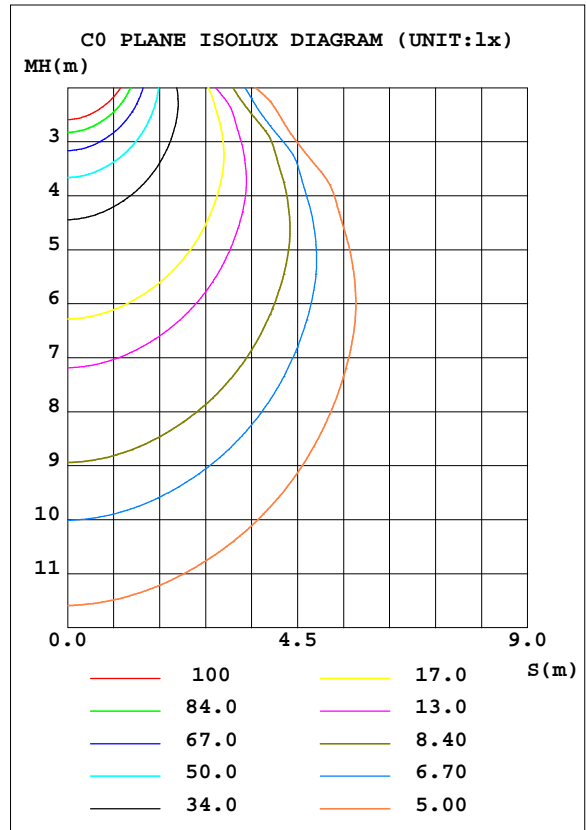
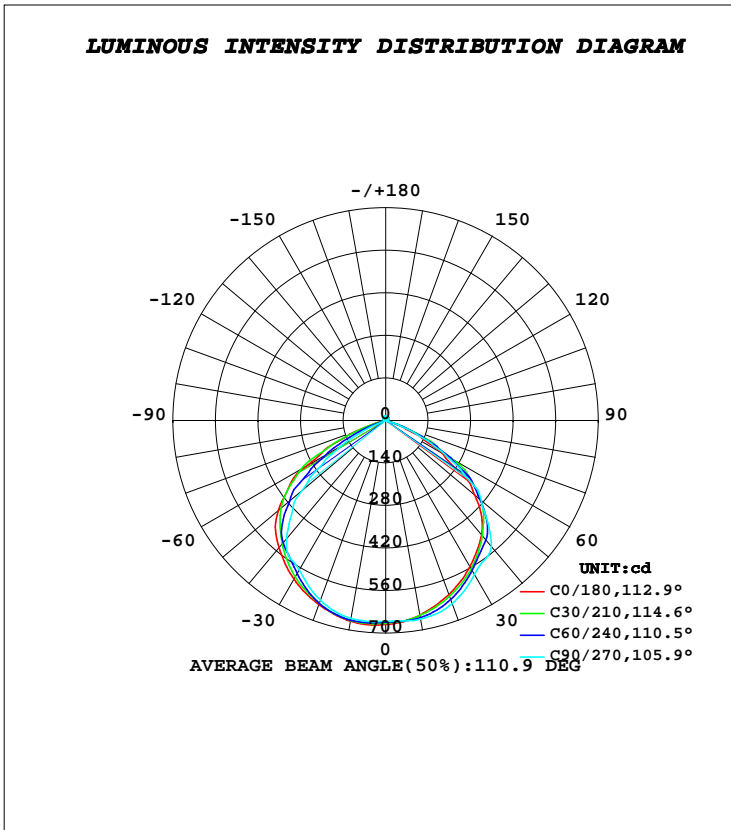


LUMINAIRE PHOTOMETRIC TEST REPORT

Test:U:220.8V I:0.0890A P:19.20W PF:0.9780 Lamp Flux:1753.77x1 lm		
NAME: GFL-20W-5730	TYPE:LED	
DIM.: 185*155MM	SUR.:100*85mm	
MFR.: GRANDOL INDUSTRY LIMITED		

DATA OF LAMP		PHOTOMETRIC DATA			
MODEL	GFL-20W-5730	Imax(cd)	674.6	S/MH(C0/180)	1.24
NOMINAL POWER(W)	20	LOR(%)	100.0	S/MH(C90/270)	1.32
RATED VOLTAGE(V)	220	TOTAL FLUX(lm)	1753.8	η UP, DN(C0-180)	1.4,48.9
NOMINAL FLUX(lm)	1753.77	CIE CLASS	DIRECT	η UP, DN(C180-360)	1.5,48.2
LAMPS INSIDE	1	η up(%)	2.9	CIBSE SHR NOM	1.25
TEST VOLTAGE(V)	220.8	η down(%)	97.1	CIBSE SHR MAX	1.35



C Range: 0 - 360DEG
C Interval: 30.0DEG
Test Speed: HIGH
Temperature:25.3DEG
Operators:DAMIN
Test Date:2016-11-03

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-2000B_V1 SYSTEM V2.0.267
Humidity:65.0%
Test Distance:8.000m [K=0.7063]
Remarks:

ZONAL FLUX DIAGRAM

ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%lum,lamp
10	650.3	655.2	663.6	658.1	670.5	667.9	660.9	647.6	0- 10	63.18	63.18	3.6,3.6
20	609.6	621.2	641.5	636.3	644.2	640.2	629.1	610.0	10- 20	182.5	245.7	14,14
30	555.4	566.1	585.0	590.7	603.3	589.2	568.8	553.1	20- 30	278.6	524.3	29.9,29.9
40	491.4	504.2	540.8	532.6	546.8	527.8	507.8	490.2	30- 40	342.8	867.1	49.4,49.4
50	382.6	407.6	411.1	448.8	461.5	431.4	360.7	389.6	40- 50	363.1	1230	70.1,70.1
60	215.1	248.1	226.9	302.3	309.5	274.9	176.1	214.6	50- 60	302.5	1533	87.4,87.4
70	40.27	59.23	45.88	98.34	101.1	68.20	4.910	34.47	60- 70	149.3	1682	95.9,95.9
80	2.843	2.958	2.695	2.860	4.079	3.737	3.492	3.681	70- 80	17.08	1699	96.9,96.9
90	3.064	2.803	2.399	2.492	3.475	3.535	3.496	3.780	80- 90	3.388	1702	97.1,97.1
100	4.513	4.111	3.551	3.597	4.467	4.592	4.731	5.001	90-100	4.012	1706	97.3,97.3
110	6.473	5.983	5.280	5.283	6.110	6.272	6.458	6.766	100-110	5.464	1712	97.6,97.6
120	8.474	7.974	7.299	7.181	7.989	8.132	8.414	8.627	110-120	6.969	1719	98,98
130	10.20	9.847	9.297	8.982	9.728	9.855	10.20	10.26	120-130	7.984	1727	98.5,98.5
140	11.48	11.31	10.82	10.44	10.98	11.14	11.43	11.46	130-140	8.094	1735	98.9,98.9
150	12.82	12.65	12.17	11.85	12.18	12.32	12.45	12.54	140-150	7.355	1742	99.3,99.3
160	14.14	13.97	13.63	13.30	13.60	13.55	13.61	13.64	150-160	6.006	1748	99.7,99.7
170	15.25	15.06	14.80	14.53	14.91	14.70	14.61	14.59	160-170	4.019	1752	99.9,99.9
180	15.69	15.45	15.24	15.06	15.79	15.44	15.18	15.06	170-180	1.435	1754	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

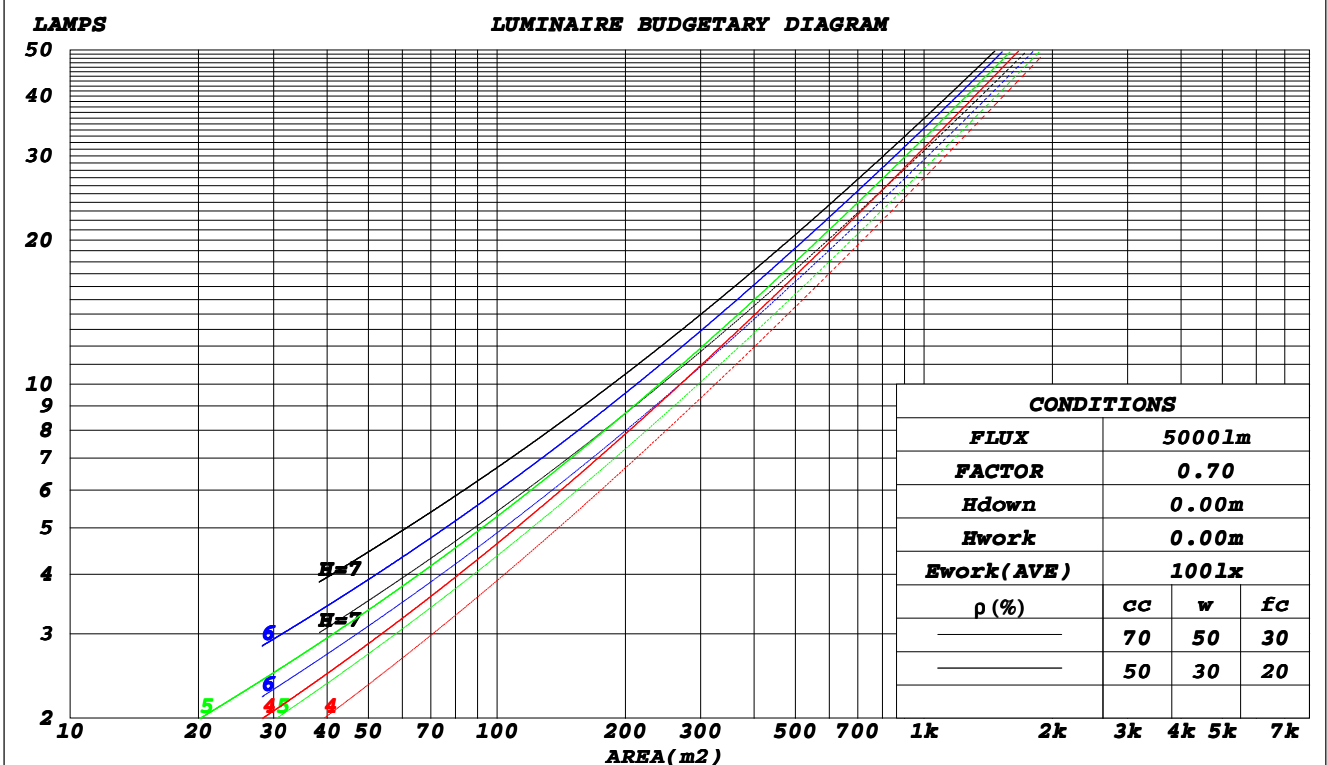
C Range: 0 - 360DEG
C Interval: 30.0DEG
Test Speed: HIGH
Temperature:25.3DEG
Operators:DAMIN
Test Date:2016-11-03

γ Range: 0 - 180DEG
 γ Interval: 1.0DEG
Test System:EVERFINE GO-2000B_V1 SYSTEM V2.0.267
Humidity:65.0%
Test Distance:8.000m [K=0.7063]
Remarks:

CU AND LUMINAIRE BUDGETARY ESTIMATE DIAGRAM

Test:U:220.8V I:0.0890A P:19.20W PF:0.9780 Lamp Flux:1753.77x1 lm		
NAME: GFL-20W-5730	TYPE:LED	
DIM.: 185*155MM	SUR.:100*85mm	
MFR.: GRANDOL INDUSTRY LIMITED		

ρ_{cc}	80%			70%			50%			30%			10%			0
ρ_w	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	0
ρ_{fc}	20%			20%			20%			20%			20%			0
RCR	RCR:Room Cavity Ratio						Coefficients of Utilization(CU)									
0.0	1.18	1.18	1.18	1.15	1.15	1.15	1.09	1.09	1.09	1.04	1.04	1.04	.99	.99	.99	.97
1.0	1.06	1.02	.99	1.04	1.00	.97	.99	.96	.94	.95	.92	.90	.91	.89	.87	.85
2.0	.94	.88	.83	.92	.87	.82	.88	.84	.80	.84	.81	.77	.81	.78	.75	.73
3.0	.83	.76	.70	.82	.75	.70	.78	.73	.68	.75	.70	.66	.72	.68	.65	.63
4.0	.74	.66	.60	.73	.65	.60	.70	.64	.59	.67	.62	.57	.65	.60	.56	.54
5.0	.67	.58	.52	.65	.58	.52	.63	.56	.51	.61	.55	.50	.59	.53	.49	.47
6.0	.60	.52	.46	.59	.51	.45	.57	.50	.45	.55	.49	.44	.53	.48	.43	.41
7.0	.54	.46	.40	.54	.46	.40	.52	.45	.40	.50	.44	.39	.49	.43	.39	.37
8.0	.50	.42	.36	.49	.41	.36	.47	.40	.35	.46	.40	.35	.45	.39	.35	.33
9.0	.46	.38	.32	.45	.37	.32	.43	.37	.32	.42	.36	.32	.41	.35	.31	.29
10.0	.42	.34	.29	.41	.34	.29	.40	.33	.29	.39	.33	.29	.38	.32	.28	.27



C Range: 0 - 360DEG
 C Interval: 30.0DEG
 Test Speed: HIGH
 Temperature: 25.3DEG
 Operators: DAMIN
 Test Date: 2016-11-03

γ Range: 0 - 180DEG
 γ Interval: 1.0DEG
 Test System: EVERFINE GO-2000B_V1 SYSTEM V2.0.267
 Humidity: 65.0%
 Test Distance: 8.000m [K=0.7063]
 Remarks:

WEC AND CCEC

Test:U:220.8V I:0.0890A P:19.20W PF:0.9780 Lamp Flux:1753.77x1 lm		
NAME: GFL-20W-5730	TYPE:LED	
DIM.: 185*155MM	SUR.:100*85mm	
MFR.: GRANDOL INDUSTRY LIMITED		

ρ_{cc}	80%			70%			50%			30%			10%			0
ρ_w	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	0
ρ_{fc}	20%			20%			20%			20%			20%			0
RCR	RCR:Room Cavity Ratio						Wall Exitance Coefficients(WEC)									
0.0																
1.0	.255	.145	.046	.247	.141	.045	.232	.133	.043	.219	.126	.041	.207	.120	.039	
2.0	.251	.137	.042	.244	.134	.041	.231	.128	.040	.219	.123	.038	.208	.118	.037	
3.0	.239	.127	.038	.233	.125	.038	.222	.120	.037	.211	.116	.036	.202	.112	.035	
4.0	.226	.118	.035	.221	.116	.034	.211	.112	.033	.201	.108	.033	.192	.104	.032	
5.0	.213	.108	.031	.208	.107	.031	.199	.103	.030	.190	.100	.030	.182	.097	.029	
6.0	.200	.100	.029	.195	.099	.028	.187	.096	.028	.180	.093	.027	.172	.091	.027	
7.0	.188	.093	.026	.184	.092	.026	.177	.089	.026	.170	.087	.025	.163	.085	.025	
8.0	.177	.086	.024	.173	.085	.024	.167	.083	.024	.160	.081	.023	.154	.079	.023	
9.0	.167	.081	.023	.163	.080	.022	.157	.078	.022	.152	.076	.022	.146	.074	.021	
10.0	.157	.076	.021	.155	.075	.021	.149	.073	.021	.144	.071	.020	.139	.070	.020	

ρ_{cc}	80%			70%			50%			30%			10%			0
ρ_w	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	50%	30%	10%	0
ρ_{fc}	20%			20%			20%			20%			20%			0
RCR	RCR:Room Cavity Ratio						Ceiling Cavity Exitance Coefficients(CCEC)									
0.0	.213	.213	.213	.182	.182	.182	.124	.124	.124	.071	.071	.071	.023	.023	.023	
1.0	.199	.179	.161	.170	.154	.139	.116	.106	.096	.067	.061	.056	.021	.020	.018	
2.0	.189	.155	.126	.162	.133	.109	.111	.092	.076	.064	.054	.044	.021	.017	.014	
3.0	.181	.137	.101	.155	.118	.088	.107	.082	.062	.062	.048	.036	.020	.016	.012	
4.0	.174	.123	.085	.149	.107	.074	.103	.074	.052	.059	.044	.031	.019	.014	.010	
5.0	.167	.113	.073	.144	.098	.063	.099	.068	.045	.057	.040	.027	.018	.013	.009	
6.0	.161	.104	.064	.138	.090	.056	.095	.063	.040	.055	.037	.023	.018	.012	.008	
7.0	.154	.098	.058	.133	.085	.050	.092	.059	.036	.053	.035	.021	.017	.011	.007	
8.0	.148	.092	.053	.128	.080	.046	.088	.056	.033	.051	.033	.020	.017	.011	.006	
9.0	.143	.087	.049	.123	.075	.043	.085	.053	.030	.050	.031	.018	.016	.010	.006	
10.0	.137	.083	.046	.119	.072	.040	.082	.051	.029	.048	.030	.017	.016	.010	.006	

C Range: 0 - 360DEG
 C Interval: 30.0DEG
 Test Speed: HIGH
 Temperature:25.3DEG
 Operators:DAMIN
 Test Date:2016-11-03

γ Range: 0 - 180DEG
 γ Interval: 1.0DEG
 Test System:EVERFINE GO-2000B_V1 SYSTEM V2.0.267
 Humidity:65.0%
 Test Distance:8.000m [K=0.7063]
 Remarks:

Uncorrected UGR Table

Test:U:220.8V I:0.0890A P:19.20W PF:0.9780 Lamp Flux:1753.77x1 lm		
NAME: GFL-20W-5730	TYPE:LED	
DIM.: 185*155MM	SUR.:100*85mm	
MFR.: GRANDOL INDUSTRY LIMITED		

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	27.3	28.7	27.6	28.9	29.2	27.4	28.8	27.8	29.1	29.3
3H	27.5	28.7	27.8	29.0	29.3	27.7	28.9	28.0	29.2	29.5
4H	27.4	28.6	27.7	28.9	29.2	27.6	28.7	27.9	29.0	29.3
6H	27.3	28.4	27.6	28.7	29.0	27.4	28.6	27.8	28.9	29.2
8H	27.2	28.3	27.6	28.6	28.9	27.4	28.5	27.8	28.8	29.1
12H	27.2	28.2	27.5	28.5	28.9	27.3	28.4	27.7	28.7	29.1
4H 2H	27.6	28.8	27.9	29.1	29.4	27.7	28.9	28.1	29.2	29.5
3H	27.8	28.8	28.2	29.2	29.5	28.0	29.0	28.4	29.3	29.7
4H	27.7	28.6	28.1	29.0	29.4	27.9	28.8	28.3	29.2	29.5
6H	27.6	28.4	28.1	28.8	29.3	27.8	28.6	28.2	29.0	29.4
8H	27.6	28.3	28.0	28.7	29.2	27.7	28.5	28.2	28.9	29.3
12H	27.5	28.2	28.0	28.6	29.1	27.7	28.4	28.1	28.8	29.2
8H 4H	27.6	28.3	28.1	28.8	29.2	27.7	28.5	28.2	28.9	29.3
6H	27.5	28.1	28.0	28.6	29.1	27.7	28.3	28.1	28.7	29.2
8H	27.5	28.0	28.0	28.5	29.0	27.6	28.1	28.1	28.6	29.1
12H	27.4	27.9	27.9	28.4	28.9	27.6	28.0	28.1	28.5	29.1
12H 4H	27.6	28.2	28.0	28.7	29.1	27.7	28.4	28.2	28.8	29.3
6H	27.5	28.0	28.0	28.5	29.0	27.6	28.1	28.1	28.6	29.1
8H	27.4	27.9	27.9	28.4	28.9	27.6	28.0	28.1	28.5	29.0
Variations with the observer position at spacings:										
S = 1.0H	+ 0.5 / - 1.1					+ 0.4 / - 0.7				
1.5H	+ 0.9 / - 1.4					+ 0.8 / - 0.9				
2.0H	+ 1.0 / - 1.2					+ 1.1 / - 1.3				

CIE Pub.117 Corrected 1754 lm Total Lamp Luminous Flux.(8log(F/F0) = 2.0)

C Range: 0 - 360DEG
C Interval: 30.0DEG
Test Speed: HIGH
Temperature:25.3DEG
Operators:DAMIN
Test Date:2016-11-03

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-2000B_V1 SYSTEM V2.0.267
Humidity:65.0%
Test Distance:8.000m [K=0.7063]
Remarks:

UTILIZATION FACTORS TABLE

Test:U:220.8V I:0.0890A P:19.20W PF:0.9780 Lamp Flux:1753.77x1 lm		
NAME: GFL-20W-5730	TYPE:LED	
DIM.: 185*155MM	SUR.:100*85mm	
MFR.: GRANDOL INDUSTRY LIMITED		

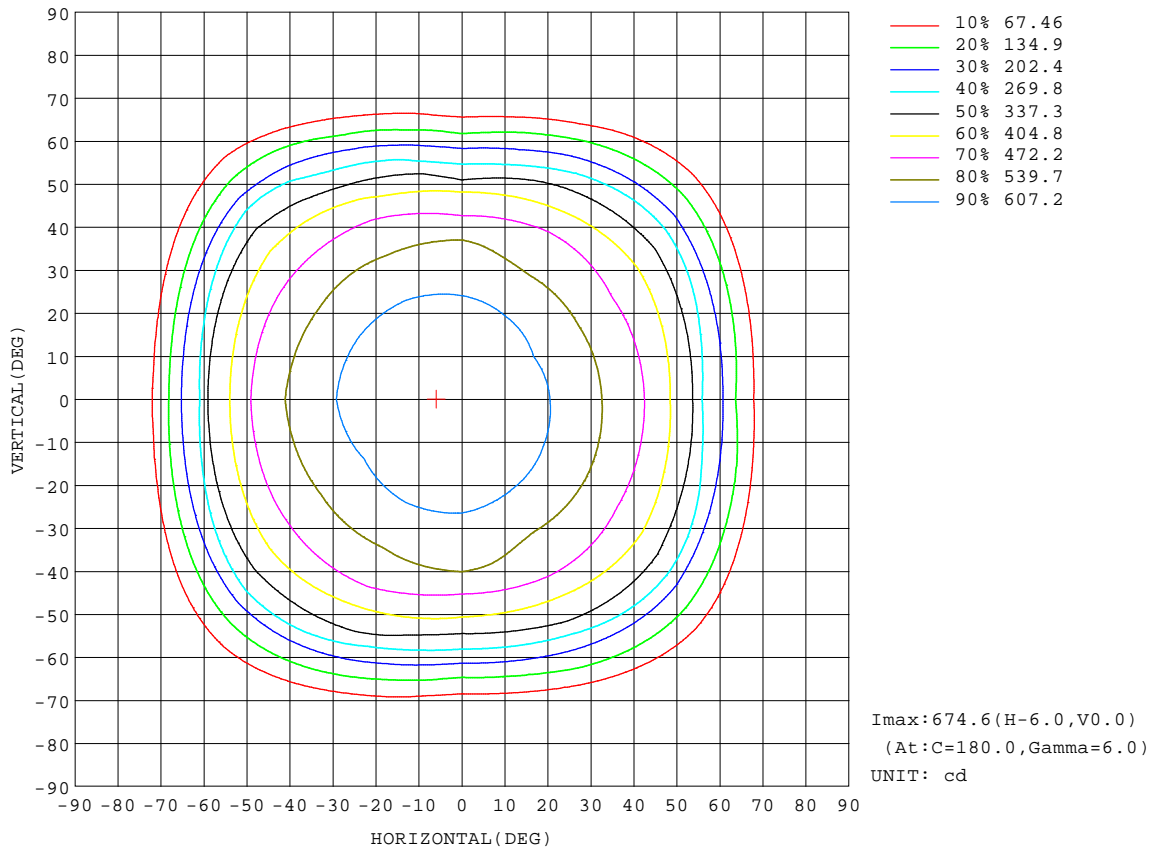
REFLECTANCE										
Ceiling	0.8	0.8	0.8	0.7	0.7	0.7	0.5	0.5	0.5	0
Walls	0.7	0.5	0.3	0.7	0.5	0.3	0.7	0.5	0.3	0
Working plane	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0
ROOM INDEX	UTILIZATION FACTORS(PERCENT) $k(RI) \times RCR = 5$									
k = 0.60	59	48	41	58	48	41	57	47	41	35
0.80	70	59	52	69	59	52	67	58	52	45
1.00	79	69	62	78	68	62	76	69	61	55
1.25	87	77	71	85	76	70	82	75	69	62
1.50	91	83	77	90	82	76	87	80	75	67
2.00	98	91	85	96	89	84	92	87	82	75
2.50	101	95	89	99	93	88	95	90	86	78
3.00	104	99	94	102	97	93	98	94	90	81
4.00	108	103	99	105	101	97	101	97	94	85
5.00	110	106	102	107	103	100	102	99	97	87
ROOM INDEX	UF(total)									Direct
According to DIN EN 13032-2 2004			Suspended				SHRNOM = 1.25			

C Range: 0 - 360DEG
C Interval: 30.0DEG
Test Speed: HIGH
Temperature:25.3DEG
Operators:DAMIN
Test Date:2016-11-03

γ Range: 0 - 180DEG
 γ Interval: 1.0DEG
Test System:EVERFINE GO-2000B_V1 SYSTEM V2.0.267
Humidity:65.0%
Test Distance:8.000m [K=0.7063]
Remarks:

ISOCANDELA DIAGRAM

Test:U:220.8V I:0.0890A P:19.20W PF:0.9780 Lamp Flux:1753.77x1 lm		
NAME: GFL-20W-5730	TYPE:LED	
DIM.: 185*155MM	SUR.:100*85mm	
MFR.: GRANDOL INDUSTRY LIMITED		



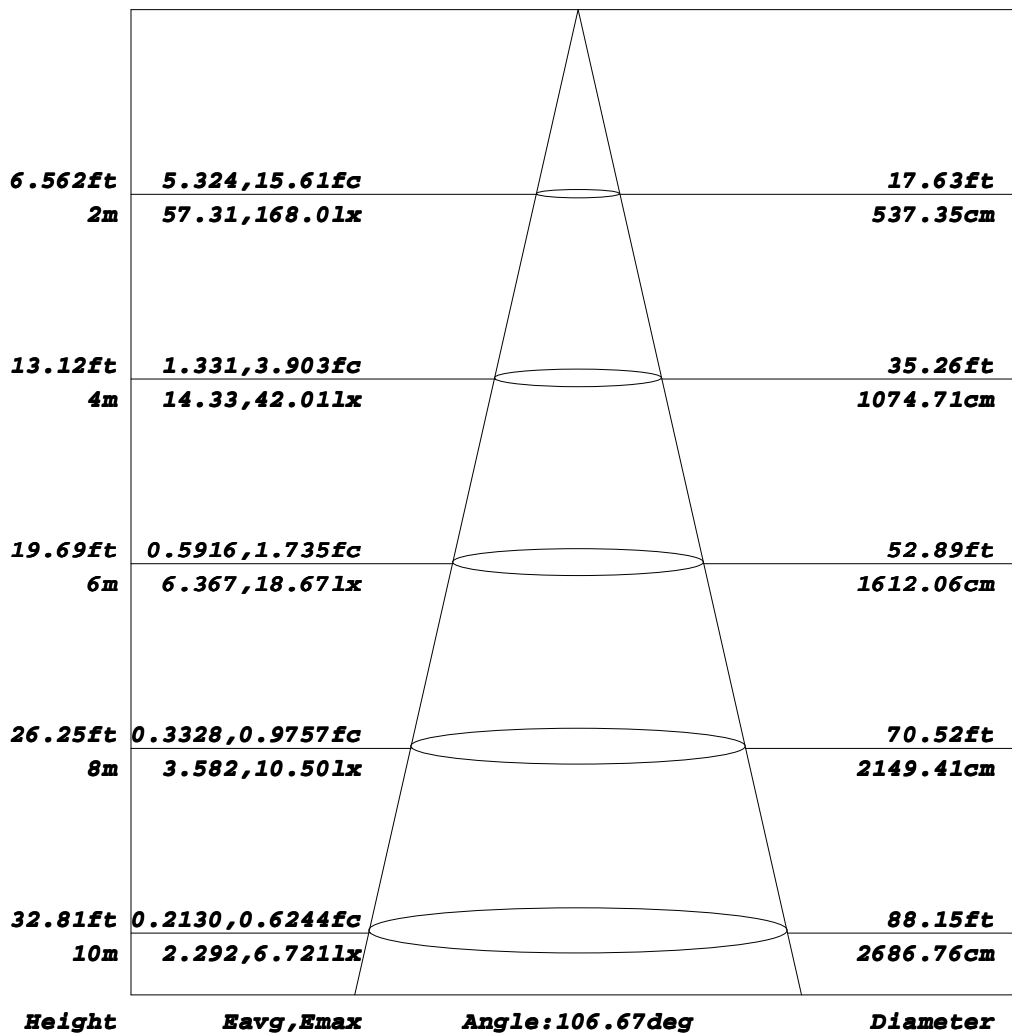
C Range: 0 - 360DEG
C Interval: 30.0DEG
Test Speed: HIGH
Temperature:25.3DEG
Operators:DAMIN
Test Date:2016-11-03

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-2000B_V1 SYSTEM V2.0.267
Humidity:65.0%
Test Distance:8.000m [K=0.7063]
Remarks:

AAI Figure

Test:U:220.8V I:0.0890A P:19.20W PF:0.9780 Lamp Flux:1753.77x1 lm		
NAME: GFL-20W-5730	TYPE:LED	
DIM.: 185*155MM	SUR.:100*85mm	
MFR.: GRANDOL INDUSTRY LIMITED		

Flux out:1364 lm



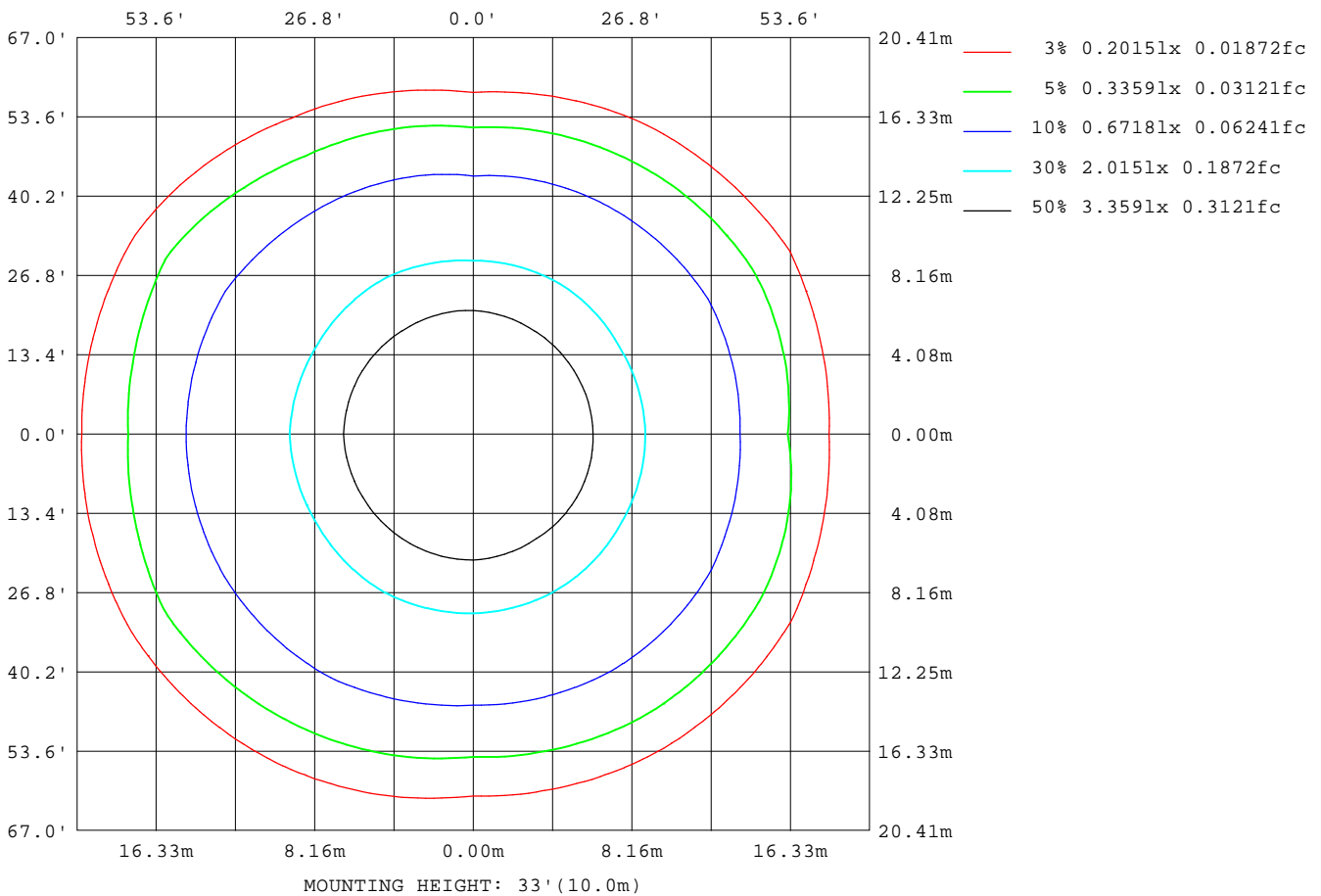
Note: The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

C Range: 0 - 360DEG
C Interval: 30.0DEG
Test Speed: HIGH
Temperature: 25.3DEG
Operators: DAMIN
Test Date: 2016-11-03

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System: EVERFINE GO-2000B_V1 SYSTEM V2.0.267
Humidity: 65.0%
Test Distance: 8.000m [K=0.7063]
Remarks:

ISOLUX DIAGRAM

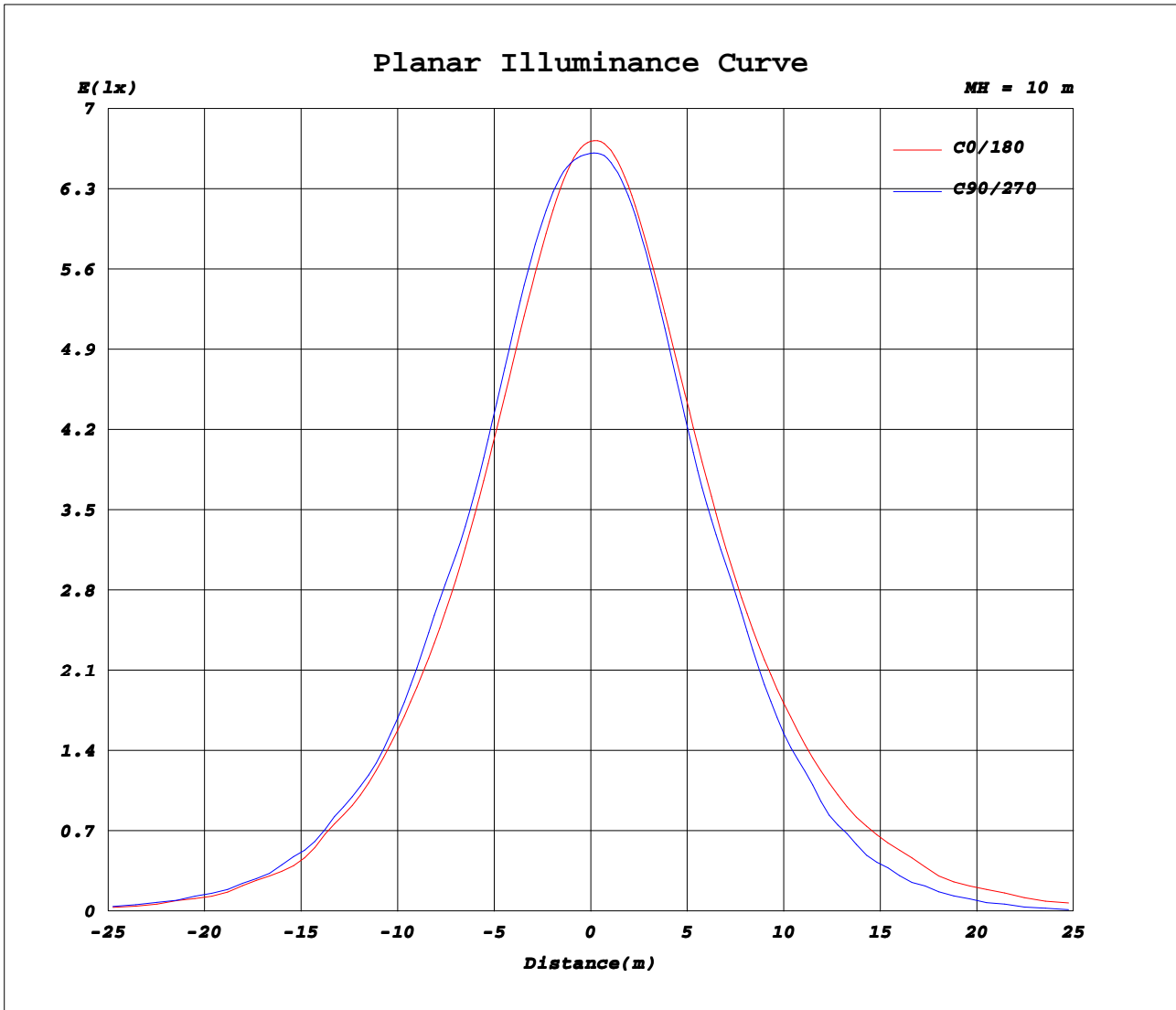
Test:U:220.8V I:0.0890A P:19.20W PF:0.9780 Lamp Flux:1753.77x1 lm		
NAME: GFL-20W-5730	TYPE:LED	
DIM.: 185*155MM	SUR.:100*85mm	
MFR.: GRANDOL INDUSTRY LIMITED		



C Range: 0 - 360DEG
C Interval: 30.0DEG
Test Speed: HIGH
Temperature:25.3DEG
Operators:DAMIN
Test Date:2016-11-03

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-2000B_V1 SYSTEM V2.0.267
Humidity:65.0%
Test Distance:8.000m [K=0.7063]
Remarks:

Planar Illuminance Curve



C Range: 0 - 360DEG
C Interval: 30.0DEG
Test Speed: HIGH
Temperature: 25.3DEG
Operators: DAMIN
Test Date: 2016-11-03

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System: EVERFINE GO-2000B_V1 SYSTEM V2.0.267
Humidity: 65.0%
Test Distance: 8.000m [K=0.7063]
Remarks:

LUMINOUS DISTRIBUTION INTENSITY DATA

Test:U:220.8V I:0.0890A P:19.20W PF:0.9780 Lamp Flux:1753.77x1 lm		
NAME: GFL-20W-5730	TYPE:LED	
DIM.: 185*155MM	SUR.:100*85mm	
MFR.: GRANDOL INDUSTRY LIMITED		

Table--1

UNIT: cd

C(DEG) γ (DEG)	0	30	60	90	120	150	180	210	240	270	300	330							
0	671	667	664	661	659	657	671	667	664	661	659	657							
5	665	663	663	662	661	658	674	671	669	664	659	654							
10	650	652	659	664	662	655	671	668	668	661	653	643							
15	631	636	647	657	656	645	660	657	658	650	638	625							
20	610	615	627	641	642	631	644	640	640	629	616	604							
25	584	591	600	616	619	613	626	620	614	601	587	579							
30	555	563	569	585	590	591	603	595	583	569	556	550							
35	524	531	538	564	559	564	577	565	551	551	525	517							
40	491	495	514	541	533	532	547	530	525	508	499	482							
45	447	456	472	476	502	497	513	492	482	439	450	444							
50	383	409	406	411	443	455	461	449	413	361	382	397							
55	294	343	345	323	374	395	393	391	324	259	292	331							
60	215	246	250	227	278	326	310	322	228	176	204	225							
65	124	164	142	126	188	207	211	201	131	82.5	107	137							
70	40.3	60.7	57.8	45.9	86.6	110	101	93.4	43.0	4.91	22.4	46.5							
75	3.40	5.40	3.57	3.62	6.18	24.5	22.0	15.2	4.04	3.98	3.83	4.03							
80	2.84	3.08	2.83	2.69	2.84	2.88	4.08	3.81	3.66	3.49	3.61	3.75							
85	2.73	2.73	2.48	2.27	2.44	2.60	3.67	3.64	3.54	3.46	3.59	3.67							
90	3.06	2.94	2.67	2.40	2.44	2.54	3.48	3.57	3.50	3.50	3.71	3.85							
95	3.72	3.55	3.22	2.91	2.93	3.03	3.90	3.99	3.97	4.00	4.23	4.37							
100	4.51	4.31	3.92	3.55	3.55	3.64	4.47	4.59	4.60	4.73	4.93	5.07							
105	5.47	5.23	4.77	4.36	4.33	4.42	5.24	5.37	5.43	5.56	5.81	5.91							
110	6.47	6.23	5.73	5.28	5.24	5.33	6.11	6.23	6.31	6.46	6.72	6.81							
115	7.48	7.23	6.73	6.27	6.19	6.26	7.05	7.15	7.23	7.42	7.66	7.74							
120	8.47	8.20	7.75	7.30	7.15	7.21	7.99	8.08	8.18	8.41	8.60	8.65							
125	9.40	9.13	8.76	8.33	8.12	8.12	8.90	8.96	9.11	9.36	9.52	9.48							
130	10.2	9.97	9.72	9.30	9.00	8.96	9.73	9.76	9.95	10.2	10.3	10.2							
135	10.9	10.7	10.5	10.1	9.78	9.70	10.4	10.4	10.6	10.9	11.0	10.8							
140	11.5	11.4	11.2	10.8	10.5	10.4	11.0	11.0	11.2	11.4	11.6	11.4							
145	12.1	12.1	11.9	11.5	11.2	11.1	11.6	11.6	11.8	12.0	12.1	11.9							
150	12.8	12.8	12.5	12.2	11.9	11.8	12.2	12.3	12.4	12.5	12.6	12.5							
155	13.5	13.5	13.2	12.9	12.7	12.5	12.9	12.9	13.0	13.0	13.1	13.1							
160	14.1	14.1	13.9	13.6	13.4	13.2	13.6	13.5	13.6	13.6	13.6	13.6							
165	14.7	14.7	14.4	14.2	14.0	13.9	14.3	14.1	14.2	14.1	14.2	14.1							
170	15.3	15.2	14.9	14.8	14.6	14.5	14.9	14.7	14.7	14.6	14.6	14.6							
175	15.6	15.5	15.2	15.1	14.9	14.8	15.5	15.2	15.2	15.0	15.0	14.9							
180	15.7	15.6	15.3	15.2	15.1	15.1	15.8	15.5	15.4	15.2	15.1	15.0							

C Range: 0 - 360DEG
C Interval: 30.0DEG
Test Speed: HIGH
Temperature:25.3DEG
Operators:DAMIN
Test Date:2016-11-03

γ Range: 0 - 180DEG
γ Interval: 1.0DEG
Test System:EVERFINE GO-2000B_V1 SYSTEM V2.0.267
Humidity:65.0%
Test Distance:8.000m [K=0.7063]
Remarks: