters:

Chromaticity Coordinate:  $x=0.4515$   $y=0.4103$

Chromaticity Coordinate:  $u'=0.2573$   $v'=0.5260$  ( $duv=0.0007$ )

Tc=2818K Dominant WL:Ld=583.4nm Purity=58.7% Centroid WL:598.0nm

Ratio:R=25.7% G=72.8% B=1.5% Peak WL:Lp=610.0nm HWL:143.5nm

Render Index:Ra=81.5

R1 =80 R2 =87 R3 =93 R4 =81 R5 =79 R6 =83 R7 =86

R8 =64 R9 =16 R10=70 R11=78 R12=61 R13=81 R14=95 R15=75

#### Photo Parameters:

Flux: 273.22 lm Fe: 0.86898 W Efficacy:40.07 lm/W

#### Electrical Parameters:

Lamp : U=120.0V I=0.07931A P=6.818W PF=0.7163

#### Instrument Status:

Scan Range:380.0nm-800.0nm Interval:5.0nm[0]

REF=8446 (R=4)

%=0.024%

Ip=709 (G=3, D=55)

PMT: 25.2 centigrade [25.8]



## 6 – Spectral Energy Distribution

Wavelength(nm)	Spectrum	Spectrum(W/nm)	AD Value
380	0	0.00E+00	55
385	0	0.00E+00	55
390	0	0.00E+00	55
395	0	0.00E+00	55
400	0.001	5.62E-06	56
405	0.0018	9.85E-06	57
410	0.0056	3.11E-05	61.9
415	0.0149	8.21E-05	75.8
420	0.0329	1.82E-04	104.5
425	0.0633	3.50E-04	148.2
430	0.1127	6.23E-04	211.9
435	0.1809	1.00E-03	305.4
440	0.265	1.46E-03	399.4
445	0.369	2.04E-03	535.7
450	0.4436	2.45E-03	679.5
455	0.3928	2.17E-03	708.5
460	0.2776	1.53E-03	602.7
465	0.2008	1.11E-03	460.3
470	0.1595	8.82E-04	336
475	0.1264	6.99E-04	270.1
480	0.113	6.24E-04	233.6
485	0.1129	6.24E-04	225.1
490	0.1268	7.01E-04	237.8
495	0.1564	8.64E-04	271.4
500	0.2053	1.13E-03	329
505	0.2701	1.49E-03	404.7
510	0.3369	1.86E-03	473.8
515	0.3934	2.17E-03	529
520	0.4482	2.48E-03	577.2
525	0.4968	2.75E-03	615.3
530	0.5272	2.91E-03	625.8
535	0.5585	3.09E-03	623
540	0.5852	3.23E-03	623.9
545	0.6108	3.37E-03	631.8
550	0.637	3.52E-03	634.9
555	0.6696	3.70E-03	659.6
560	0.6998	3.87E-03	657
565	0.7392	4.08E-03	667.7
570	0.7829	4.33E-03	683.7
575	0.8259	4.56E-03	687.9
580	0.8677	4.79E-03	696.8
585	0.9107	5.03E-03	695.9

590	0.9447	5.22E-03	679.2
595	0.9806	5.42E-03	673
600	0.9942	5.49E-03	662.1
605	0.9964	5.51E-03	633.4
610	1	5.53E-03	602.4
615	0.9934	5.49E-03	568.6
620	0.9776	5.40E-03	534.5
625	0.9507	5.25E-03	496.6
630	0.9088	5.02E-03	452.7
635	0.8595	4.75E-03	405.8
640	0.8095	4.47E-03	363.7
645	0.7657	4.23E-03	332.5
650	0.7193	3.97E-03	306.4
655	0.6543	3.62E-03	272.5
660	0.5946	3.29E-03	240.5
665	0.5458	3.02E-03	206.5
670	0.4893	2.70E-03	216.8
675	0.4337	2.40E-03	278
680	0.3989	2.20E-03	268.2
685	0.3472	1.92E-03	208
690	0.3162	1.75E-03	170.6
695	0.2796	1.54E-03	142.4
700	0.2402	1.33E-03	121.3
705	0.2151	1.19E-03	108.2
710	0.1821	1.01E-03	96.2
715	0.1597	8.83E-04	88.1
720	0.1362	7.53E-04	81.1
725	0.124	6.85E-04	77.1
730	0.1029	5.68E-04	72.1
735	0.0897	4.96E-04	69
740	0.0818	4.52E-04	67
745	0.0652	3.60E-04	64
750	0.0612	3.38E-04	63
755	0.0484	2.68E-04	61
760	0.0428	2.37E-04	60
765	0.0365	2.02E-04	59
770	0.0383	2.11E-04	59
775	0.0304	1.68E-04	58
780	0.0317	1.75E-04	58
785	0.0223	1.23E-04	57
790	0.0235	1.30E-04	57
795	0.0248	1.37E-04	57
800	0.0134	7.40E-05	56

## 7 – EUT Photos



## **8 – Luminous Intensity Distribution Test Plots**

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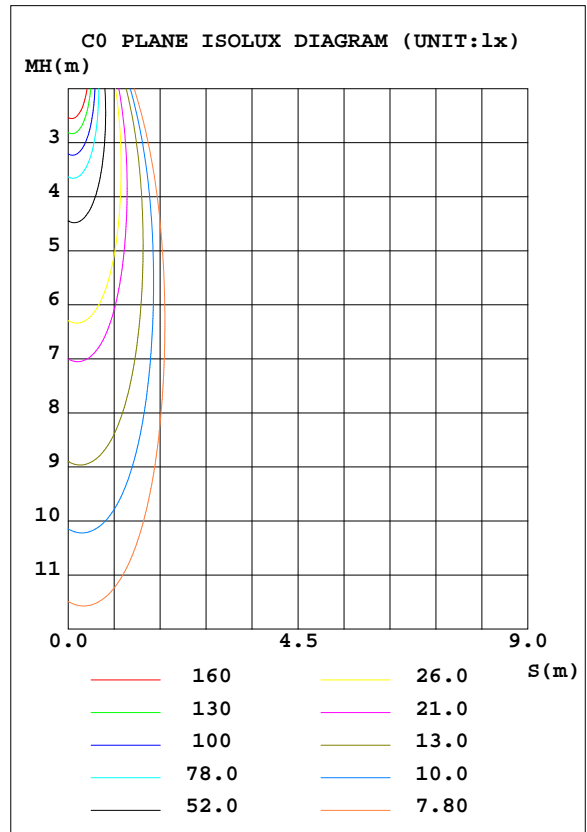
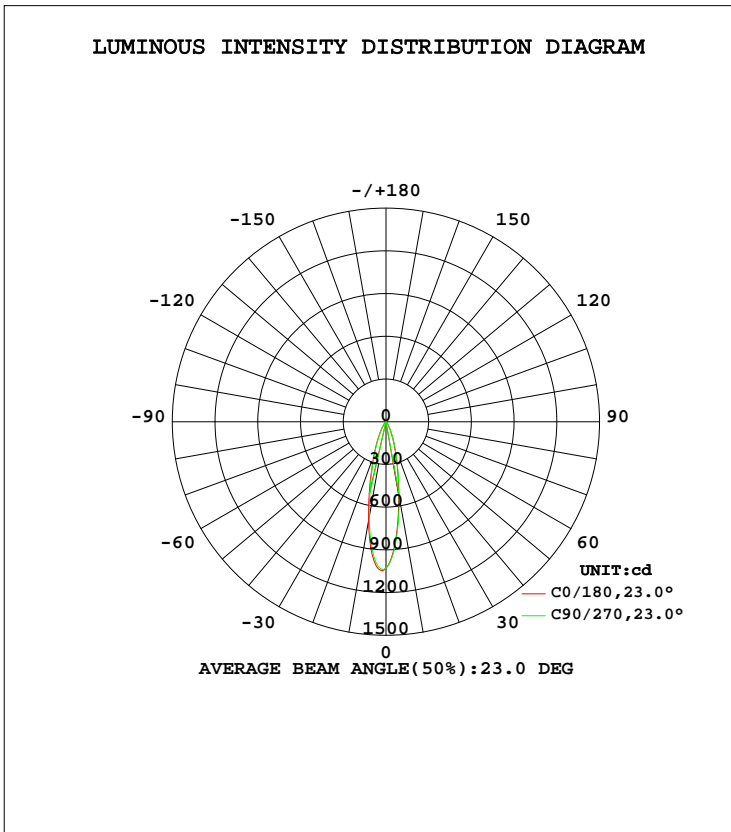
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LUMINAIRE PHOTOMETRIC TEST REPORT

Test:U:120.0V I:0.0779A P:6.828W PF:0.7306 Lamp Flux:274.12x1 lm		
NAME:	TYPE:Indoor	WEIGHT:
DIM.:	SPEC.:	SERIAL No.:
MFR.: Philips	SUR.:	PROTECTION ANGLE:

DATA OF LAMP		PHOTOMETRIC DATA Eff: 40.15 lm/W			
MODEL	7E26PAR20D-1	I <sub>max</sub> (cd)	1056	S/MH(C0/180)	0.45
NOMINAL POWER(W)	7	LOR(%)	100.0	S/MH(C90/270)	0.43
RATED VOLTAGE(V)	120	TOTAL FLUX(lm)	274.12	η UP, DN(C0-180)	0.0, 54.2
NOMINAL FLUX(lm)	274.12	CIE CLASS	DIRECT	η UP, DN(C180-360)	0.0, 45.8
LAMPS INSIDE	1	η up(%)	0.0	CIBSE SHR NOM	0.00
TEST VOLTAGE(V)	120.0	η down(%)	100.0	CIBSE SHR MAX	1.00



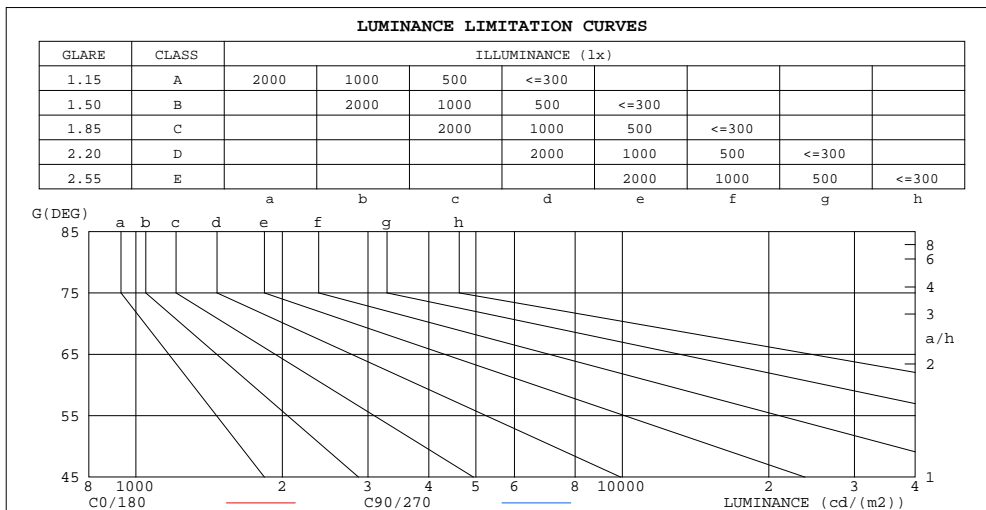
C Range: 0 - 360DEG  
 C Interval: 22.5DEG  
 Test Speed: MEDIUM  
 Temperature:25.2DEG  
 Operators:Katrina  
 Test Date:2011-08-29

γ Range: 0 - 180DEG  
 γ Interval: 1.0DEG  
 Test System:EVERFINE GO-R5000\_V2 SYSTEM V2.0.265  
 Humidity:49.3%  
 Test Distance:2.441m [K=1.0000]  
 Remarks:

**ZONAL FLUX DIAGRAM  
AND LUMINANCE LIMITATION CURVES**

**ZONAL FLUX DIAGRAM:**

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	Φlum,lamp
10	706.3	739.2	677.6	575.6	516.5	499.2	535.1	624.0	0- 10	75.96	75.96	27.7,27.7
20	243.5	251.0	233.1	188.6	164.7	164.8	175.2	210.2	10- 20	100.6	176.6	64.4,64.4
30	74.90	73.43	69.49	54.68	48.87	49.58	52.44	63.45	20- 30	53.14	229.7	83.8,83.8
40	23.65	23.52	22.12	18.62	17.33	17.34	17.99	20.96	30- 40	22.13	251.9	91.9,91.9
50	9.823	9.875	9.612	8.307	7.883	8.109	8.029	9.064	40- 50	10.30	262.1	95.6,95.6
60	5.274	5.229	5.386	4.706	4.483	4.769	4.514	4.975	50- 60	5.877	268.0	97.8,97.8
70	3.115	3.068	3.215	2.717	2.521	2.678	2.507	2.885	60- 70	3.784	271.8	99.2,99.2
80	1.215	1.320	1.275	0.8280	0.5771	0.7651	0.6089	0.9865	70- 80	1.990	273.8	99.9,99.9
90	0	0	0	0	0	0	0	0	80- 90	0.3155	274.1	100,100
100	0	0	0	0	0	0	0	0	90-100	0	274.1	100,100
110	0	0	0	0	0	0	0	0	100-110	0	274.1	100,100
120	0	0	0	0	0	0	0	0	110-120	0	274.1	100,100
130	0	0	0	0	0	0	0	0	120-130	0	274.1	100,100
140	0	0	0	0	0	0	0	0	130-140	0	274.1	100,100
150	0	0	0	0	0	0	0.0000	0	140-150	0.0000	274.1	100,100
160	0	0	0	0	0.0024	0.0029	0.0029	0	150-160	0.0002	274.1	100,100
170	0	0	0.0004	0.0020	0.0042	0.0049	0.0040	0.0031	160-170	0.0003	274.1	100,100
180	0	0	0	0	0	0	0	0	170-180	0.0002	274.1	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

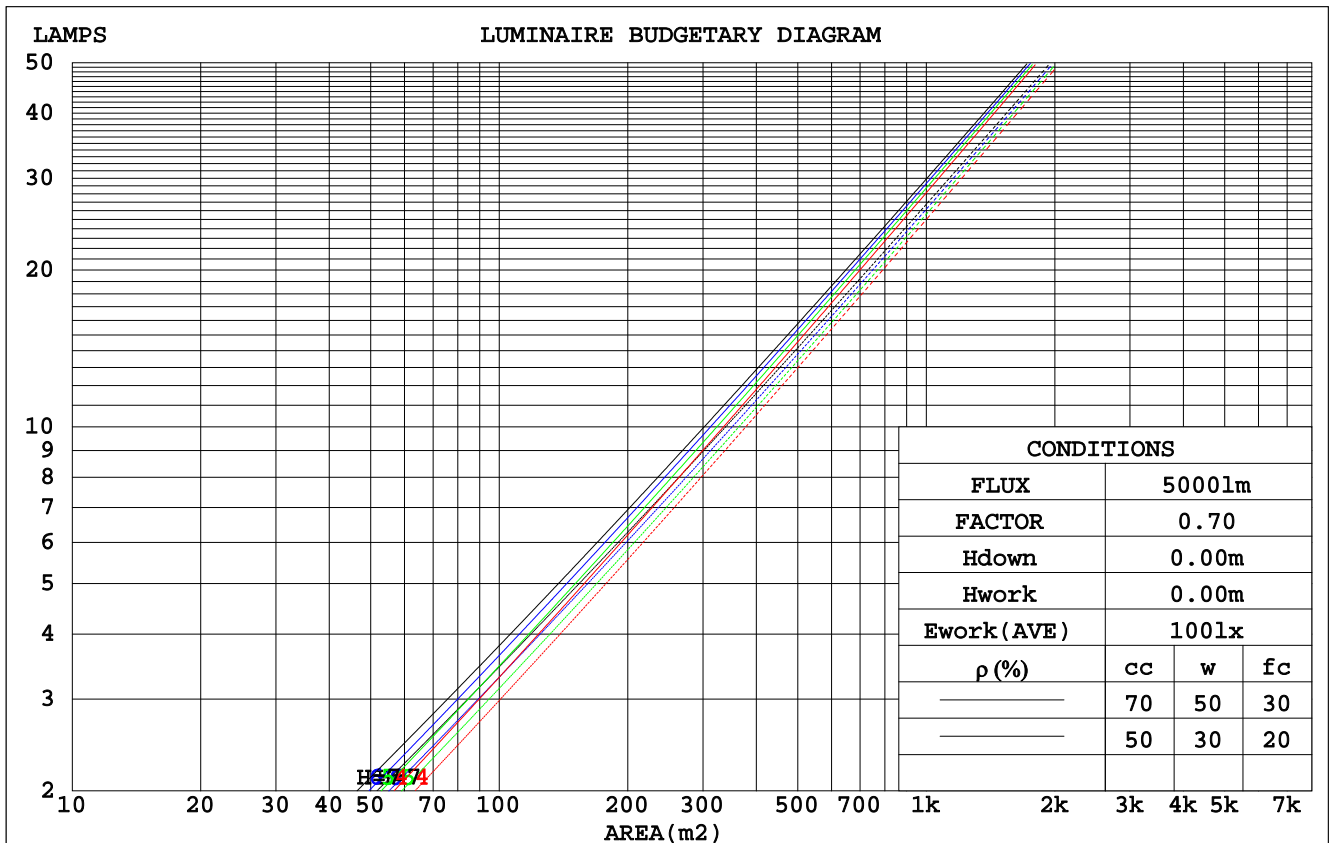


C Range: 0 - 360DEG  
 C Interval: 22.5DEG  
 Test Speed: MEDIUM  
 Temperature:25.2DEG  
 Operators:Katrina  
 Test Date:2011-08-29

γ Range: 0 - 180DEG  
 γ Interval: 1.0DEG  
 Test System:EVERFINE GO-R5000\_V2 SYSTEM V2.0.265  
 Humidity:49.3%  
 Test Distance:2.441m [K=1.0000]  
 Remarks:

CU AND LUMINAIRE BUDGETARY ESTIMATE DIAGRAM

$\rho_{cc}$	80%			70%			50%			30%			10%			0
$\rho_w$	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	0
$\rho_{fc}$	20%			20%			20%			20%			20%			0
RCR	RCR:Room Cavity Ratio						Coefficients of Utilization(CU)									
0.0	1.19	1.19	1.19	1.16	1.16	1.16	1.11	1.11	1.11	1.06	1.06	1.06	1.02	1.02	1.02	.00
1.0	1.12	1.09	1.07	1.09	1.07	1.06	1.05	1.04	1.02	1.02	1.01	.99	.98	.97	.97	.95
2.0	1.05	1.02	.99	1.03	1.00	.97	1.00	.98	.95	.97	.95	.93	.95	.93	.91	.90
3.0	.99	.95	.92	.98	.94	.91	.95	.92	.89	.93	.90	.88	.91	.89	.87	.85
4.0	.94	.90	.86	.93	.89	.86	.91	.87	.85	.89	.86	.84	.88	.85	.83	.81
5.0	.90	.85	.81	.89	.84	.81	.87	.83	.80	.86	.82	.80	.84	.81	.79	.78
6.0	.86	.81	.77	.85	.81	.77	.84	.80	.77	.83	.79	.76	.81	.78	.76	.74
7.0	.82	.77	.74	.82	.77	.74	.81	.76	.73	.80	.76	.73	.79	.75	.73	.72
8.0	.79	.74	.71	.79	.74	.71	.78	.74	.71	.77	.73	.70	.76	.73	.70	.69
9.0	.76	.71	.68	.76	.71	.68	.75	.71	.68	.74	.70	.68	.73	.70	.67	.66
10.0	.74	.69	.66	.73	.69	.66	.73	.68	.66	.72	.68	.65	.71	.68	.65	.64



C Range: 0 - 360DEG  
 C Interval: 22.5DEG  
 Test Speed: MEDIUM  
 Temperature: 25.2DEG  
 Operators: Katrina  
 Test Date: 2011-08-29

$\gamma$  Range: 0 - 180DEG  
 $\gamma$  Interval: 1.0DEG  
 Test System: EVERFINE GO-R5000\_V2 SYSTEM V2.0.265  
 Humidity: 49.3%  
 Test Distance: 2.441m [K=1.0000]  
 Remarks:

WEC AND CCEC

ρcc	80%			70%			50%			30%			10%			0
ρw	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	0
ρfc	20%			20%			20%			20%			20%			0
RCR	RCR:Room Cavity Ratio						Wall Exitance Coefficients(WEC)									
0.0																
1.0	.161	.092	.029	.154	.088	.028	.142	.081	.026	.130	.075	.024	.120	.069	.022	
2.0	.151	.083	.025	.146	.080	.025	.135	.075	.023	.126	.071	.022	.117	.066	.021	
3.0	.142	.075	.023	.137	.073	.022	.128	.070	.021	.120	.066	.020	.113	.062	.019	
4.0	.133	.069	.020	.129	.068	.020	.122	.065	.019	.115	.062	.019	.108	.059	.018	
5.0	.125	.064	.019	.122	.063	.018	.116	.060	.018	.110	.058	.017	.104	.056	.017	
6.0	.119	.059	.017	.116	.058	.017	.110	.056	.016	.105	.054	.016	.100	.053	.016	
7.0	.112	.056	.016	.110	.055	.016	.105	.053	.015	.100	.051	.015	.096	.050	.015	
8.0	.107	.052	.015	.105	.051	.015	.100	.050	.014	.096	.049	.014	.092	.047	.014	
9.0	.102	.049	.014	.100	.049	.014	.096	.047	.013	.092	.046	.013	.089	.045	.013	
10.0	.097	.047	.013	.096	.046	.013	.092	.045	.013	.089	.044	.013	.086	.043	.012	

ρcc	80%			70%			50%			30%			10%			0
ρw	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	0
ρfc	20%			20%			20%			20%			20%			0
RCR	RCR:Room Cavity Ratio						Ceiling Cavity Exitance Coefficients(CCEC)									
0.0	.190	.190	.190	.163	.163	.163	.111	.111	.111	.064	.064	.064	.020	.020	.020	
1.0	.170	.157	.146	.145	.135	.126	.100	.093	.087	.057	.054	.051	.018	.017	.016	
2.0	.154	.133	.115	.131	.114	.099	.090	.079	.069	.052	.046	.041	.017	.015	.013	
3.0	.140	.113	.092	.120	.098	.080	.082	.068	.056	.048	.040	.033	.015	.013	.011	
4.0	.128	.098	.076	.110	.085	.066	.076	.059	.046	.044	.035	.027	.014	.011	.009	
5.0	.118	.086	.063	.102	.075	.055	.070	.052	.039	.041	.031	.023	.013	.010	.008	
6.0	.110	.077	.053	.095	.066	.046	.065	.047	.033	.038	.027	.019	.012	.009	.006	
7.0	.103	.069	.045	.088	.060	.039	.061	.042	.028	.035	.025	.017	.011	.008	.005	
8.0	.096	.062	.039	.083	.054	.034	.057	.038	.024	.033	.022	.014	.011	.007	.005	
9.0	.091	.057	.034	.078	.049	.029	.054	.035	.021	.032	.020	.012	.010	.007	.004	
10.0	.086	.052	.030	.074	.045	.026	.051	.032	.018	.030	.019	.011	.010	.006	.004	

C Range: 0 - 360DEG  
 C Interval: 22.5DEG  
 Test Speed: MEDIUM  
 Temperature:25.2DEG  
 Operators:Katrina  
 Test Date:2011-08-29

γ Range: 0 - 180DEG  
 γ Interval: 1.0DEG  
 Test System:EVERFINE GO-R5000\_V2 SYSTEM V2.0.265  
 Humidity:49.3%  
 Test Distance:2.441m [K=1.0000]  
 Remarks:



## Uncorrected UGR Table

ceiling/cavity	0.7	0.7	0.5	0.5	0.3	0.7	0.7	0.5	0.5	0.3
walls	0.5	0.3	0.5	0.3	0.3	0.5	0.3	0.5	0.3	0.3
working plane	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Room dimensions	Viewed crosswise					Viewed endwise				
x = 2H y = 2H	1.1	1.9	1.4	2.1	2.2	1.0	1.8	1.2	1.9	2.1
3H	1.7	2.5	2.0	2.7	2.8	1.6	2.4	1.9	2.6	2.7
4H	2.0	2.7	2.3	2.9	3.1	1.9	2.6	2.2	2.8	3.1
6H	2.2	2.9	2.5	3.1	3.3	2.1	2.8	2.4	3.0	3.3
8H	2.2	2.9	2.5	3.1	3.4	2.2	2.8	2.5	3.1	3.3
12H	2.3	2.9	2.6	3.1	3.4	2.2	2.8	2.5	3.1	3.4
4H 2H	1.3	2.0	1.6	2.2	2.4	1.1	1.8	1.4	2.1	2.3
3H	2.1	2.7	2.4	3.0	3.2	2.0	2.6	2.3	2.9	3.1
4H	2.5	3.0	2.8	3.3	3.6	2.4	3.0	2.8	3.3	3.6
6H	2.8	3.3	3.1	3.6	3.9	2.7	3.2	3.1	3.6	3.9
8H	2.9	3.3	3.2	3.7	4.0	2.8	3.3	3.2	3.6	4.0
12H	2.9	3.3	3.3	3.7	4.1	2.9	3.3	3.3	3.6	4.0
8H 4H	2.6	3.1	3.0	3.4	3.8	2.5	3.0	2.9	3.4	3.7
6H	3.0	3.4	3.4	3.8	4.2	3.0	3.3	3.4	3.7	4.1
8H	3.1	3.4	3.6	3.9	4.3	3.1	3.4	3.5	3.8	4.3
12H	3.2	3.4	3.6	3.9	4.4	3.1	3.4	3.6	3.9	4.3
12H 4H	2.6	3.0	3.0	3.4	3.8	2.5	2.9	2.9	3.3	3.7
6H	3.0	3.3	3.4	3.7	4.2	3.0	3.3	3.4	3.7	4.2
8H	3.1	3.4	3.6	3.9	4.3	3.1	3.4	3.6	3.8	4.3
Variations with the observer position at spacings:										
S = 1.0H	+ 0.8 / - 1.0					+ 0.7 / - 0.9				
1.5H	+ 1.6 / - 0.8					+ 1.3 / - 0.7				
2.0H	+ 1.3 / - 0.7					+ 1.2 / - 0.6				

CIE Pub.117 Corrected 274.1 lm Total Lamp Luminous Flux.(8log(F/F0) = -4.5)

C Range: 0 - 360DEG  
C Interval: 22.5DEG  
Test Speed: MEDIUM  
Temperature:25.2DEG  
Operators:Katrina  
Test Date:2011-08-29

$\gamma$  Range: 0 - 180DEG  
 $\gamma$  Interval: 1.0DEG  
Test System:EVERFINE GO-R5000\_V2 SYSTEM V2.0.265  
Humidity:49.3%  
Test Distance:2.441m [K=1.0000]  
Remarks:

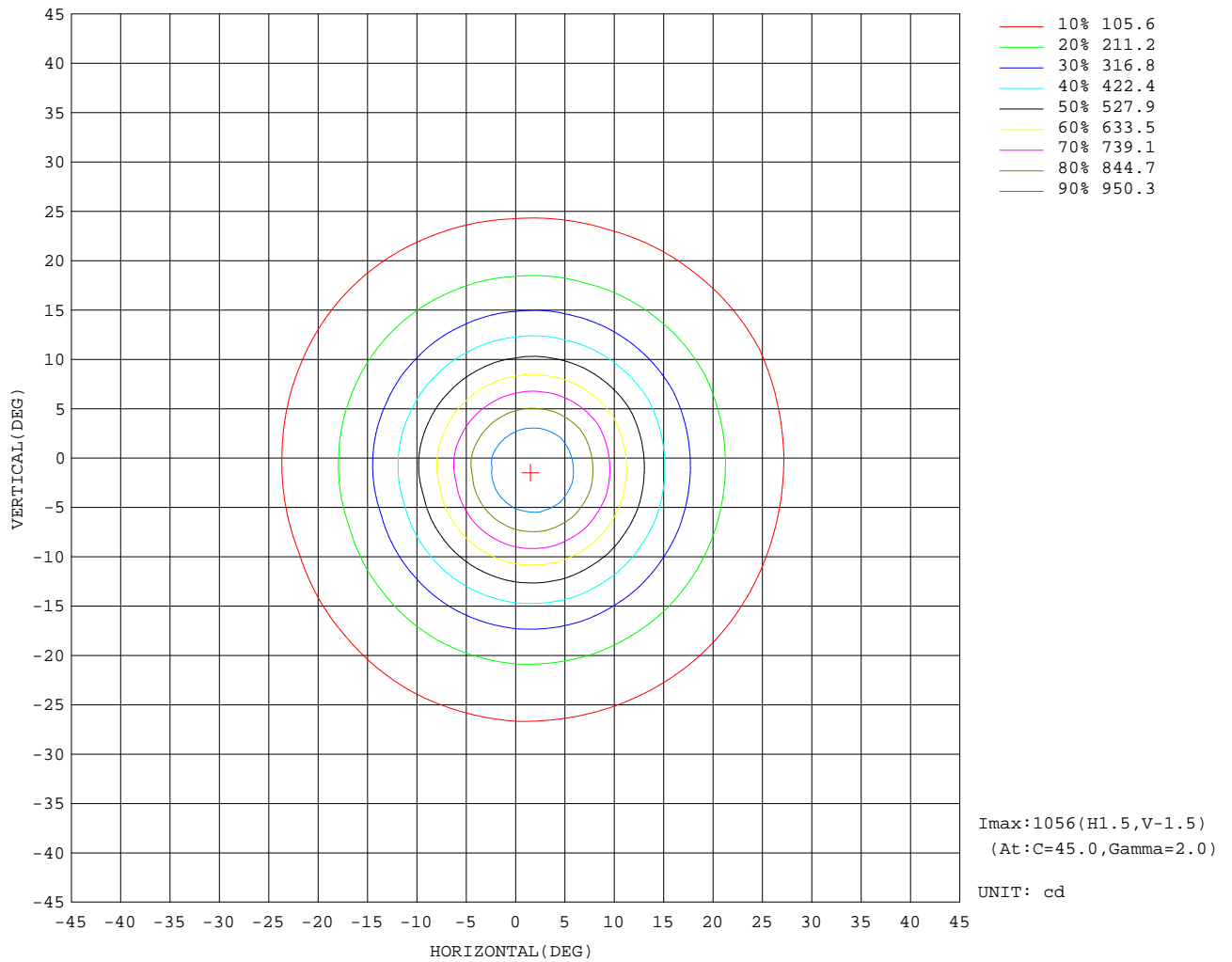
## UTILIZATION FACTORS TABLE

REFLECTANCE										
Ceiling	0.8	0.8	0.8	0.7	0.7	0.7	0.5	0.5	0.5	0
Walls	0.7	0.5	0.3	0.7	0.5	0.3	0.7	0.5	0.3	0
Working plane	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0
ROOM INDEX	UTILIZATION FACTORS(PERCENT) $k(RI) \times RCR = 5$									
$k = 0.60$	87	80	76	86	80	76	85	79	76	72
0.80	94	88	84	93	88	84	92	87	84	80
1.00	98	93	89	98	92	89	96	92	88	84
1.25	102	97	94	101	97	93	99	95	92	88
1.50	105	100	97	104	100	96	102	98	95	91
2.00	108	104	100	107	103	100	104	101	98	93
2.50	110	106	103	108	105	102	105	102	100	94
3.00	111	108	105	110	106	104	106	104	102	95
4.00	114	111	108	111	109	107	108	106	104	97
5.00	115	112	111	113	111	109	109	107	106	98
ROOM INDEX	UF(total)									Direct
According to DIN EN 13032-2 2004			Suspended				SHRNOM = 1.25			

C Range: 0 - 360DEG  
 C Interval: 22.5DEG  
 Test Speed: MEDIUM  
 Temperature: 25.2DEG  
 Operators: Katrina  
 Test Date: 2011-08-29

$\gamma$  Range: 0 - 180DEG  
 $\gamma$  Interval: 1.0DEG  
 Test System: EVERFINE GO-R5000\_V2 SYSTEM V2.0.265  
 Humidity: 49.3%  
 Test Distance: 2.441m [K=1.0000]  
 Remarks:

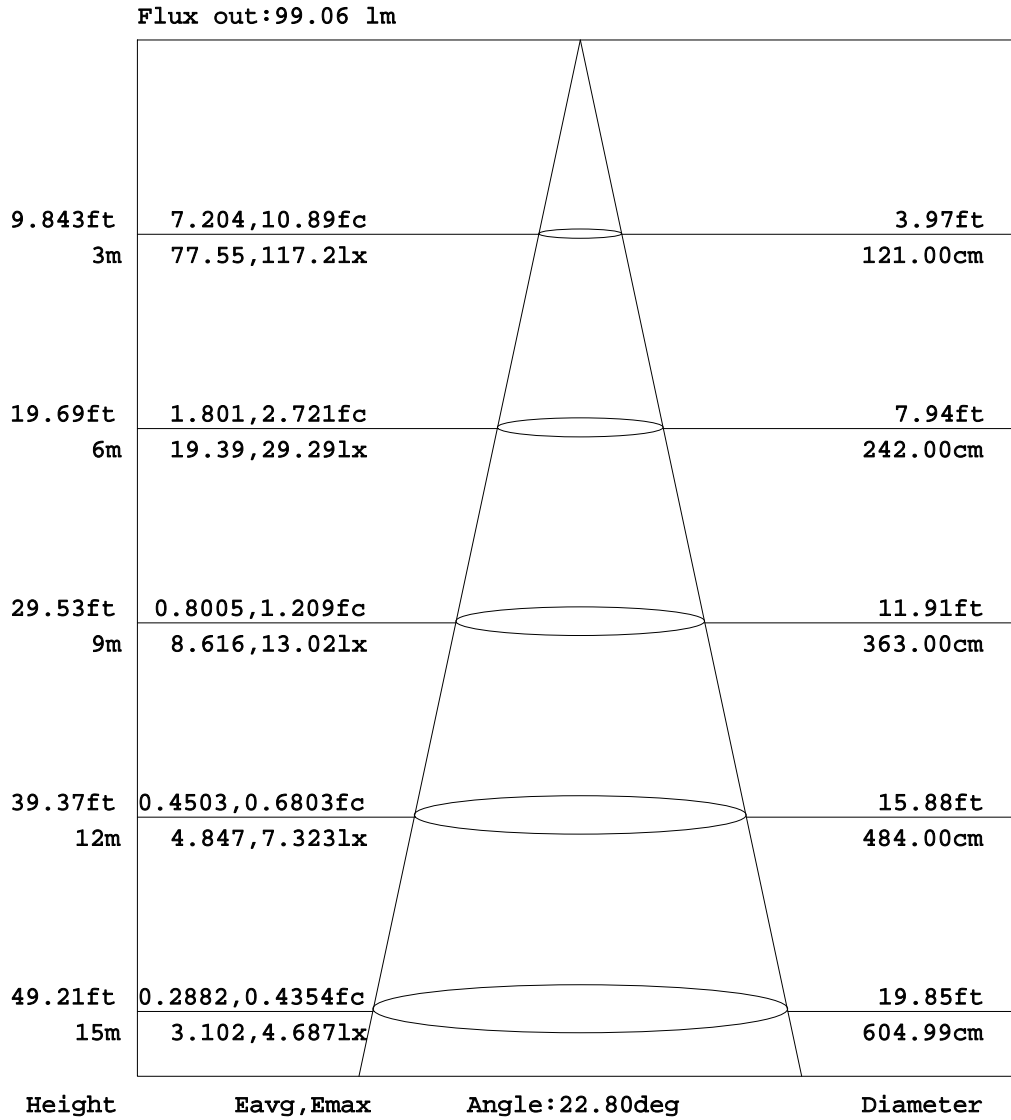
ISOCANDELA DIAGRAM



C Range: 0 - 360DEG  
 C Interval: 22.5DEG  
 Test Speed: MEDIUM  
 Temperature:25.2DEG  
 Operators:Katrina  
 Test Date:2011-08-29

$\gamma$  Range: 0 - 180DEG  
 $\gamma$  Interval: 1.0DEG  
 Test System:EVERFINE GO-R5000\_V2 SYSTEM V2.0.265  
 Humidity:49.3%  
 Test Distance:2.441m [K=1.0000]  
 Remarks:

AAI Figure

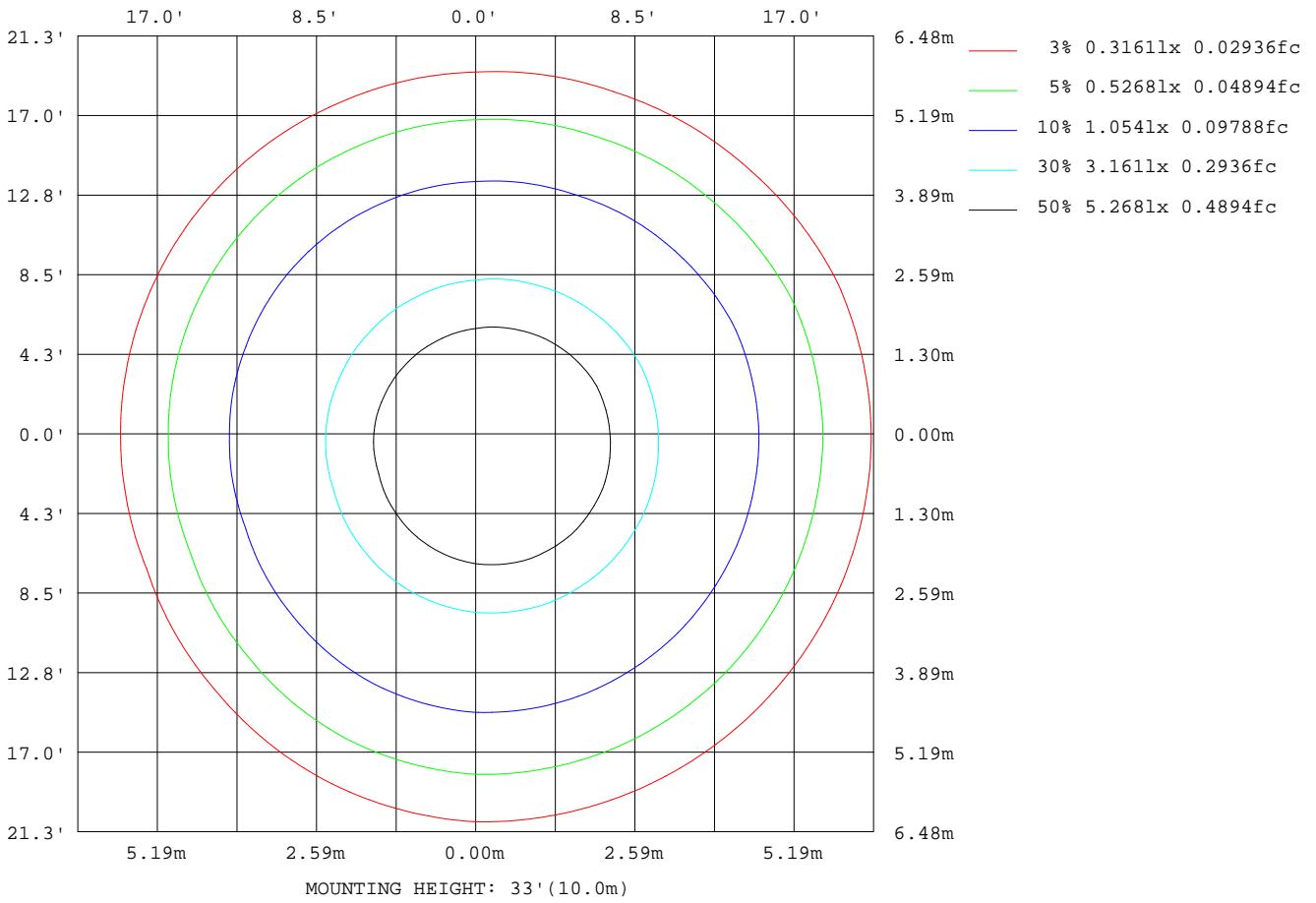


Note:The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

C Range: 0 - 360DEG  
 C Interval: 22.5DEG  
 Test Speed: MEDIUM  
 Temperature:25.2DEG  
 Operators:Katrina  
 Test Date:2011-08-29

γ Range: 0 - 180DEG  
 γ Interval: 1.0DEG  
 Test System:EVERFINE GO-R5000\_V2 SYSTEM V2.0.265  
 Humidity:49.3%  
 Test Distance:2.441m [K=1.0000]  
 Remarks:

ISOLUX DIAGRAM



C Range: 0 - 360DEG  
C Interval: 22.5DEG  
Test Speed: MEDIUM  
Temperature: 25.2DEG  
Operators: Katrina  
Test Date: 2011-08-29

$\gamma$  Range: 0 - 180DEG  
 $\gamma$  Interval: 1.0DEG  
Test System: EVERFINE GO-R5000\_V2 SYSTEM V2.0.265  
Humidity: 49.3%  
Test Distance: 2.441m [K=1.0000]  
Remarks:

Average Luminance Table(CIBSE)

Parameter description for average Luminance	Symbol	Value	Unit
Luminance in Azimuth Plane	Bc	refer Table 2	cd/sq.m.
Intensity at angle Gamma in given azimuth plane	I	from data	cd/klm
Number of lamps	N	1	
Output of each lamp(initial lumens as specified)	F	274.12	lm
Multiplying factor	K	1	
Luminous area in horizontal plane used in calculations	A	0.1	sq.m.
Angle to the downward vertical from light centre	Gamma	from data	deg

Table 1. Calculation parameters for determination of CIBSE LG3:1996 Average Luminance

G deg	C plane(deg)																		
	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
55	122	123	123	121	119	117	116	115	114	113	111	110	109	107	106	104	102	102	102
60	105	106	106	105	103	101	100	100	99	99	98	97	96	95	94	92	91	90	90
65	97	97	97	96	94	93	91	91	91	90	90	89	89	88	86	84	82	82	82
70	91	92	92	90	88	86	85	84	84	84	83	81	81	79	78	76	74	74	74
75	83	84	84	83	80	78	77	76	75	74	72	70	69	67	65	63	62	61	61
80	70	72	72	71	68	65	61	58	56	54	53	52	50	47	44	40	36	34	33
85	46	47	45	40	32	27	25	25	25	25	21	16	11	7	3	2	1	0	0

Table 2. Average Luminance(cd/sq.m.) for defined C plane,Gamma angle

CIBSE Category	Gamma (deg)	Average Luminance		Patch Luminance	
		maximum	specified	maximum	specified
		calculated	maximum	measured	maximum
Category 1	55 to 90	123	200	---	500
Category 2	65 to 90	97	200	---	500
Category 3	75 to 90	84	200	---	500

Table 3. Tabulation of Average and Patch Luminance(cd/sq.m.) for defined CIBSE categories

No match

C Range: 0 - 360DEG  
 C Interval: 22.5DEG  
 Test Speed: MEDIUM  
 Temperature:25.2DEG  
 Operators:Katrina  
 Test Date:2011-08-29

γ Range: 0 - 180DEG  
 γ Interval: 1.0DEG  
 Test System:EVERFINE GO-R5000\_V2 SYSTEM V2.0.265  
 Humidity:49.3%  
 Test Distance:2.441m [K=1.0000]  
 Remarks:

Average Luminance Table(CIBSE)

Parameter description for average Luminance	Symbol	Value	Unit
Luminance in Azimuth Plane	Bc	refer Table 2	cd/sq.m.
Intensity at angle Gamma in given azimuth plane	I	from data	cd/klm
Number of lamps	N	1	
Output of each lamp(initial lumens as specified)	F	274.12	lm
Multiplying factor	K	1	
Luminous area in horizontal plane used in calculations	A	0.1	sq.m.
Angle to the downward vertical from light centre	Gamma	from data	deg

Table 1. Calculation parameters for determination of CIBSE LG3:2001 Average Luminance

G deg	C plane(deg)																		
	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
55	122	123	123	121	119	117	116	115	114	113	111	110	109	107	106	104	102	102	102
60	105	106	106	105	103	101	100	100	99	99	98	97	96	95	94	92	91	90	90
65	97	97	97	96	94	93	91	91	91	90	90	89	89	88	86	84	82	82	82
70	91	92	92	90	88	86	85	84	84	84	83	81	81	79	78	76	74	74	74
75	83	84	84	83	80	78	77	76	75	74	72	70	69	67	65	63	62	61	61
80	70	72	72	71	68	65	61	58	56	54	53	52	50	47	44	40	36	34	33
85	46	47	45	40	32	27	25	25	25	25	21	16	11	7	3	2	1	0	0

Table 2. Average Luminance(cd/sq.m.) for defined C plane,Gamma angle

range (deg)	Maximum measured	Average Luminance(cd/sq.m)			
		Maximum limit for screen type & software category used			
		Type I,II screen Some neg.s'ware	Type I,II screen Only pos.s'ware	Type III screen Some neg.s'ware	Type III screen Only pos.s'ware
55 to 90	123	1000	1500	200	500
65 to 90	97	1000	1500	200	500

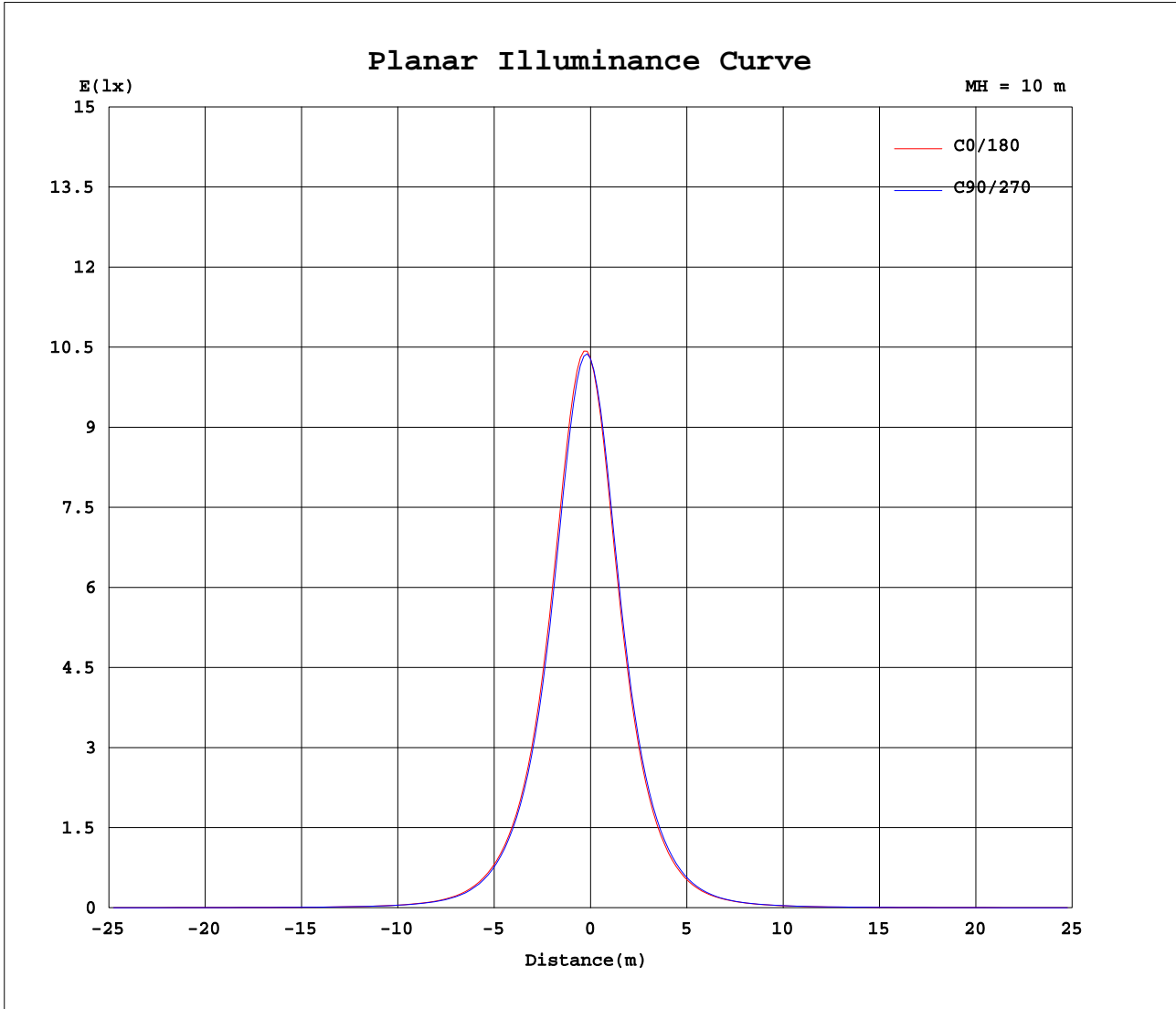
Table 3. Tabulation of average luminance(cd/sq.m.) and luminance limits

The luminaire satisfies the specified luminance criteria for Negative Software with Type I & II Screen(Good to Moderate treatment).

C Range: 0 - 360DEG  
 C Interval: 22.5DEG  
 Test Speed: MEDIUM  
 Temperature:25.2DEG  
 Operators:Katrina  
 Test Date:2011-08-29

γ Range: 0 - 180DEG  
 γ Interval: 1.0DEG  
 Test System:EVERFINE GO-R5000\_V2 SYSTEM V2.0.265  
 Humidity:49.3%  
 Test Distance:2.441m [K=1.0000]  
 Remarks:

Planar Illuminance Curve



C Range: 0 - 360DEG  
C Interval: 22.5DEG  
Test Speed: MEDIUM  
Temperature: 25.2DEG  
Operators: Katrina  
Test Date: 2011-08-29

$\gamma$  Range: 0 - 180DEG  
 $\gamma$  Interval: 1.0DEG  
Test System: EVERFINE GO-R5000\_V2 SYSTEM V2.0.265  
Humidity: 49.3%  
Test Distance: 2.441m [K=1.0000]  
Remarks:



LUMINOUS DISTRIBUTION INTENSITY DATA

Table--1

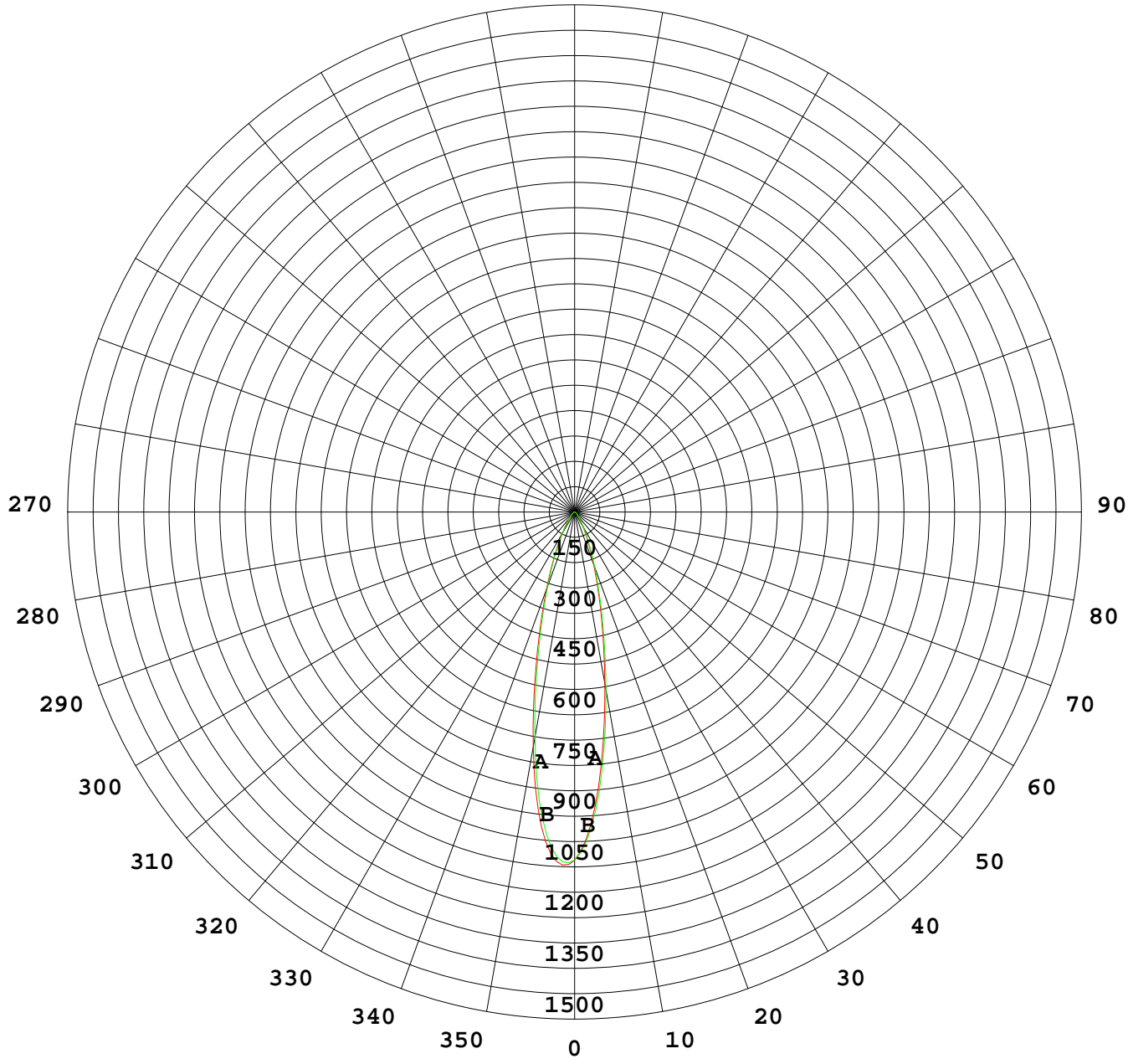
UNIT: cd

C(DEG) γ (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338			
0	1030	1030	1030	1029	1029	1027	1027	1025	1030	1030	1030	1029	1029	1027	1027	1025			
5	980	1002	1007	989	957	914	870	829	815	798	796	807	832	869	911	954			
10	706	734	739	719	678	626	576	532	517	502	499	511	535	574	624	678			
15	427	443	445	433	407	373	338	307	297	289	290	297	311	336	371	408			
20	244	250	251	246	233	213	189	170	165	163	165	168	175	189	210	233			
25	137	138	137	134	130	117	102	91.4	89.5	89.7	91.2	92.9	96.2	104	117	132			
30	74.9	74.3	73.4	71.6	69.5	63.2	54.7	49.2	48.9	49.0	49.6	50.5	52.4	56.5	63.4	72.3			
35	40.8	41.0	40.0	38.8	37.7	34.3	30.6	28.0	28.2	27.9	28.0	28.3	29.6	32.0	35.3	39.5			
40	23.6	24.0	23.5	22.9	22.1	20.5	18.6	17.3	17.3	17.1	17.3	17.2	18.0	19.4	21.0	22.9			
45	14.7	15.0	14.8	14.5	14.1	13.2	12.1	11.3	11.3	11.3	11.4	11.3	11.6	12.4	13.4	14.5			
50	9.82	9.94	9.88	9.78	9.61	9.08	8.31	7.86	7.88	8.00	8.11	7.92	8.03	8.46	9.06	9.69			
55	7.01	7.04	6.99	7.02	7.03	6.67	6.12	5.79	5.84	5.98	6.10	5.90	5.90	6.17	6.56	7.01			
60	5.27	5.25	5.23	5.30	5.39	5.13	4.71	4.45	4.48	4.64	4.77	4.54	4.51	4.69	4.97	5.33			
65	4.09	4.03	4.03	4.11	4.21	4.01	3.66	3.41	3.44	3.58	3.72	3.50	3.43	3.58	3.85	4.16			
70	3.11	3.07	3.07	3.15	3.21	3.04	2.72	2.52	2.52	2.55	2.68	2.52	2.51	2.63	2.88	3.19			
75	2.14	2.19	2.20	2.21	2.21	2.06	1.77	1.65	1.58	1.56	1.65	1.56	1.62	1.75	1.90	2.15			
80	1.21	1.26	1.32	1.25	1.28	1.13	0.83	0.60	0.58	0.68	0.77	0.65	0.61	0.77	0.99	1.24			
85	0.40	0.34	0.31	0.36	0.42	0.26	0.08	0.02	0.00	0.00	0.00	0.00	0.02	0.06	0.19	0.44			
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
105	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
175	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			

C Range: 0 - 360DEG  
 C Interval: 22.5DEG  
 Test Speed: MEDIUM  
 Temperature: 25.2DEG  
 Operators: Katrina  
 Test Date: 2011-08-29

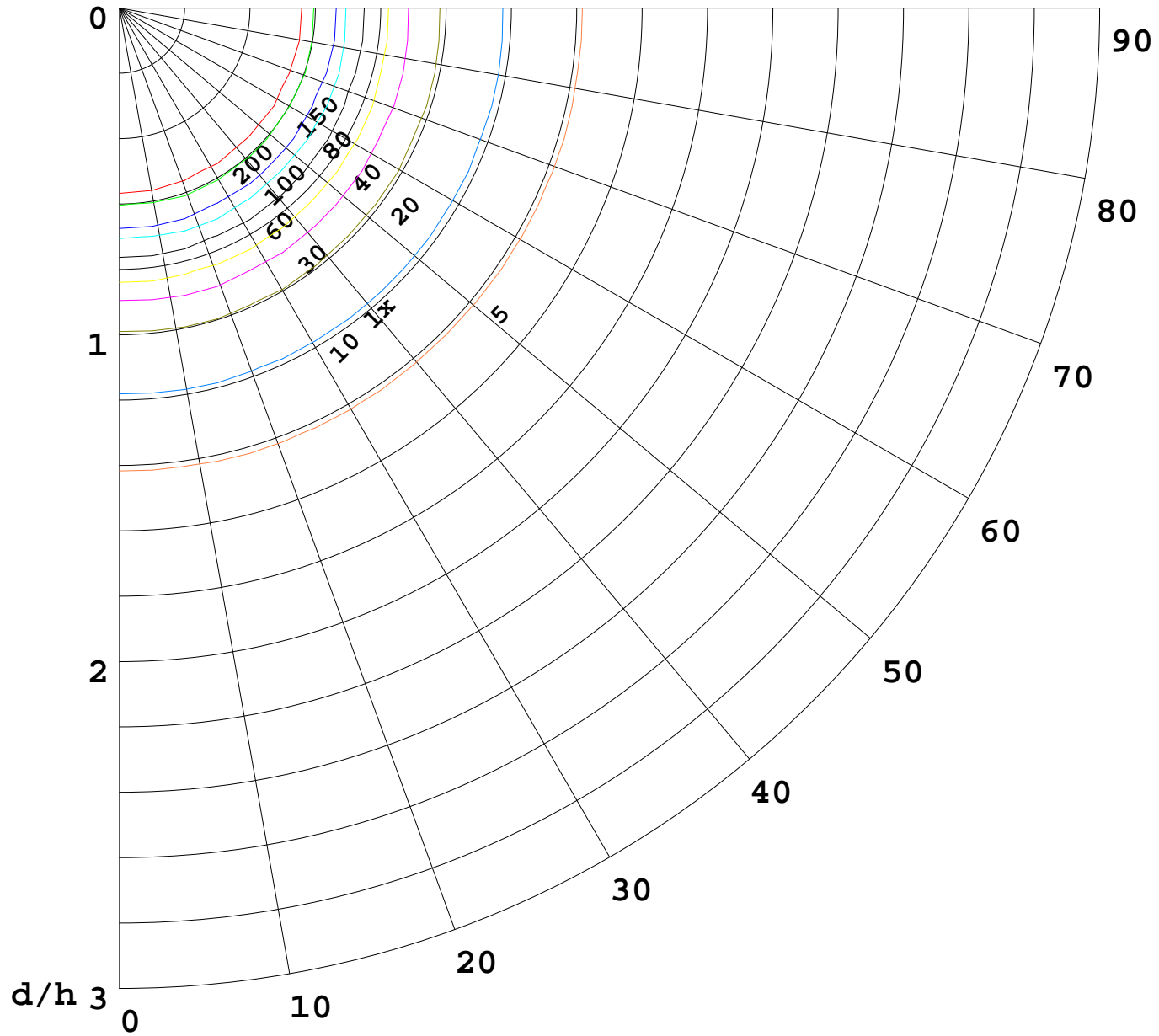
γ Range: 0 - 180DEG  
 γ Interval: 1.0DEG  
 Test System: EVERFINE GO-R5000\_V2 SYSTEM V2.0.265  
 Humidity: 49.3%  
 Test Distance: 2.441m [K=1.0000]  
 Remarks:

I (cd)



1000 lm

$K = 1$



**F** = 5000 lm  
**K** = 0.7  
**Hcc** = 0.0 m  
**Hfc** = 0.0 m  
**Eave** = 100 lx

	<b>Pcc</b>	<b>Pw</b>	<b>Pfc</b>
—————	70	50	30
—————	50	30	20

