DLC V4.2TEST REPORT

Applicant's name .....:	Shanghai Supertek Lighting Co., Ltd.
Address .....:	No.455,laodongRoad,caowang industrial Zone,Jiading District,shanghai
Brand Name.....:	SUPERTEK
Report No......:	BTR66.181.16.0031.33
Product Name.....:	Architectural Flood and Spot Luminaires
Model .....:	FL31A-20-4000K; FL31A-20-5000K
Tested by (printed name and signature) .....:	David Zhang
Title .....:	**Test Engineer**
Approved by (printed name and signature) .....:	Steven Huo
Title .....:	**Approved Signatory**
Date of issue .....:	May 25, 2017
Testing Laboratory Name .....:	BEST Test Service Shenzhen Co., Ltd.
Address .....:	1st Floor, 1st Building, Weitai Industrial Park, Yingrenshi, Shiyan, Baoan, Shenzhen, China TEL: + 86-755-28236006; FAX: + 86-755-23467087 Email: certification@bestcert.cn
Accrediation .....:	DLC/Lighting Facts/UL/ETL/ELI/CEC/EPA/DOE NVLAP Testing Lab Code: 200770-0
Test specification	
Standard .....:	DLC V4.2
Test procedure .....:	DLC Test Procedure
Non-standard test method .....:	No
Test Report Form No.	BEST_ DLC-V4.2
TRF originator.....:	BEST Test Service Shenzhen Co., Ltd. Mr Tseng
Master TRF .....:	BEST_DLC V4.2.doc

Note:

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Product description:		
Sample received date .....:	May 16, 2017	
Tested date .....:	May 16, 2017 to May 25, 2017	
Sample Quantity .....:	1 pcs per model	
Model Number .....:	FL31A-20-4000K; FL31A-20-5000K	
Rating(s) (V; Hz) .....:	120V-277VAC	
Nominal Power.....:	20W	
Nominal Power Factor .....:	N/A	
Nominal Lumen Output.....:	2020lm; 2080lm	
Nominal CCT .....:	4000K; 5000K	
Nominal CRI(Ra) .....:	⩾80	
Nominal Life.....:	50000H	
Product Classification .....:	☐Premium	☒Standard
Category.....:	☐Indoor	☐Indoor Retrofit Kit
	☒Outdoor	☐Outdoor Retrofit Kit
	☐Linear Replacement Lamp	☐E39 Replacements for HID Lamps
	☐Four Pin-Base Replacement Lamps for CFLs	
General Applicant .....:	Outdoor –Low Output	
Primary use .....:	Architectural Flood and Spot Luminaires	
Dimmable .....:	☒Yes,	☐No
If Yes, Select Dimming Mechanism...:	☒Continuous dimming,	☐Step dimming
If Yes, Mini Dimming Level .....:	10%	
Integral Controller .....:	☒Yes,	☐No
LED Lighting Source Manufacture.....:	Philips Lumileds	
LED Lighting Source Model .....:	LUXEON 3030 2D	
LED Driver Brand.....:	N/A	
LED Driver Model Number.....	N/A	
Maximum Recommended Temperature (ºC) During Normal Operation .....:	N/A	
Fixtures Band (Retrofit Kit/Lamp Only) .....:	N/A	
Fixtures Model No. (Retrofit Kit/Lamp Only) .....:	N/A	

Test Method Description

ANSI C78.376-2001 Specifications for the Chromaticity of Fluorescent Lamps
ANSI C78.377-2015 Specifications for the Chromaticity of Solid State Lighting Products
ANSI/NEMA/ANSLG C78.377-2011 Specifications for the Chromaticity of Solid State Lighting Products
ANSI C78.5-2003 Specifications for Performance of Self-ballasted Compact Fluorescent Lamps
ANSI/ANSLG C78.81-2010 Double-Capped Fluorescent Lamps—Dimensional and Electrical Characteristics
ANSI C78.901-2014 Single-Based Fluorescent Lamps—Dimensional and Electrical Characteristics
ANSI/ANSLG C81.61-2009 Specifications for Bases (Caps) for Electric Lamps
ANSI/ANSLG C81.62-2009 Lamp holders for Electric Lamps
ANSI C82.11-2011High-Frequency Fluorescent Lamp Ballasts
ANSI/ANSLG C82.16-2015 (anticipated) Light Emitting Diode Drivers—Methods of Measurement
ANSI C82.2-2002 Method of Measurement of Fluorescent Lamp Ballasts
ANSI C82.77-10:2014 Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment
ANSI/IEEE C62.41.1-2002 IEEE Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits
ANSI/IEEE C62.41.2-2002 IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000V and Less) AC Power Circuits
ANSI/UL 153-2002 Standard for Safety of Portable Electric Luminaires
ANSI/UL 935-2009 Standard for Safety of Fluorescent-Lamp Ballasts
ANSI/UL 1310-2010 Standard for Safety of Class 2 Power Units
ANSI/UL 1574-2004 Standard for Safety of Track Lighting Systems
ANSI/UL 1598-2008 Standard for Safety of Luminaires
ANSI/UL 1598C Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits
ANSI/UL 1598B-2010 Standard for Supplemental Requirements for Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires
ANSI/UL 1993-2009 Standard for Safety of Self-Ballasted Lamps and Lamp Adapters
ANSI/UL 2108-2004 Standard for Low-Voltage Lighting Systems
ANSI/UL 8750-2009 Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products
ASTM E283-04 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
CIE Pub. No. 13.3-1995 Method of Measuring and Specifying Color Rendering of Light Sources
CIE Pub. No. 15:2004 Colorimetry
EU Directive 2002/95/EC Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the Restriction of the Use of Certain Hazardous Substances In Electrical and Electronic Equipment
FCC CFR Title 47 Part 15 Radio Frequency Devices
FCC CFR Title 47 Part 18 Industrial, Scientific, and Medical Equipment
IEC 60061-1 (2012) Lamp Caps and Holders Together with Gauges for the Control of Interchangeability and Safety – Part 1: Lamp Caps
IEC 60081 Amend 4 Ed 5.0 (2010) Double-capped Fluorescent Lamps - Performance Specifications
IEC 60901 (2011) Single-capped Fluorescent Lamps - Performance Specifications
IEC 62301 ED.2.0 B:2011 Household electrical appliances - Measurement of standby power
IEC 61347-2-3-am2 ed1.0 b.2011 Amendment 2 - Lamp Control Gear - Part 2-3: Particular Requirements for A.C. Supplied Electronic Ballasts for Fluorescent Lamps
IEC 62321 Ed. 1.0 Electrotechnical Products - Determination Of Levels Of Six Regulated Substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers)
IEEE PAR1789 IEEE Recommending Practices for Modulating Current in High Brightness LEDs for Mitigating Health Risks to Viewers
IES LM-9-09 Electric and Photometric Measurements of Fluorescent Lamps
IES LM-10-96 or LM-10-XX Photometric Testing of Outdoor Fluorescent Luminaires (2015 update anticipated)
IES LM-31-95 Photometric Testing of Roadway Luminaires Using Incandescent Filament and High Intensity Discharge (HID) Lamps
IES LM-40-10 Life Testing of Fluorescent Lamps
IES LM-41-14 Approved Method for Photometric Testing of Indoor Fluorescent Luminaries
IES LM-46-04 Photometric Testing of Indoor Luminaires Using High Intensity Discharge or Incandescent Filament Lamps
IES LM-49-12 Life Testing of Incandescent Filament Lamps
IES LM-58-13 Method for Spectroradiometric Measurement Methods for Light Sources
IES LM-65-14 Life Testing of Compact Fluorescent Lamps
IES LM-66-14 Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps
IES LM-79-08 Electrical and Photometric Measurements of Solid-State Lighting Products
IES LM-80-08 Measuring Lumen Maintenance of LED Light Sources
IES LM-82-12 Method for the Characterization of LED Light Engines and Integrated LED Lamps for Electrical and Photometric Properties as a Function of Temperature
IES LM-84-14 Measuring Luminous Flux and Color Maintenance of LED Lamps, Light Engines, and Luminaires
IES RP-16-10 Nomenclature and Definitions for Illuminating Engineering
IES TM-21-11 Projecting Long Term Lumen Maintenance of LED Sources
IES TM-28-14 Projecting Long-Term Luminous Flux Maintenance of LED Lamps and Luminaries
NEMA LL 9-2009 Dimming of T8 Fluorescent Lighting Systems
NEMA LSD 45-2009 Recommendations for Solid State Lighting Sub-Assembly Interfaces for Luminaires
NEMA SSL 7A-2013 Phase Cut Dimming for Solid State Lighting: Basic Compatibility

Initial Photometric and Electrical Test Data

EUT	Input Voltage (V)	Frequency (Hz)	Input Current (A)	ITHD	Input Power (W)	Power Factor	Lumen Output (Lumens)	Efficiency Lumen/w
FL31A-20-4000K	120.0	60.0	0.162	7.9%	19.24	0.989	2030.11	105.52
FL31A-20-4000K	277.0	60.0	0.082	18.0%	20.39	0.900	/	/
FL31A-20-5000K	120.0	60.0	0.163	8.0%	19.37	0.988	/	/
FL31A-20-5000K	277.0	60.0	0.083	17.9%	20.56	0.897 (3% tolerance)	/	/

EUT	CCT (K)	CRI Ra	R9	x CIE1931	y CIE1931
FL31A-20-4000K	4082	82.3	9	0.3779	0.3785
FL31A-20-5000K	5300	83.4	9	0.3374	0.3562

EUT	u' CIE1976	v' CIE1976	Duv	Rf	Rg
FL31A-20-4000K	0.2228	0.5020	0.0016	82	96
FL31A-20-5000K	0.2045	0.4858	0.0055	82	94

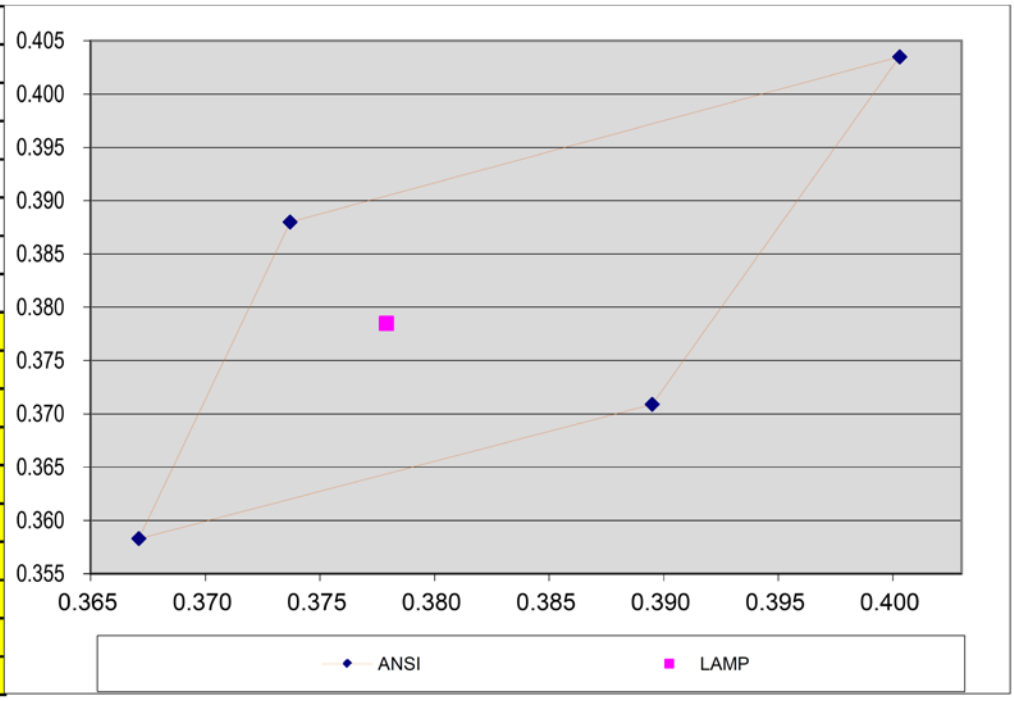
EUT	Zonal Lumen Density zone (0-90°)
FL31A-20-4000K	99.7%

Note:
1. See the annex of Luminous Intensity Distribution Test Plots

7 Step Quadrangle

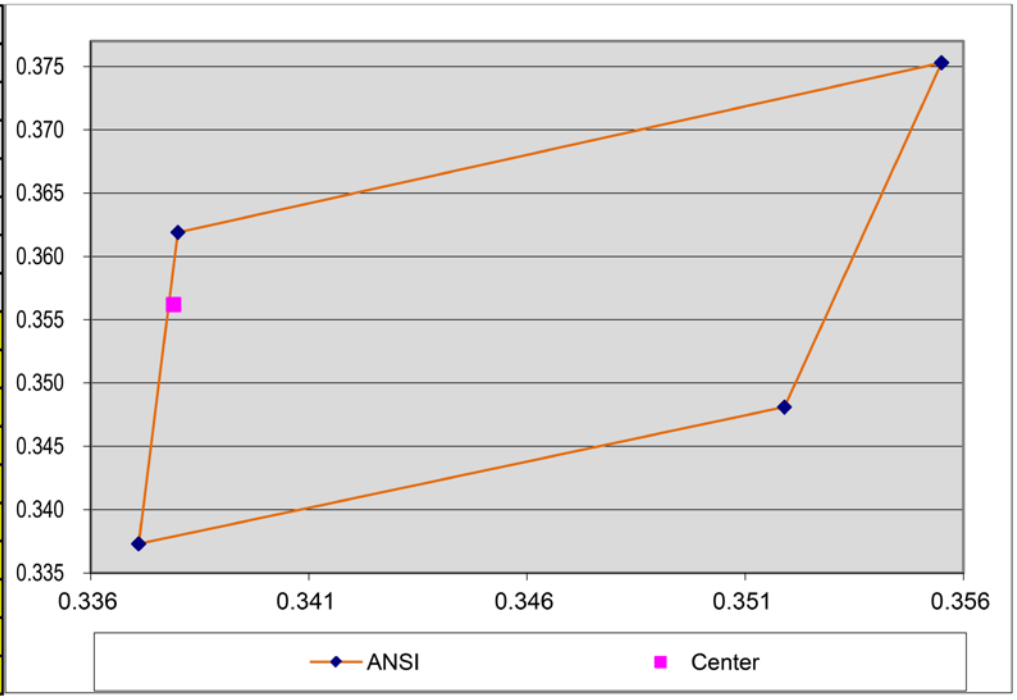
FL31A-20-4000K

	4100K quadrangle	
	x	y
ANSI 78.377-2015	0.4003	0.4035
	0.3737	0.3880
	0.3671	0.3583
	0.3895	0.3709
	0.4003	0.4035
Center		
1	0.3779	0.3785
2		
3		
4		
5		
6		
7		
8		
9		
10		



FL31A-20-5000K

	5000K Quadrangle	
	x	y
ANSI 78.377-2015	0.3550	0.3753
	0.3375	0.3619
	0.3366	0.3373
	0.3514	0.3481
	0.3550	0.3753
Center		
1	0.3374	0.3562
2		
3		
4		
5		
6		
7		
8		
9		
10		



Spectral Energy Distribution

FL31A-20-4000K

WL(nm)	Spectrum	Spectrum	WL(nm)	Spectrum	Spectrum
380	0.0261	0.9546	585	0.8332	30.5000
385	0.0140	0.5126	590	0.8402	30.7500
390	0.0085	0.3116	595	0.8420	30.8200
395	0.0077	0.2829	600	0.8336	30.5100
400	0.0068	0.2485	605	0.8187	29.9700
405	0.0090	0.3287	610	0.7971	29.1800
410	0.0161	0.5904	615	0.7675	28.0900
415	0.0326	1.1930	620	0.7307	26.7400
420	0.0604	2.2090	625	0.6870	25.1400
425	0.1093	3.9990	630	0.6415	23.4800
430	0.1890	6.9170	635	0.5930	21.7000
435	0.3238	11.8500	640	0.5439	19.9100
440	0.5625	20.5900	645	0.4949	18.1200
445	0.8974	32.8500	650	0.4462	16.3300
450	0.9606	35.1600	655	0.4005	14.6600
455	0.6501	23.7900	660	0.3555	13.0100
460	0.4680	17.1300	665	0.3149	11.5200
465	0.3702	13.5500	670	0.2766	10.1300
470	0.2659	9.7320	675	0.2416	8.8440
475	0.2199	8.0470	680	0.2103	7.6960
480	0.2217	8.1150	685	0.1830	6.6990
485	0.2441	8.9350	690	0.1584	5.7970
490	0.2888	10.5700	695	0.1370	5.0140
495	0.3516	12.8700	700	0.1178	4.3120
500	0.4180	15.3000	705	0.1011	3.6990
505	0.4769	17.4600	710	0.0868	3.1770
510	0.5248	19.2100	715	0.0746	2.7290
515	0.5644	20.6600	720	0.0643	2.3520
520	0.5941	21.7400	725	0.0549	2.0100
525	0.6170	22.5800	730	0.0469	1.7160
530	0.6356	23.2600	735	0.0405	1.4820
535	0.6525	23.8800	740	0.0346	1.2670
540	0.6706	24.5500	745	0.0298	1.0900
545	0.6884	25.2000	750	0.0257	0.9421
550	0.7075	25.9000	755	0.0225	0.8227
555	0.7277	26.6300	760	0.0194	0.7117
560	0.7493	27.4200	765	0.0167	0.6109
565	0.7694	28.1600	770	0.0145	0.5311
570	0.7888	28.8700	775	0.0128	0.4687
575	0.8073	29.5500	780	0.0115	0.4202
580	0.8226	30.1100			

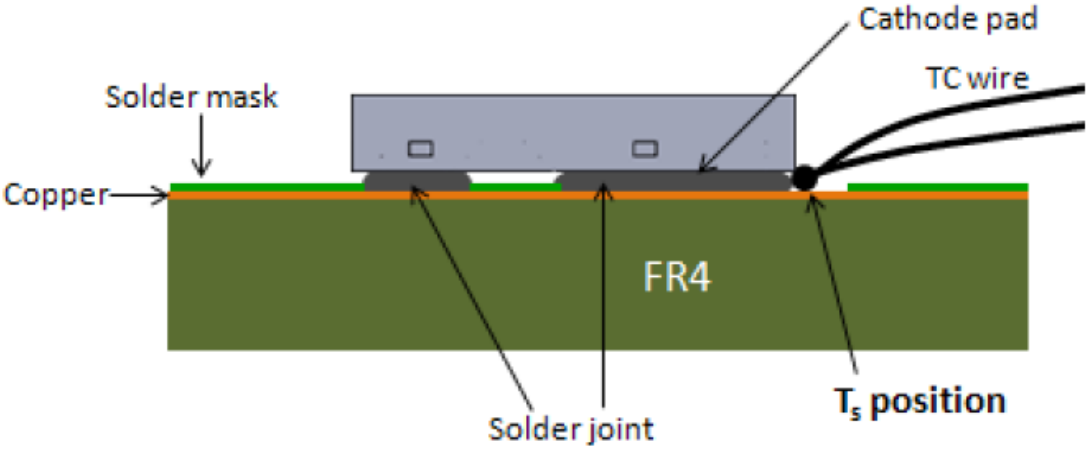
FL31A-20-5000K

WL(nm)	Spectrum	Spectrum	WL(nm)	Spectrum	Spectrum
380	0.0165	0.7376	585	0.5599	25.0800
385	0.0126	0.5638	590	0.5534	24.7900
390	0.0091	0.4083	595	0.5450	24.4100
395	0.0066	0.2964	600	0.5330	23.8800
400	0.0063	0.2800	605	0.5168	23.1500
405	0.0064	0.2888	610	0.4965	22.2400
410	0.0080	0.3586	615	0.4736	21.2200
415	0.0133	0.5936	620	0.4469	20.0200
420	0.0238	1.0680	625	0.4179	18.7200
425	0.0451	2.0200	630	0.3865	17.3100
430	0.0840	3.7630	635	0.3555	15.9200
435	0.1556	6.9710	640	0.3249	14.5500
440	0.2892	12.9500	645	0.2943	13.1800
445	0.5358	24.0000	650	0.2651	11.8800
450	0.8792	39.3800	655	0.2368	10.6100
455	0.9854	44.1400	660	0.2102	9.4150
460	0.7524	33.7000	665	0.1859	8.3250
465	0.5597	25.0700	670	0.1630	7.3030
470	0.4511	20.2100	675	0.1426	6.3870
475	0.3426	15.3500	680	0.1236	5.5350
480	0.2797	12.5300	685	0.1079	4.8350
485	0.2678	11.9900	690	0.0933	4.1790
490	0.2794	12.5200	695	0.0806	3.6120
495	0.3084	13.8200	700	0.0692	3.1000
500	0.3504	15.7000	705	0.0592	2.6530
505	0.3949	17.6900	710	0.0511	2.2910
510	0.4352	19.4900	715	0.0439	1.9690
515	0.4673	20.9300	720	0.0378	1.6910
520	0.4917	22.0300	725	0.0326	1.4590
525	0.5111	22.8900	730	0.0275	1.2310
530	0.5240	23.4700	735	0.0240	1.0750
535	0.5340	23.9200	740	0.0206	0.9219
540	0.5412	24.2400	745	0.0178	0.7967
545	0.5485	24.5700	750	0.0154	0.6899
550	0.5533	24.7800	755	0.0134	0.6003
555	0.5586	25.0200	760	0.0117	0.5233
560	0.5610	25.1300	765	0.0100	0.4474
565	0.5646	25.2900	770	0.0087	0.3903
570	0.5660	25.3500	775	0.0076	0.3402
575	0.5652	25.3200	780	0.0070	0.3157
580	0.5630	25.2200			

Driver Case Temperature/ LED Drive Current/TMP_{LED} Test Data

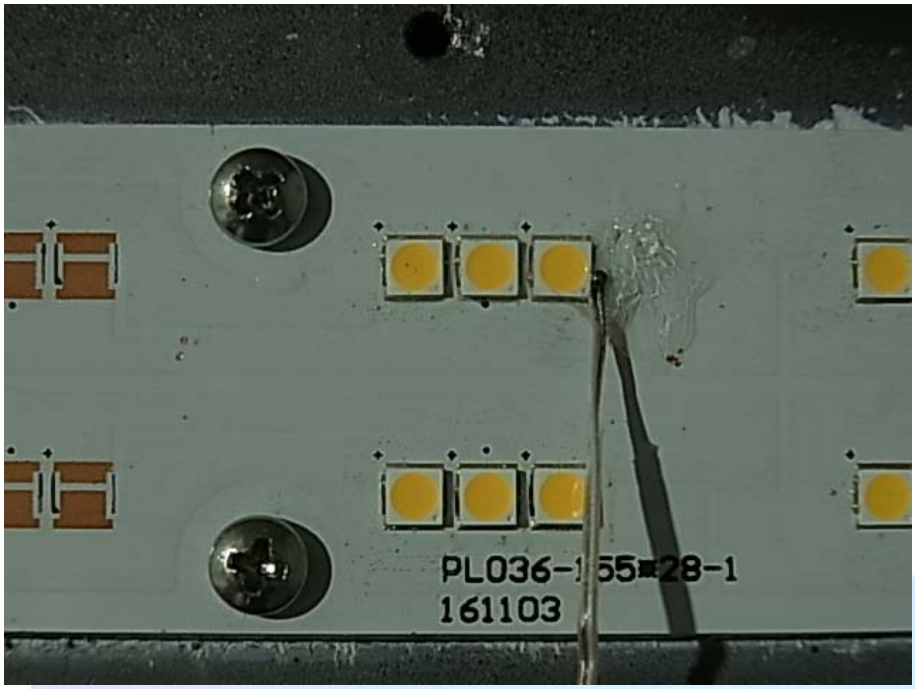
EUT	Driver Max Tc (℃)	Driver In-Situ Temperature (℃)	LED In-Situ Current (mA)	LED In-Situ Temperature (℃)(1#)	LED In-Situ Temperature (℃)(2#)	LED In-Situ Temperature (℃)(3#)
FL31A-20-4000K	N/A	N/A	122	58.8	58.9	60.8

LED Lighting Source Temperature Measurement Point in LM-80 Report



LED Lighting Source In Situ Temperature Measurement

TOP: LED 3



Lumen Maintenance and Lighting Source Life Test Data

L70

TM-21 Inputs

Instructions
Yellow fields are completed by the user. Fields not used should be left blank. Cyan fields are calculated based on user entries. First, enter a description of the LED light source tested. Then complete the fields labeled "LM-80 Testing Details". Test duration must be at least 6,000 hours. If only one case temperature data set is to be used (no interpolation), complete only "Tested case temperature 1". For only two case temperature data sets, complete 1 and 2. Next, further to the right, in the corresponding box(es) for each tested case temperature, enter the test data along with the time (in hours) at which each measurement was taken. Data entered must be normalized then averaged measured data (per TM-21 sections 5.2.1 and 5.2.2). If case temperatures have different test durations, enter data up to the lowest of the test durations for all of the case temperatures. Enter drive current, *in-situ* temperature data and the percentage of initial lumens to project to in the fields labeled "*In-Situ* Inputs". Results can be tailored to estimate lumen maintenance at a specific time by entering a value (t) in the yellow field. A complete TM-21 report will appear on the next tab labeled "Report".

Description of LED Light Source Tested (manufacturer, model, catalog number)
Philips Lumileds LUXEON 3030 2D

LM-80 Testing Details	
Total number of units tested per case temperature:	25
Number of failures:	0
Number of units measured:	25
Test duration (hours):	6000
Tested drive current (mA):	150
Tested case temperature 1 (T_c, °C):	55
Tested case temperature 2 (T_c, °C):	85
Tested case temperature 3 (T_c, °C):	105

LM-80 Test Inputs

Test Data for 55°C Case Temperature		Test Data for 85°C Case Temperature		Test Data for 105°C Case Temperature	
Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
1000	99.96%	1000	99.85%	1000	99.85%
2000	99.57%	2000	99.42%	2000	99.32%
3000	99.03%	3000	98.82%	3000	98.59%
4000	98.31%	4000	98.00%	4000	97.58%
5000	97.63%	5000	97.24%	5000	96.69%
6000	96.88%	6000	96.16%	6000	95.38%

In-Situ Inputs

Drive current for each LED package/array/module (mA):	122
In-situ case temperature (T_c, °C):	60.8
Percentage of initial lumens to project to (e.g. for L_{70}, enter 70):	70

Results

Time (t) at which to estimate lumen maintenance (hours):	50,000
Lumen maintenance at time (t) (%):	72.52%
Reported L70 (hours):	>36000

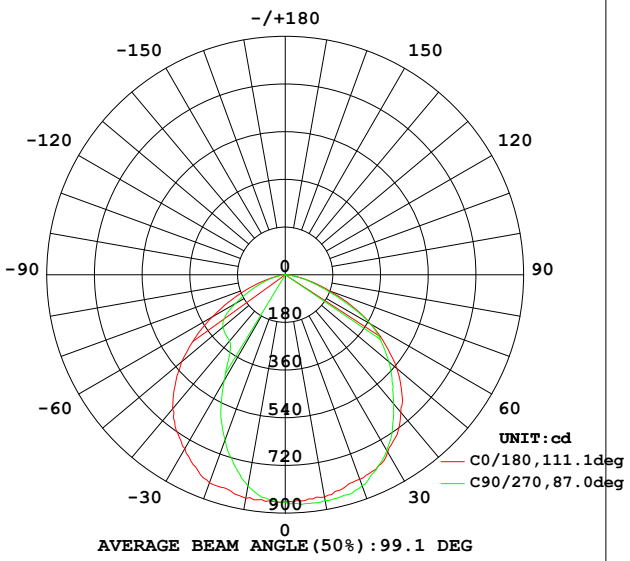
EUT Photos

STREETLIGHT PHOTOMETRIC TEST REPORT

Test:U:120.1V I:0.1622A P:19.24W PF:0.9885 Lamp Flux:2030.11x1 lm		
NAME:	TYPE:FL31A-20-4000K	WEIGHT:
SPEC.:	DIM.:	SERIAL No.:
MFR.: Supertek	SUR.:0.18*0.05	PROTECTION ANGLE:

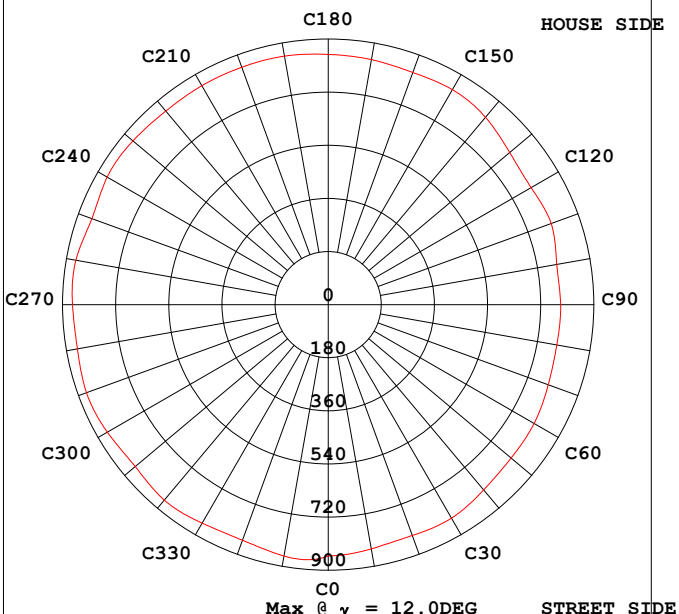
DATA OF LAMP		PHOTOMETRIC DATA Eff: 105.52 lm/W			
MODEL	FL31A-20-4000K	Imax(cd)	871.7	η street_up(%)	0.1
NOMINAL POWER(W)	20	LOR(%)	100.0	η street_down(%)	51.4
RATED VOLTAGE(V)	120.0	TOTAL FLUX(lm)	2030	η house_up(%)	0.1
NOMINAL FLUX(lm)	2030.11	MAXIMUM @(C,γ)	290,12.0	η house_down(%)	48.4
LAMPS INSIDE	1	η up(%)	0.3	76 FLASHAREA(m2)	
TEST VOLTAGE(V)	120.0	η down(%)	99.7	SLI	

INTENSITY DISTRIBUTION DIAGRAM
IN C PLANS



AVERAGE BEAM ANGLE(50%):99.1 DEG

MAX INTENSITY CONE SURFACE
DISTRIBUTION DIAGRAM



Max @ γ = 12.0DEG STREET SIDE

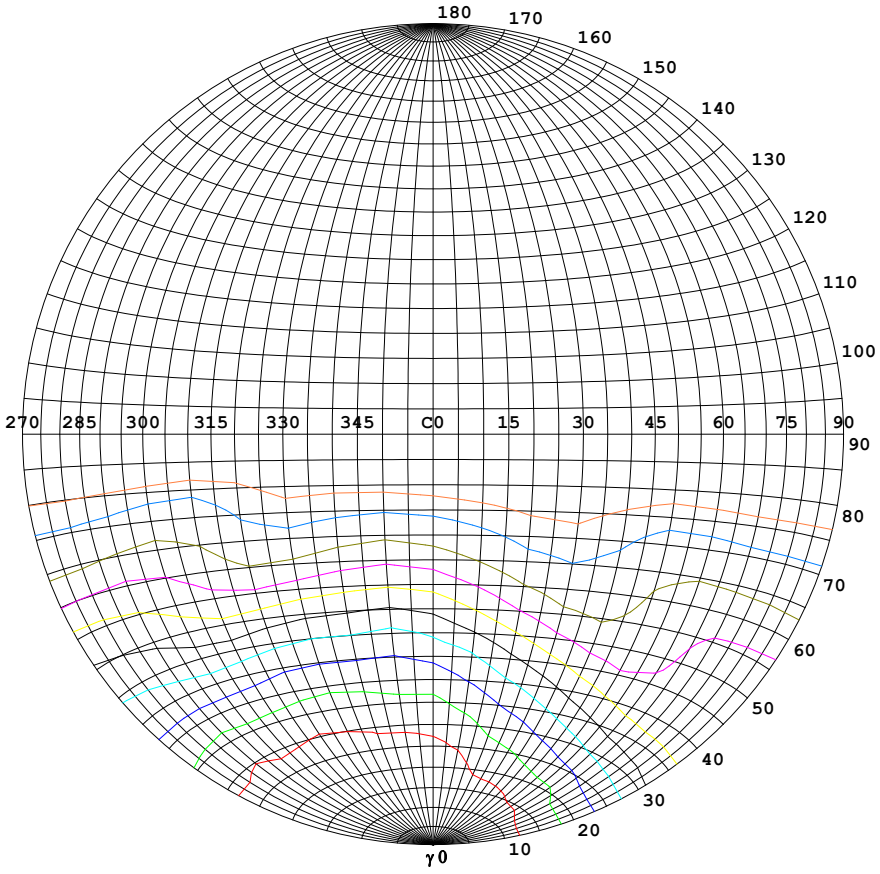
C Range: 0 - 360DEG
C Interval: 10.0DEG
Test Speed: HIGH
Temperature:25.6DEG
Operators:David
Test Date:2017-05-17

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.287
Humidity:67.1%
Test Distance:26.000m [K=1.0000]
Remarks:

Note: SLI:Specific Luminaire Index

STREETLIGHT ISOCANDELA DIAGRAM

Test:U:120.1V I:0.1622A P:19.24W PF:0.9885 Lamp Flux:2030.11x1 lm		
NAME:	TYPE:FL31A-20-4000K	WEIGHT:
SPEC.:	DIM.:	SERIAL No.:
MFR.: Supertek	SUR.:0.18*0.05	PROTECTION ANGLE:



Classification:

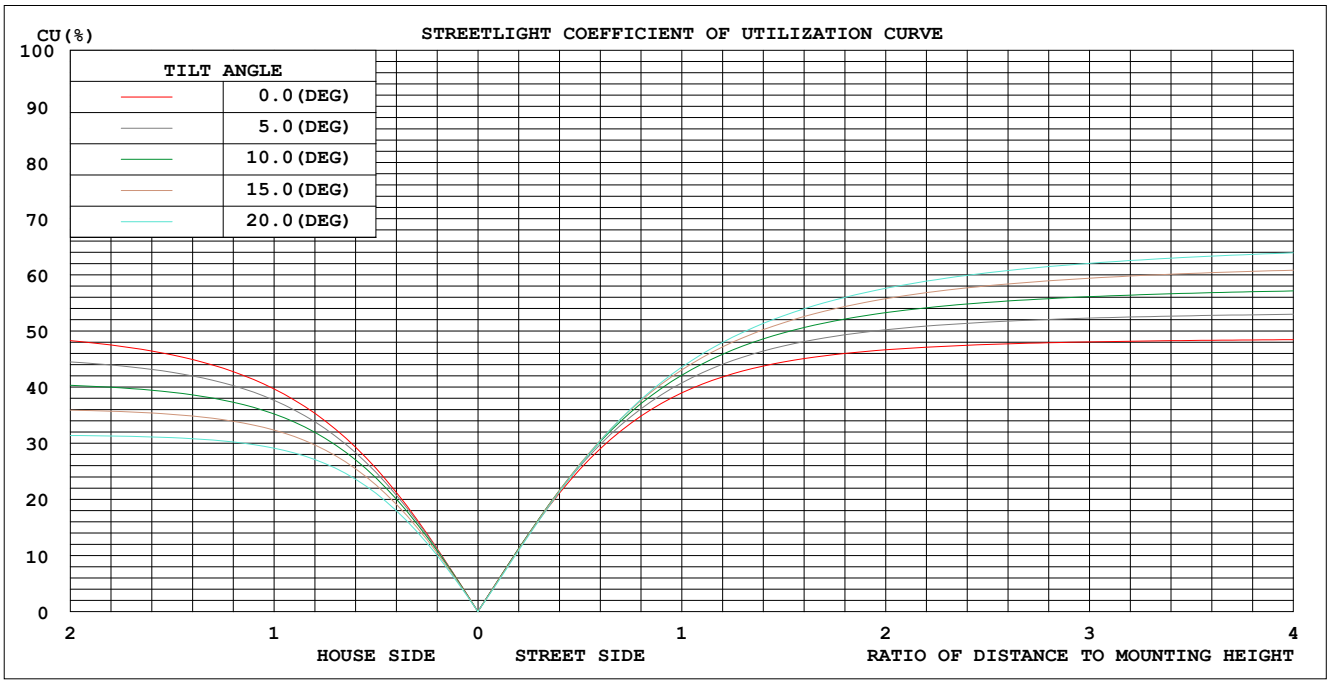
IES:Type II - Very Short
CIE:Narrow - Short
IES:Cut-off
CIE:Semi-cut-off
Max.At80:44.84cd/klm
Max.At90:0.5798cd/klm
Max.80-90:44.84cd/klm

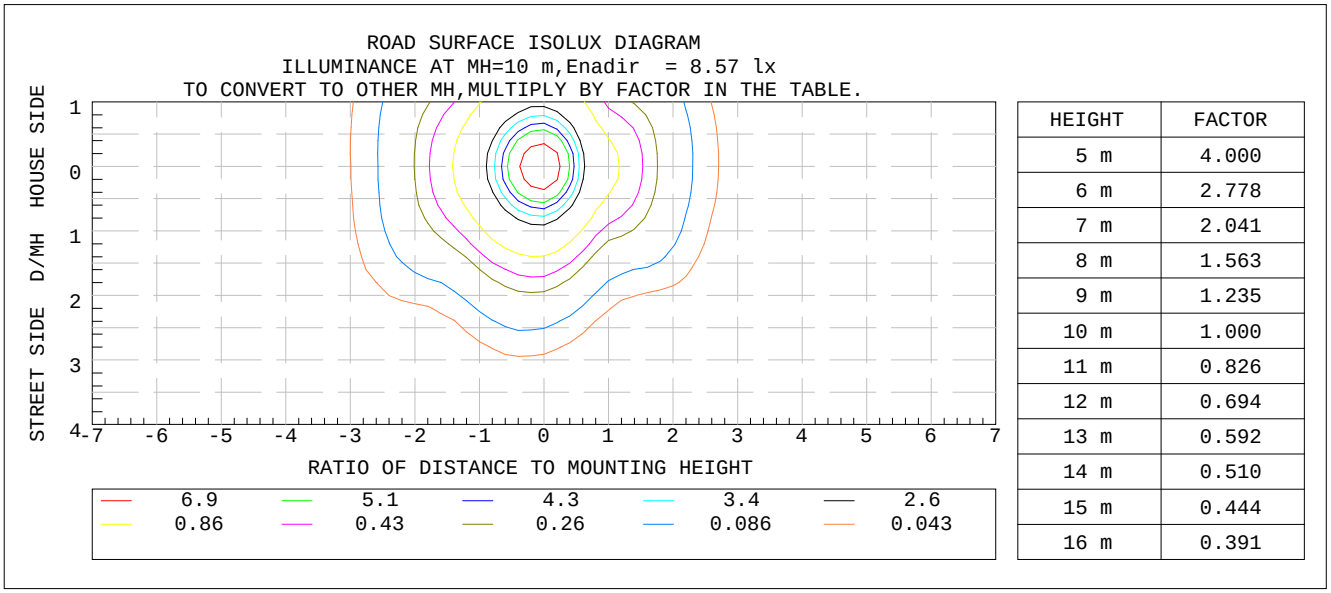
ISOCANDELA DIAGRAM	
UNIT	cd
Imax=100%	872
90%	784
80%	697
70%	610
60%	523
50%	436
40%	349
30%	261
20%	174
10%	87
5%	44

C Range: 0 - 360DEG
C Interval: 10.0DEG
Test Speed: HIGH
Temperature:25.6DEG
Operators:David
Test Date:2017-05-17

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.287
Humidity:67.1%
Test Distance:26.000m [K=1.0000]
Remarks:

COEFFICIENT OF UTILIZATION CURVE AND ISOLUX DIAGRAM





HEIGHT	FACTOR
5 m	4.000
6 m	2.778
7 m	2.041
8 m	1.563
9 m	1.235
10 m	1.000
11 m	0.826
12 m	0.694
13 m	0.592
14 m	0.510
15 m	0.444
16 m	0.391

C Range: 0 - 360DEG
C Interval: 10.0DEG
Test Speed: HIGH
Temperature:25.6DEG
Operators:David
Test Date:2017-05-17

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.287
Humidity:67.1%
Test Distance:26.000m [K=1.0000]
Remarks:

ZONAL FLUX DIAGRAM

Test:U:120.1V I:0.1622A P:19.24W PF:0.9885 Lamp Flux:2030.11x1 lm		
NAME:	TYPE:FL31A-20-4000K	WEIGHT:
SPEC.:	DIM.:	SERIAL No.:
MFR.: Supertek	SUR.:0.18*0.05	PROTECTION ANGLE:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%lum
10	857.0	826.6	810.0	830.2	852.3	861.0	865.1	861.4	0- 10	81.36	81.36	4.01
20	835.8	732.6	664.1	742.2	821.2	846.8	847.2	848.8	10- 20	231.8	313.2	15.4
30	757.6	572.7	461.8	588.1	774.1	785.2	766.7	783.5	20- 30	342.1	655.3	32.3
40	662.0	383.3	327.4	403.8	678.8	675.2	636.9	661.2	30- 40	386.7	1042	51.3
50	511.4	225.2	307.2	239.2	550.0	517.5	511.3	489.4	40- 50	373.5	1416	69.7
60	317.9	153.6	217.0	157.1	372.3	317.3	371.2	280.6	50- 60	310.3	1726	85
70	139.0	95.57	98.98	103.0	177.8	169.5	157.0	144.3	60- 70	199.5	1925	94.8
80	28.41	21.96	21.61	33.00	46.11	78.61	42.15	61.31	70- 80	86.25	2012	99.1
90	0.2241	0.1799	0.1693	0.2529	0.9045	0.6262	0.0940	0.5072	80- 90	13.14	2025	99.7
100	0.2432	0.2521	0.1860	0.2103	0.2258	0.1472	0.1318	0.1461	90-100	0.1931	2025	99.7
110	0.3996	0.4524	0.5068	0.3460	0.4972	0.2846	0.3396	0.2814	100-110	0.2720	2025	99.8
120	0.8942	0.8753	0.8823	0.8500	0.9361	0.4826	0.6015	0.4786	110-120	0.5692	2026	99.8
130	1.240	1.239	1.240	1.217	1.374	0.7098	0.7330	0.7213	120-130	0.8124	2027	99.8
140	1.602	1.692	1.690	1.689	1.698	1.013	0.9028	1.030	130-140	0.9549	2028	99.9
150	1.878	2.043	2.030	2.021	1.746	1.391	1.184	1.371	140-150	0.9735	2029	99.9
160	1.968	2.063	2.076	2.056	1.793	1.552	1.411	1.517	150-160	0.8142	2029	100
170	2.060	2.091	2.100	2.066	2.309	2.139	1.993	2.050	160-170	0.5375	2030	100
180	2.461	2.375	2.331	2.359	2.442	2.375	2.349	2.331	170-180	0.2129	2030	100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

C Range: 0 - 360DEG
C Interval: 10.0DEG
Test Speed: HIGH
Temperature:25.6DEG
Operators:David
Test Date:2017-05-17

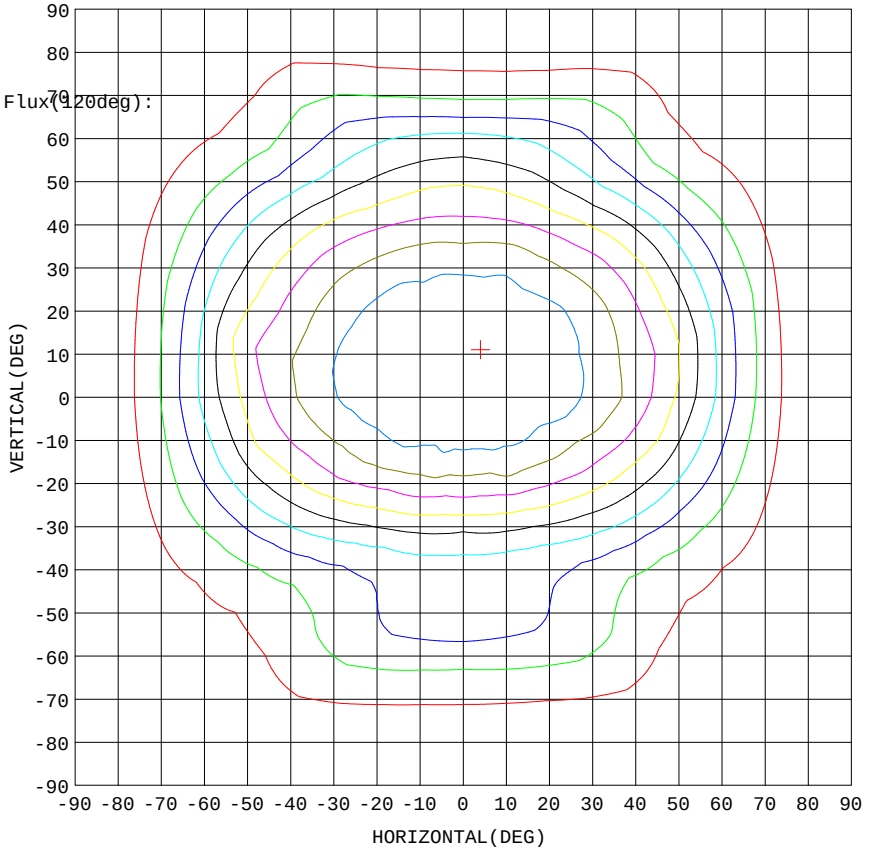
γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.287
Humidity:67.1%
Test Distance:26.000m [K=1.0000]
Remarks:

ISOCANDELA DIAGRAM

Test:U:120.1V I:0.1622A P:19.24W PF:0.9885 Lamp Flux:2030.11x1 lm		
NAME:	TYPE:FL31A-20-4000K	WEIGHT:
SPEC.:	DIM.:	SERIAL No.:
MFR.: Supertek	SUR.:0.18*0.05	PROTECTION ANGLE:

Conical surface Flux(90deg):
1233.3 lm
%lum = 60.7%
%lamp = 60.7%

Conical surface Flux(120deg):
1725.9 lm
%lum = 85.0%
%lamp = 85.0%

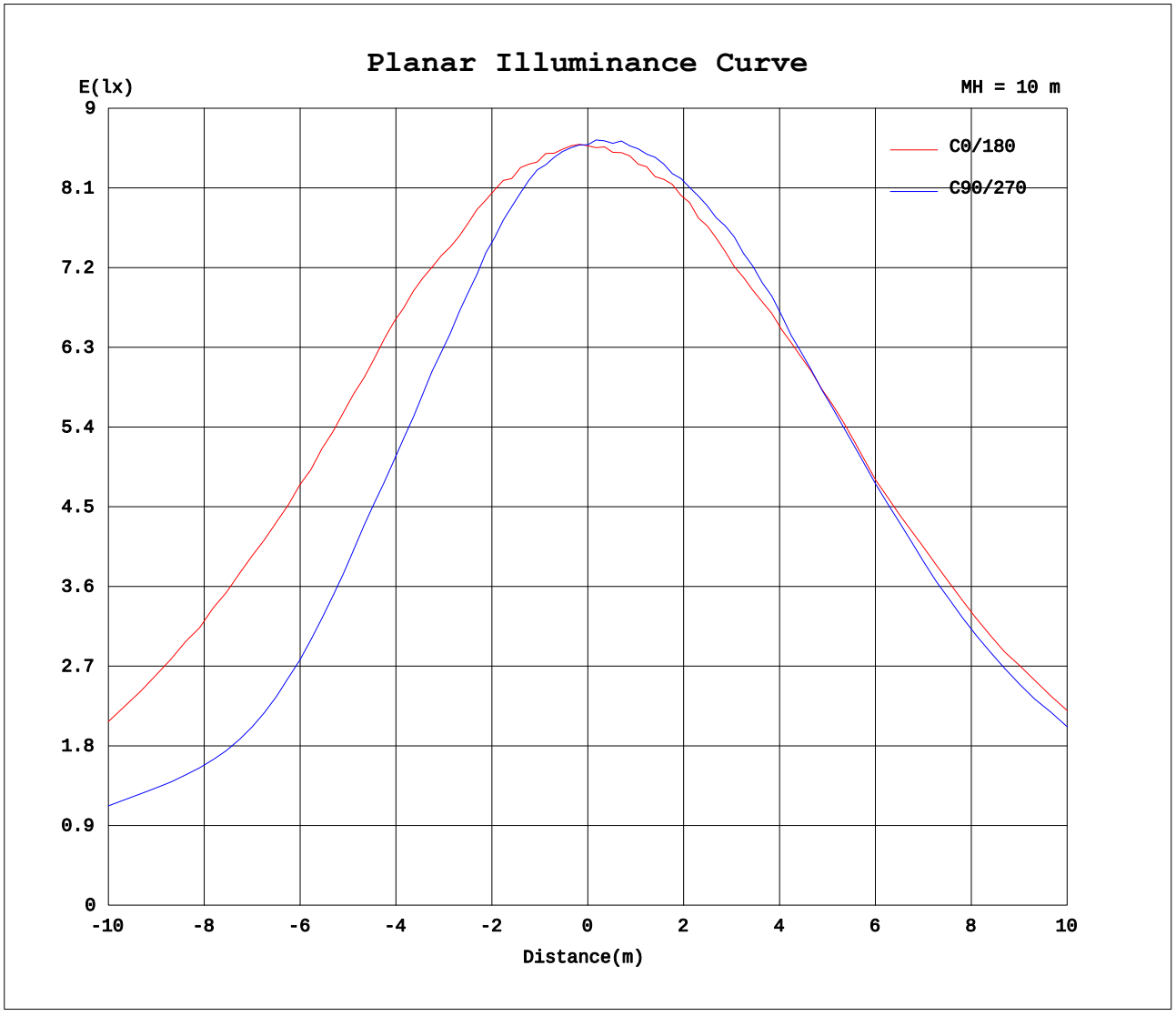


Imax:871.1(H4.0,V11.0)
(At:C=290.0,Gamma=12.0)
UNIT: cd

C Range: 0 - 360DEG
C Interval: 10.0DEG
Test Speed: HIGH
Temperature:25.6DEG
Operators:David
Test Date:2017-05-17

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.287
Humidity:67.1%
Test Distance:26.000m [K=1.0000]
Remarks:

Planar Illuminance Curve



C Range: 0 - 360DEG
C Interval: 10.0DEG
Test Speed: HIGH
Temperature:25.6DEG
Operators:David
Test Date:2017-05-17

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.287
Humidity:67.1%
Test Distance:26.000m [K=1.0000]
Remarks:

LUMINOUS DISTRIBUTION INTENSITY DATA

Test:U:120.1V I:0.1622A P:19.24W PF:0.9885 Lamp Flux:2030.11x1 lm		
NAME:	TYPE:FL31A-20-4000K	WEIGHT:
SPEC.:	DIM.:	SERIAL No.:
MFR.: Supertek	SUR.:0.18*0.05	PROTECTION ANGLE:

Table--1 UNIT: cd

γ (DEG) \ C(DEG)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0	858	860	855	861	858	861	857	858	858	859	860	860	859	856	859	861	855	859	858
5	859	855	849	857	848	848	849	850	848	846	849	849	844	844	855	857	856	852	856
10	857	850	836	843	830	823	821	812	808	810	810	819	810	821	839	845	842	849	852
15	839	826	814	811	798	781	775	754	741	744	750	767	762	778	805	827	829	834	836
20	836	809	776	762	742	723	712	675	668	664	668	694	704	727	757	778	792	804	821
25	801	778	729	708	673	642	620	588	576	577	574	599	628	649	693	728	755	781	810
30	758	728	677	639	593	552	512	489	473	462	475	499	527	561	615	665	697	741	774
35	718	670	614	564	506	453	409	386	376	366	381	397	424	466	531	592	642	689	736
40	662	604	541	478	408	358	321	313	320	327	321	325	328	371	436	513	574	636	679
45	587	535	455	383	315	273	271	289	310	318	309	294	272	286	343	420	496	570	622
50	511	442	362	285	230	220	252	283	309	307	306	285	249	223	255	324	407	502	550
55	414	344	264	196	167	197	240	267	276	278	278	272	237	193	185	233	316	399	462
60	318	254	181	131	127	180	215	219	218	217	220	228	217	177	137	157	222	304	372
65	223	170	112	88.0	103	153	168	160	154	151	157	169	177	155	108	104	143	217	275
70	139	103	67.4	57.6	78.1	113	112	102	99.4	99.0	102	111	124	121	84.9	69.5	85.0	135	178
75	71.3	54.4	38.8	33.6	49.1	65.7	61.5	55.8	54.7	55.1	57.4	63.0	71.2	77.9	57.5	42.3	48.3	73.9	103
80	28.4	22.4	16.6	13.8	19.7	24.2	22.1	20.5	20.6	21.6	23.4	26.6	31.0	36.6	29.4	21.4	25.3	34.3	46.1
85	6.04	4.05	2.46	1.44	1.29	1.10	0.74	0.69	0.79	1.09	1.18	1.70	3.26	6.45	6.78	6.19	8.20	11.5	16.3
90	0.22	0.19	0.18	0.14	0.15	0.21	0.21	0.21	0.17	0.17	0.19	0.22	0.21	0.24	0.26	0.19	0.20	0.41	0.90
95	0.20	0.21	0.17	0.18	0.18	0.25	0.22	0.25	0.17	0.18	0.18	0.18	0.21	0.21	0.20	0.15	0.13	0.16	0.27
100	0.24	0.23	0.17	0.22	0.22	0.28	0.27	0.28	0.17	0.19	0.19	0.20	0.19	0.20	0.22	0.13	0.19	0.15	0.23
105	0.27	0.25	0.28	0.28	0.26	0.31	0.28	0.26	0.26	0.29	0.26	0.27	0.28	0.26	0.23	0.21	0.25	0.26	0.34
110	0.40	0.53	0.49	0.51	0.41	0.49	0.53	0.51	0.53	0.51	0.52	0.51	0.48	0.33	0.36	0.36	0.34	0.39	0.50
115	0.65	0.78	0.81	0.66	0.62	0.66	0.74	0.80	0.71	0.77	0.80	0.75	0.63	0.59	0.56	0.62	0.60	0.64	0.74
120	0.89	0.90	0.90	0.88	0.85	0.90	0.87	0.84	0.84	0.88	0.90	0.83	0.86	0.84	0.86	0.87	0.80	0.86	0.94
125	1.14	1.14	1.15	1.15	1.11	1.07	1.10	1.12	1.13	1.13	1.13	1.15	1.14	1.06	1.09	1.13	1.10	1.12	1.18
130	1.24	1.41	1.41	1.38	1.25	1.23	1.23	1.26	1.24	1.24	1.28	1.29	1.21	1.19	1.24	1.32	1.32	1.29	1.37
135	1.45	1.49	1.49	1.51	1.47	1.44	1.46	1.42	1.43	1.45	1.49	1.44	1.44	1.42	1.48	1.48	1.49	1.44	1.56
140	1.60	1.69	1.71	1.72	1.68	1.70	1.70	1.67	1.64	1.69	1.69	1.66	1.62	1.67	1.70	1.70	1.70	1.69	1.70
145	1.74	1.81	1.83	1.82	1.78	1.78	1.80	1.76	1.77	1.77	1.78	1.81	1.77	1.75	1.81	1.82	1.79	1.76	1.72
150	1.88	2.02	2.02	2.03	2.04	2.04	2.01	2.04	2.03	2.03	2.01	2.06	1.94	1.99	2.05	2.03	1.98	2.04	1.75
155	1.92	2.06	2.06	2.06	2.07	2.06	2.04	2.04	2.07	2.05	2.06	2.08	2.04	2.03	2.05	2.05	2.02	2.06	1.77
160	1.97	2.04	2.05	2.08	2.05	2.07	2.06	2.08	2.09	2.08	2.06	2.08	2.05	2.05	2.06	2.09	2.03	2.06	1.79
165	2.01	2.03	2.04	2.05	2.05	2.06	2.08	2.08	2.10	2.09	2.06	2.08	2.04	2.02	2.07	2.10	2.05	2.04	1.81
170	2.06	2.08	2.05	2.06	2.09	2.09	2.06	2.08	2.12	2.10	2.09	2.10	2.04	2.03	2.10	2.11	2.07	2.10	2.31
175	2.35	2.32	2.32	2.31	2.30	2.31	2.30	2.28	2.29	2.29	2.30	2.34	2.29	2.27	2.33	2.31	2.31	2.30	2.42
180	2.46	2.42	2.40	2.38	2.38	2.37	2.42	2.34	2.37	2.33	2.36	2.40	2.31	2.33	2.39	2.45	2.38	2.49	2.44

C Range: 0 - 360DEG
C Interval: 10.0DEG
Test Speed: HIGH
Temperature:25.6DEG
Operators:David
Test Date:2017-05-17

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.287
Humidity:67.1%
Test Distance:26.000m [K=1.0000]
Remarks:

LUMINOUS DISTRIBUTION INTENSITY DATA

Test:U:120.1V I:0.1622A P:19.24W PF:0.9885 Lamp Flux:2030.11x1 lm		
NAME:	TYPE:FL31A-20-4000K	WEIGHT:
SPEC.:	DIM.:	SERIAL No.:
MFR.: Supertek	SUR.:0.18*0.05	PROTECTION ANGLE:

Table--2 UNIT: cd

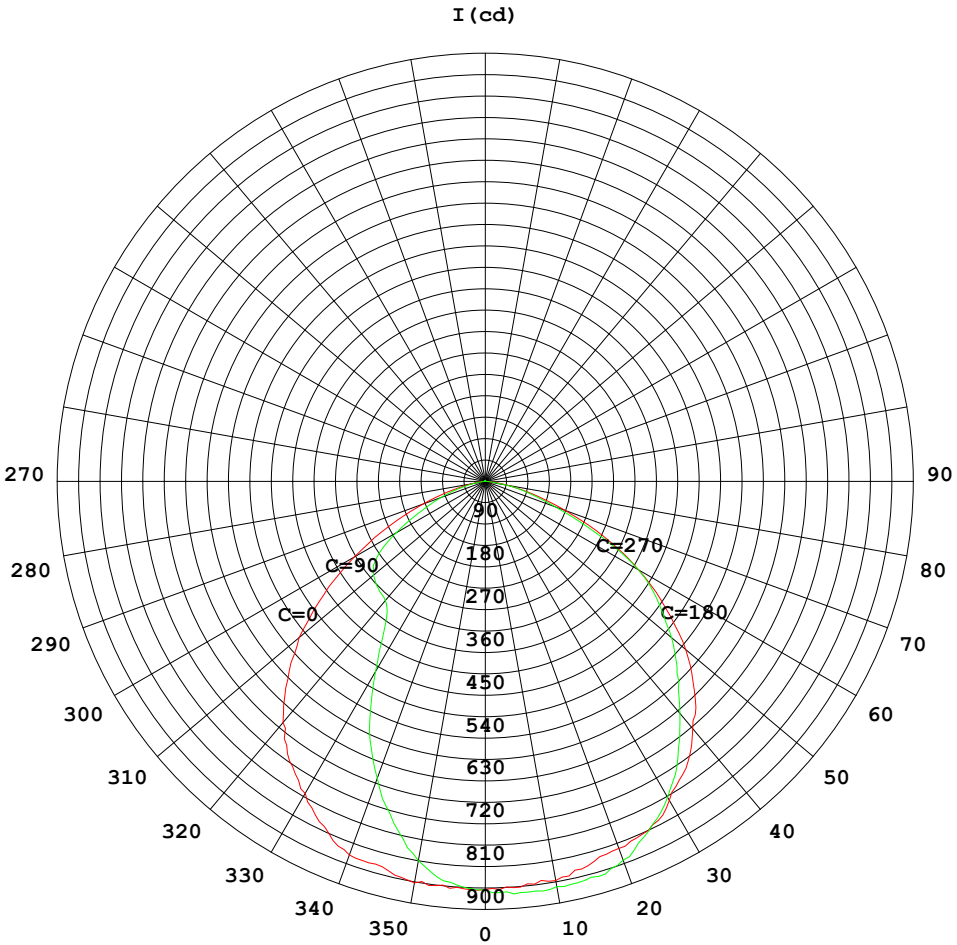
C(DEG) / γ (DEG)	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350		
0	860	855	861	858	861	857	858	858	859	860	860	859	856	859	861	855	859		
5	856	858	866	861	865	861	858	865	868	862	866	863	861	866	861	861	866		
10	854	856	860	857	865	864	852	870	865	862	869	862	859	864	860	853	867		
15	852	850	852	850	861	864	849	865	861	861	869	856	854	860	855	846	850		
20	830	829	837	842	851	853	838	851	847	844	854	845	848	850	837	822	832		
25	818	821	815	819	828	829	808	817	812	808	822	813	817	827	827	811	812		
30	792	793	786	786	784	783	770	773	767	768	781	767	778	789	783	776	769		
35	745	745	741	743	729	723	718	715	706	714	724	712	727	738	735	725	714		
40	701	684	686	681	670	656	649	643	637	641	645	647	653	670	675	673	668		
45	656	626	617	612	597	574	569	572	570	567	560	561	572	596	606	606	614		
50	597	555	542	528	507	490	498	510	511	503	492	471	476	503	522	524	546		
55	513	470	455	428	406	415	429	442	445	434	420	391	371	396	417	428	444		
60	396	375	352	319	316	345	365	373	371	364	353	322	284	277	303	324	339		
65	288	274	246	218	248	284	287	270	258	264	276	263	221	178	193	227	247		
70	191	176	148	144	195	216	189	167	157	162	181	198	172	117	110	137	159		
75	113	98.5	83.2	99.7	145	140	113	99.0	93.8	94.6	106	126	125	81.7	61.2	72.5	81.0		
80	52.7	49.3	44.5	66.2	91.0	75.7	58.8	48.7	42.2	41.0	48.9	63.6	73.6	49.0	30.9	33.9	32.9		
85	19.7	20.0	18.3	27.3	25.2	19.8	7.95	5.06	3.32	3.01	2.97	3.04	4.41	9.31	5.96	8.06	7.43		
90	1.07	0.50	0.21	0.08	1.18	0.08	0.07	0.12	0.09	0.06	0.08	0.09	0.94	0.08	0.06	0.07	0.09		
95	0.10	0.06	0.06	0.11	0.54	0.08	0.09	0.15	0.09	0.08	0.09	0.15	0.33	0.08	0.08	0.09	0.13		
100	0.16	0.09	0.08	0.12	0.17	0.13	0.13	0.15	0.13	0.11	0.15	0.19	0.18	0.11	0.09	0.13	0.19		
105	0.23	0.15	0.13	0.19	0.23	0.23	0.21	0.21	0.23	0.21	0.25	0.30	0.26	0.19	0.18	0.22	0.32		
110	0.38	0.27	0.21	0.27	0.30	0.32	0.34	0.38	0.34	0.32	0.38	0.37	0.32	0.25	0.30	0.37	0.49		
115	0.55	0.43	0.34	0.37	0.40	0.42	0.47	0.51	0.47	0.45	0.49	0.49	0.41	0.36	0.41	0.54	0.69		
120	0.76	0.57	0.47	0.47	0.49	0.53	0.56	0.60	0.60	0.58	0.57	0.56	0.50	0.45	0.57	0.75	0.92		
125	0.97	0.77	0.64	0.60	0.59	0.59	0.66	0.68	0.69	0.66	0.64	0.63	0.60	0.62	0.72	0.91	1.14		
130	1.16	0.96	0.80	0.72	0.70	0.66	0.71	0.75	0.73	0.71	0.72	0.73	0.71	0.73	0.88	1.08	1.31		
135	1.37	1.15	0.97	0.87	0.80	0.78	0.79	0.81	0.79	0.77	0.79	0.82	0.86	0.89	1.05	1.25	1.48		
140	1.54	1.34	1.17	1.04	0.99	0.89	0.90	0.92	0.90	0.88	0.91	0.95	0.99	1.07	1.24	1.45	1.63		
145	1.65	1.52	1.40	1.25	1.14	1.06	1.03	1.06	1.05	1.03	1.06	1.12	1.17	1.28	1.47	1.64	1.71		
150	1.68	1.56	1.51	1.46	1.33	1.23	1.18	1.20	1.18	1.20	1.21	1.29	1.30	1.44	1.57	1.65	1.70		
155	1.70	1.60	1.56	1.52	1.38	1.33	1.31	1.30	1.26	1.29	1.31	1.36	1.40	1.50	1.58	1.66	1.70		
160	1.74	1.66	1.65	1.59	1.52	1.46	1.44	1.45	1.41	1.35	1.40	1.47	1.49	1.54	1.59	1.67	1.69		
165	1.78	1.72	1.69	1.67	1.60	1.58	1.54	1.55	1.55	1.52	1.56	1.57	1.55	1.61	1.66	1.70	1.71		
170	2.29	2.25	2.18	2.17	2.10	2.04	1.99	2.01	1.99	2.01	2.02	2.03	2.01	2.09	2.16	2.18	2.23		
175	2.46	2.35	2.35	2.40	2.39	2.38	2.36	2.37	2.33	2.35	2.38	2.35	2.34	2.35	2.41	2.38	2.40		
180	2.46	2.40	2.40	2.38	2.37	2.38	2.36	2.35	2.35	2.33	2.36	2.35	2.31	2.35	2.39	2.42	2.40		

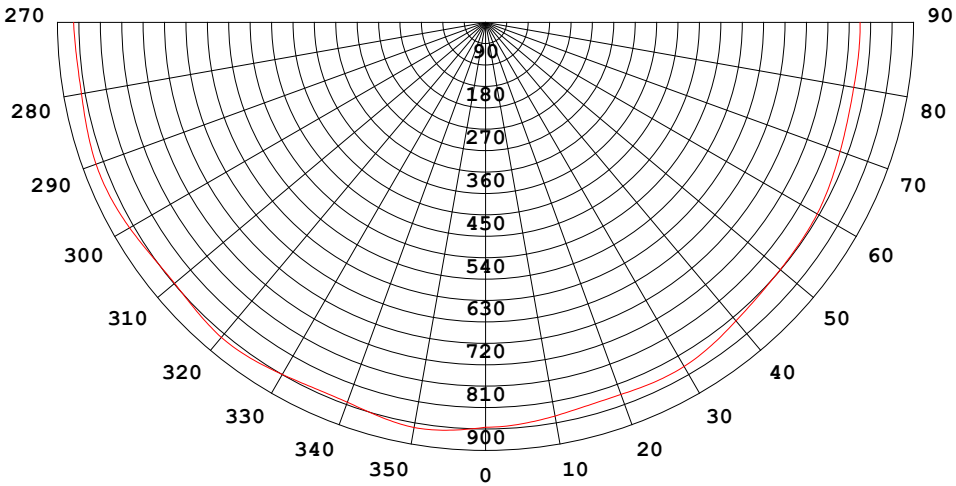
C Range: 0 - 360DEG
C Interval: 10.0DEG
Test Speed: HIGH
Temperature:25.6DEG
Operators:David
Test Date:2017-05-17

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-R5000_V2 SYSTEM V2.0.287
Humidity:67.1%
Test Distance:26.000m [K=1.0000]
Remarks:

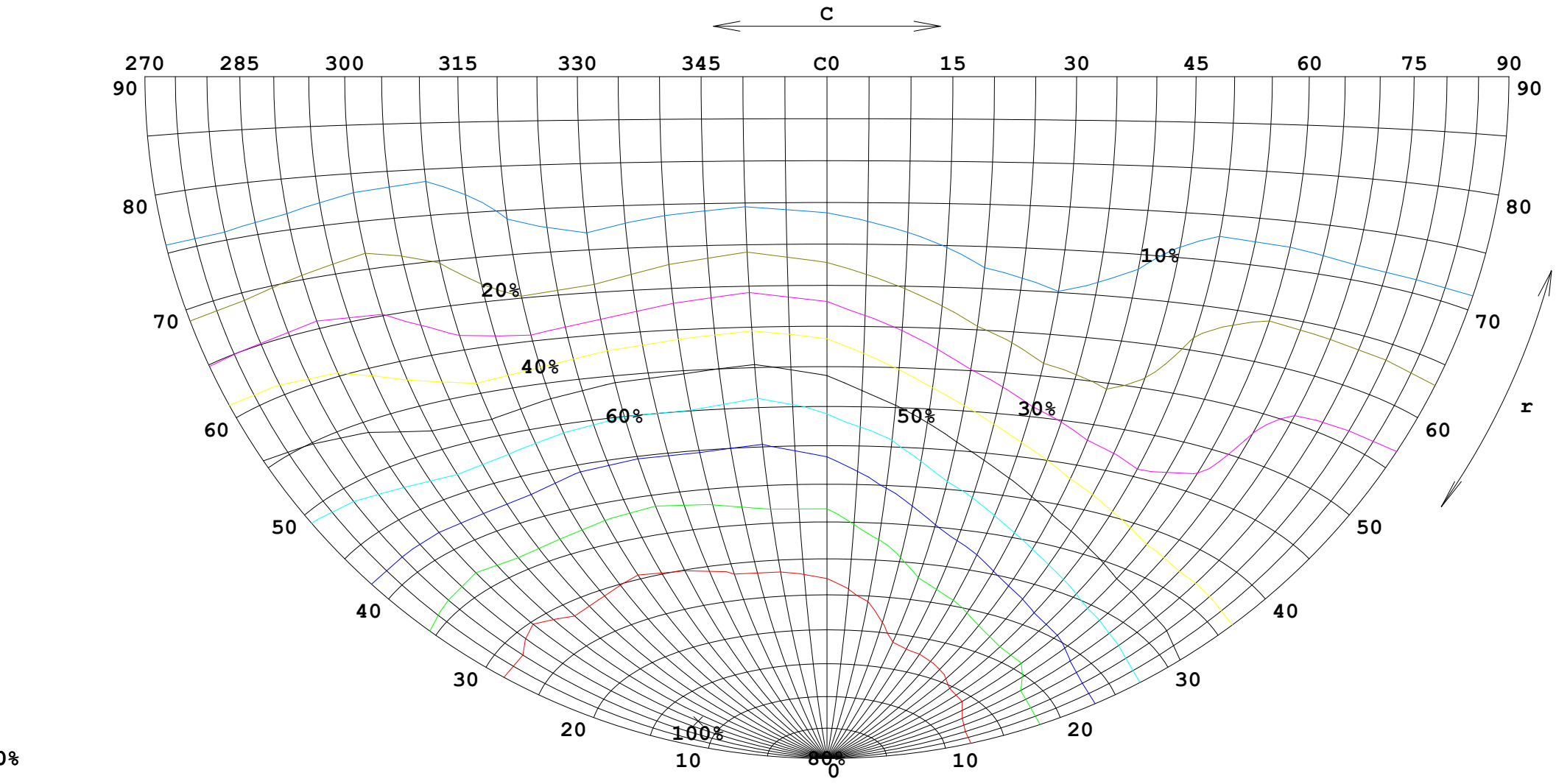
FLUX DATA:

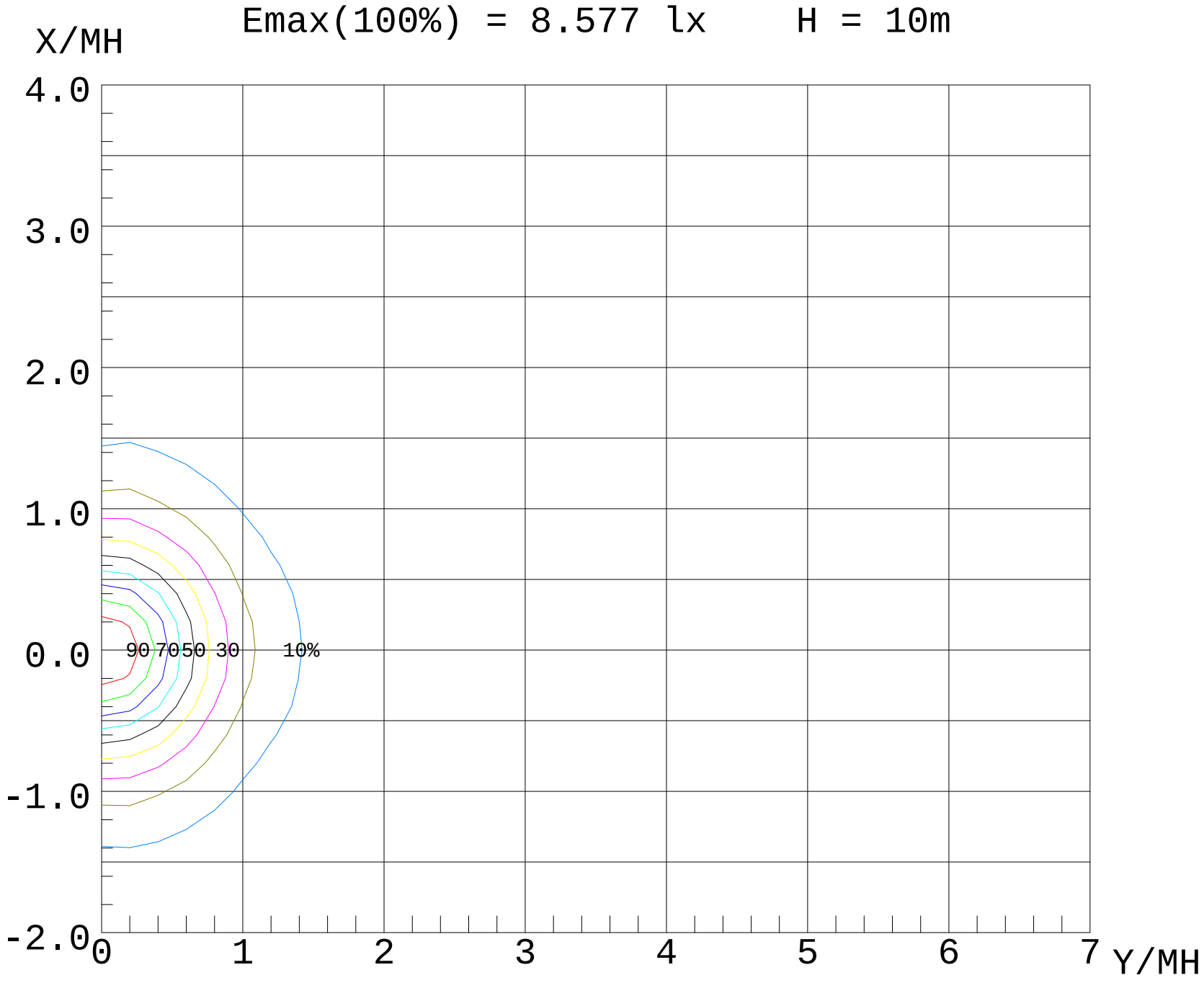
LOR:	100.0 %
STREET DOWN:	1043 lm
STREET UP:	2.841 lm
HOUSE DOWN:	982.3 lm
HOUSE UP:	2.499 lm

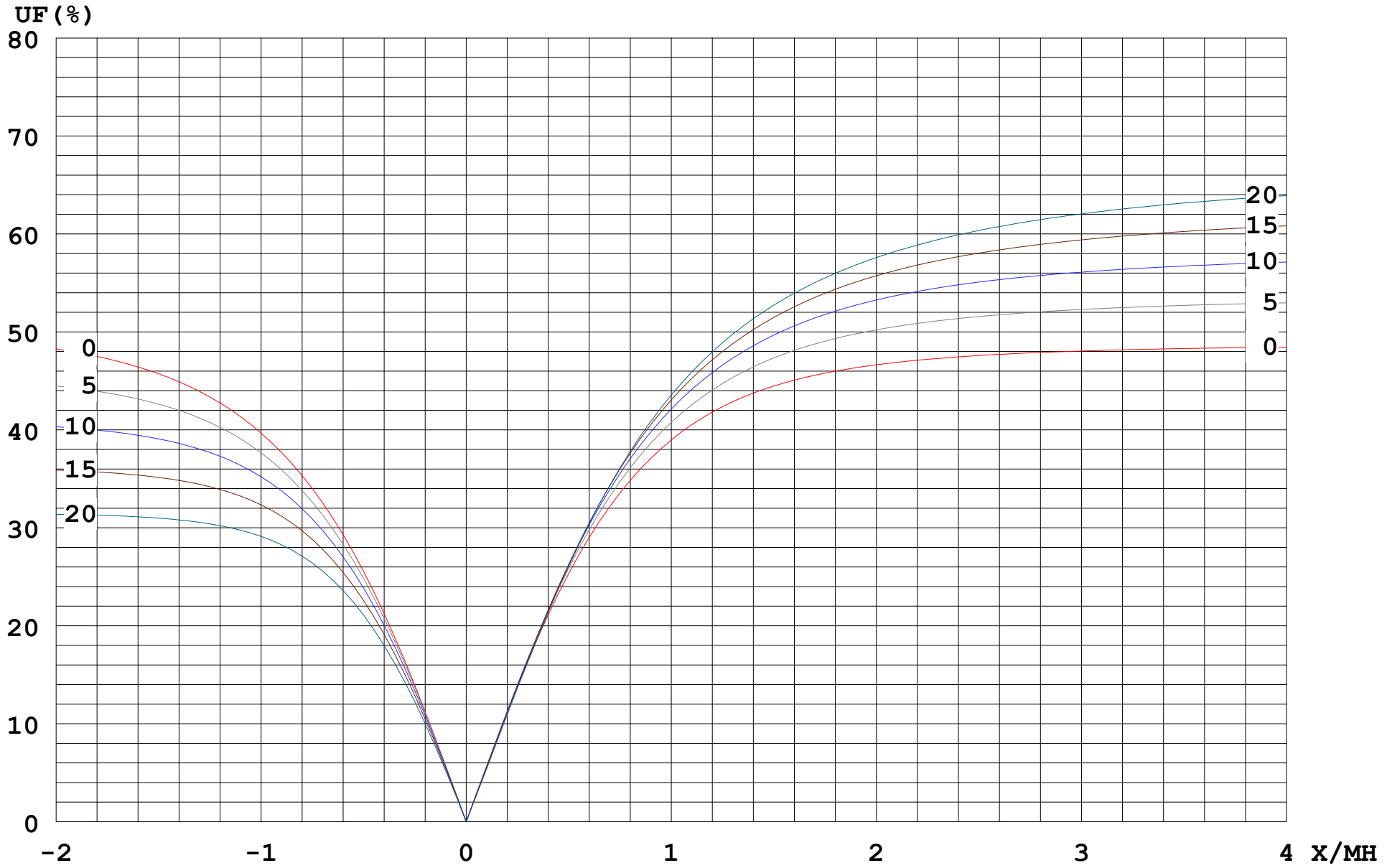




Imax(100%) = 871.7 cd




Emax(100%) = 8.577 lx
H = 10m
X/MH
Y/MH
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
0
1
2
3
4
5
6
7
90 70 50 30
10%


UF(%)
80
70
60
50
40
30
20
10
0
-2
-1
0
1
2
3
4 X/MH
0
5
10
15
20
20
15
10
5
0