



# **Photometric Test Report**

**Relevant Standards** 

IES LM-79-2008
ANSI C82.77-10-2014
UL1598-2008

## **Prepared For**

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## Catalog Number EXCYL4/WM\*\*/M/8CCT3S/DIM010UNV/%/%/#/CC

**Project Number** 4791459714 **Report Number** 4791459714-5a

Test Date 2024-09-27 Issue Date 2024-11-30 Revision Date N/A

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The results contained in this report pertain only to the tested sample.

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## 1.0 Test List

### Sample Received Date: 2024-08-26

Test No.	Test Item	Sample ID	Model Number	Test Conducted By
1	Integrating Sphere Test	7537301-4	EXCYL4/WMDI/M/8CCT3S/DIM010UNV /SP/SP/BK/CC	James Tan
1	Goniophotometer Test	7537301-1	EXCYL4/WMDI/M/8CCT3S/DIM010UNV /MD/MD/BK/CC	James Tan
2	Goniophotometer Test	7537301-2	EXCYL4/WMDI/M/8CCT3S/DIM010UNV /NR/NR/BK/CC	James Tan
3	Goniophotometer Test	7537301-3	EXCYL4/WMDI/M/8CCT3S/DIM010UNV /MD/MD/BK/CC	James Tan
4	Goniophotometer Test	7537301-4	EXCYL4/WMDI/M/8CCT3S/DIM010UNV /SP/SP/BK/CC	James Tan

## Remark (if any)

[X] 1. UL test equipment information is recorded on Meter Use in UL's Aurora database.





## 2.0 Product Description

Luminaire Description: Wall-Mounted Area Luminaires Model Number: EXCYL4/WMDI/M/8CCT3S/DIM010UNV/MD/MD/BK/CC Electrical Ratings and CCT: 120-277Vac, 50/60 Hz, 20W, 3000K/3500K/4000K Driver Model Number: BW-998-CSP-20W LED Package: BXCP-30E-11M-J19-3-A1 and BXCP-40E-11M-J19-3-A1, Bridgelux Inc. Family Model and Variation: EXCYL4/WM\*\*/M/8CCT3S/DIM010UNV/%/%/#/CC % means Optic: SP(15°), VN(25°), NR(40°), MD(60°) or blank;

% means Optic: SP(15°), VN(25°), NR(40°), MD(60°) or blank; # means finish color: BZ, BK, SV, WH, RALxxxx; \* means ligting direction : D (direct), I (indirect), DI (direct and indirect); Photos of Luminaire Characteristics







## 3.1 Integrating Sphere Test 3000K

Model No.	EXCYL4/WMDI/M	I/8CCT3S/DIM010UNV/SP/SP/BZ/CC	Sample ID.	753	7301-4
Operate t	ime (Min.)	55	Stabilization ti	me (Min.)	50

#### **Test Method**

1. The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning. 2. Photometric paramters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25° C ± 1.0° C. The reference standard lamp is power 100W omni-directional Incandescent lamp and was calibrated by National Institute of Metrology, China.

3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using  $4\pi$  geometry. The self-absorption factor is applied in the final test result. The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

Integrating Sphere Test Conditions									
Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation			
24.8	120	60	0.163	19.59	0.9985	Vertical			
	Test Results								

ССТ (К)	CRI (Ra)	R9	Rf	Rg	Luminous Flux (lm)	Luminous Efficacy (Im/W)
3091	84	10	85	95	2213.2	113.0







## 3.1 Integrating Sphere Test 3500K

Model No.	EXCYL4/WMDI/N	1/8CCT3S/DIM010UNV/SP/SP/BZ/CC	Sample ID.	753	7301-4
Operate t	ime (Min.)	55	Stabilization ti	me (Min.)	50

#### **Test Method**

1. The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning. 2. Photometric paramters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25° C ± 1.0° C. The reference standard lamp is power 100W omni-directional Incandescent lamp and was calibrated by National Institute of Metrology, China..

3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using  $4\pi$  geometry. The self-absorption factor is applied in the final test result. The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.8	120	60	0.162	19.39	0.9985	Vertical

Test Results									
ССТ (К)	CRI (Ra)	R9	Rf	Rg	Luminous Flux (lm)	Luminous Efficacy (Im/W)			
3428	84.4	11	85	96	2290.9	118.1			







### 3.1 Integrating Sphere Test 4000K

Model No.	EXCYL4/WMDI/N	//8CCT3S/DIM010UNV/SP/SP/BZ/CC	Sample ID.	753	7301-4
Operate t	ime (Min.)	55	Stabilization ti	me (Min.)	50

#### Test Method

1. The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning. 2. Photometric paramters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25° C ± 1.0° C. The reference standard lamp is power 100W omni-directional Incandescent lamp and was calibrated by National Institute of Metrology, China..

3. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. Coating reflectance of the integrating sphere was 90% to 98%. Photometric measurement conditions was using  $4\pi$  geometry. The self-absorption factor is applied in the final test result. The sample was operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

#### **Integrating Sphere Test Conditions**

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.8	120	60	0.165	19.79	0.9985	Vertical

Test Results									
ССТ (К)	CRI (Ra)	R9	Rf	Rg	Luminous Flux (lm)	Luminous Efficacy (Im/W)			
3879	83.2	6	84	95	2182.2	110.3			







#### 3.2 Goniophotometer Test 3000K

Model No.	EXCYL4/WMDI/N	//8CCT3S/DIM010UNV/MD/MD/BZ/CC	Sample ID.	753	37301-1
Operate time (Min.)		60	Stabilization	time (Min.)	50

#### **Test Method**

1. The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning. 2. Photometric paramters were measured using a type C goniophotometer and software.

3. The ambient temperature shall be maintained at 25° C  $\pm$  1.0° C, measured at a point not more than 1 m from the sample and at the same height as the sample. The reference standard lamp is power 400W omni-directional Incandescent lamp and was calibrated by National Institute of Metrology, China.

4. The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1° vertical intervals and 22.5° horizontal intervals. Photometric distance was more than five times of the largest dimension of the test SSL product.

#### Goniophotometer Test Conditions

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation
24.9	120	60	0.161	19.34	0.9982	Face down and up

#### **Test Result**

÷							
Field AngleBeam Angle(10%)(50%)					Flux	Luminous Efficacy	
	Horizontal Spread	Vertical Spread	Horizontal Spread Vertical Spread		(lm)	(Im/W)	
	85.2	86.2	54.1	54.8	2124.6	109.9	





## 3.2 Goniophotometer Test (Cont'd) Light Distribution Curve





#### IsoCandela Plot





# 3.2 Goniophotometer Test (Cont'd)

Zonal Lumen Summary

Zonal	Lumen 9	Summary
Zone	Lumens	% Luminaire
0-30	731.4	34.4%
0-40	986.7	46.4%
0-60	1,055.1	49.7%
60-90	7.8	0.4%
70-100	4.0	0.2%
90-120	7.8	0.4%
0-90	1,062.9	50%
90-180	1,061.8	50%
0-180	2,124.6	100%

#### Lumens Per Zone

Lume	Lumens Per Zone												
Zone	Lumens	% Total	Zone	Lumens	% Total								
0-10	115.2	5.4%	90-100	0.7	0%								
10-20	292.7	13.8%	100-110	2.6	0.1%								
20-30	323.5	15.2%	110-120	4.5	0.2%								
30-40	255.3	12.0%	120-130	8.3	0.4%								
40-50	60.1	2.8%	130-140	59.8	2.8%								
50-60	8.3	0.4%	140-150	255.1	12%								
60-70	4.5	0.2%	150-160	323.2	15.2%								
70-80	2.6	0.1%	160-170	292.5	13.8%								
80-90	0.7	0.0%	170-180	115.1	5.4%								





# 3.2 Goniophotometer Test (Cont'd)

Intens	<u>ntensity Data(cd)</u>																
	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
0	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250
1	1251	1253	1252	1251	1248	1244	1247	1243	1243	1242	1244	1243	1247	1250	1250	1249	1251
2	1255	1254	1251	1251	1246	1246	1245	1242	1241	1241	1244	1244	1246	1248	1251	1253	1253
3	1254	1256	1253	1250	1248	1242	1241	1235	1235	1231	1233	1237	1239	1240	1246	1250	1251
4	1253	1254	1250	1247	1242	1235	1228	1225	1220	1218	1224	1225	1230	1233	1242	1248	1248
5	1250	1246	1244	1238	1231	1224	1217	1209	1208	1204	1203	1209	1215	1225	1235	1236	1240
6	1240	1238	1237	1230	1222	1216	1206	1198	1192	1189	1189	1196	1203	1214	1222	1228	1237
7	1229	1231	1232	1222	1215	1208	1199	1191	1182	1179	1180	1184	1193	1203	1211	1222	1224
8	1218	1223	1221	1215	1208	1198	1190	1180	1171	1169	1168	1176	1186	1192	1205	1215	1218
9	1205	1212	1210	1205	1197	1186	1178	1170	1161	1157	1158	1165	1173	1183	1194	1201	1209
10	1192	1198	1193	1189	1182	1173	1162	1152	1141	1138	1138	1147	1155	1164	1178	1188	1191
11	1179	1180	1176	1173	1165	1155	1142	1130	1120	1112	1113	1121	1129	1144	1161	1168	1175
12	1166	1162	1161	1157	1146	1132	1118	1107	1090	1084	1087	1094	1105	1119	1136	1146	1159
13	1148	1144	1142	1135	1125	1115	1098	1080	1065	1055	1059	1064	1076	1097	1113	1129	1140
14	1129	1122	1121	1113	1103	1091	1072	1054	1036	1022	1025	1034	1047	1071	1090	1105	1119
15	1104	1101	1102	1093	1080	1063	1044	1027	1008	994	993	1004	1021	1043	1063	1080	1095
16	1079	1076	1078	1066	1055	1037	1017	999	980	965	964	973	990	1013	1032	1055	1068
17	1050	1053	1051	1040	1028	1016	989	972	952	936	935	946	960	984	1006	1026	1040
18	1019	1024	1026	1015	1003	990	962	946	926	911	908	914	932	957	974	997	1016
19	987	996	999	990	977	958	935	916	897	880	879	887	900	929	948	969	989
20	949	965	966	958	943	920	900	884	863	848	843	853	863	886	909	932	951
25	766	761	767	755	737	716	699	681	665	653	652	659	669	685	706	726	752
30	581	573	574	570	556	540	526	517	507	499	507	509	524	533	547	563	573
35	444	451	441	438	430	418	407	395	392	390	383	393	401	412	426	436	449
40	308	295	304	307	294	271	251	227	213	203	182	206	223	215	263	281	293
45	91	80	80	63	45	37	30	31	30	28	29	28	30	33	37	58	66
50	16	14	14	13	14	14	13	14	13	13	13	12	13	13	13	14	15
55	10	9	9	9	9	9	9	9	9	8	8	9	9	9	9	10	9
60	7	6	7	7	6	6	6	6	7	6	6	6	6	6	7	7	6
65	5	5	5	4	5	4	4	4	5	5	5	4	4	4	5	4	4
70	3	3	3	3	3	3	3	3	3	4	4	3	4	4	3	3	3
75	- 3	2	2	2	2	3	3	3	2	3	2	3	3	3	2	3	3
80	2	1	2	2	1	2	1	2	2	1	1	1	1	1	1	2	2
85	1	1	1	1	0	1	0	0	0	0	1	1	1	1	1	0	0
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95	0	0	0	1	0	1	1	1	0	0	1	1	1	1	1	0	0
100	2	2	1	2	1	2	2	1	2	2	1	1	1	1	1	1	2
105	2	3	3	3	2	2	2	2	3	3	2	3	3	3	2	3	2
110	3	3	3	3	3	3	3	3	3	3	3	4	4	3	4	4	3
115	5	4	4	4	5	4	5	5	4	4	5	4	4	4	5	5	5
120	7	6	6	6	6	7	7	6	6	7	7	6	. 6	6	6	6	7
125	,	9	0	0	0	, 0	,	9	0	, 10	, 0	0	0	0	8	8	,
120	13	14	13	1/	1/	13	1/	14	15	14	13	13	13	12	13	13	13
125	30	21	30	27	17	62	80	11	15	59	27	33	30	28	20	13	30
140	212	227	251	37	204	207	204	205	202	201	37	33	222	20	192	20	212
140	213	227	201	2/1	294	307	304	295	293	281	203	215	223	200	182	203	213
145	392	395	407	418	430	438	441	401	449	430	420	412	401	393	383	390	392
150	507	517	526	540	556	570	5/4	5/3	5/3	563	547	533	524	509	507	499	507
155	665	681	699	/16	/37	/55	/67	/61	/52	/26	706	685	669	659	652	653	665
160	863	884	900	920	943	958	966	965	951	932	909	886	863	853	843	848	863
165	1008	1027	1044	1063	1080	1093	1102	1101	1095	1080	1063	1043	1021	1004	993	994	1008
170	1141	1152	1162	1173	1182	1189	1193	1198	1191	1188	1178	1164	1155	1147	1138	1138	1141
175	1208	1209	1217	1224	1231	1238	1244	1246	1240	1236	1235	1225	1215	1209	1203	1204	1208
180	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250





#### 3.3 Goniophotometer Test 3000K

Model No.	EXCYL4/WMDI/I	M/8CCT3S/DIM010UNV/NR/NR/BZ/CC	Sample ID.	753	37301-2
Operate ti	me (Min.)	60	Stabilization	time (Min.)	50

#### **Test Method**

1. The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning. 2. Photometric paramters were measured using a type C goniophotometer and software.

3. The ambient temperature shall be maintained at 25° C  $\pm$  1.0° C, measured at a point not more than 1 m from the sample and at the same height as the sample. The reference standard lamp is power 400W omni-directional Incandescent lamp and was calibrated by National Institute of Metrology, China.

4.The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1° vertical intervals and 22.5° horizontal intervals. Photometric distance was more than five times of the largest dimension of the test SSL product.

#### **Goniophotometer Test Conditions**

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation	
24.9	120	60	0.161	19.34	0.9982	Face down and up	

#### **Test Result**

Field / (10	Angle %)	Beam / (509	Flux	Luminous Efficacy	
Horizontal Spread	Vertical Spread	Horizontal Spread	Vertical Spread	(lm)	(lm/W)
81.8	81.8	38.5	38.2	2139.6	110.6





3.3 Goniophotometer Test (Cont'd) Light Distribution Curve



IsoCandela Plot







## 3.3 Goniophotometer Test (Cont'd)

#### Zonal Lumen Summary

Zonal	Lumen 9	Summary
Zone	Lumens	% Luminaire
0-30	797.3	37.3%
0-40	998.8	46.7%
0-60	1,065.0	49.8%
60-90	5.1	0.2%
70-100	2.0	0.1%
90-120	5.1	0.2%
0-90	1,070.1	50%
90-180	1,069.5	50%
0-180	2,139.6	100%

#### Lumens Per Zone

Lume	Lumens Per Zone												
Zone	Lumens	% Total	Zone	Lumens	% Total								
0-10	179.3	8.4%	90-100	0.4	0%								
10-20	368.2	17.2%	100-110	1.2	0.1%								
20-30	249.8	11.7%	110-120	3.5	0.2%								
30-40	201.5	9.4%	120-130	8.2	0.4%								
40-50	58.0	2.7%	130-140	58.0	2.7%								
50-60	8.2	0.4%	140-150	201.4	9.4%								
60-70	3.5	0.2%	150-160	249.7	11.7%								
70-80	1.2	0.1%	160-170	367.9	17.2%								
80-90	0.4	0.0%	170-180	179.2	8.4%								





## 3.3 Goniophotometer Test (Cont'd)

Intens	ity Dat	ta(cd)															
	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
0	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
1	1971	1972	1973	1977	1973	1969	1966	1963	1958	1959	1958	1957	1959	1962	1966	1966	1968
2	1972	1972	1975	1974	1973	1971	1965	1961	1959	1958	1956	1956	1959	1960	1966	1966	1967
3	1968	1975	1980	1983	1981	1977	1969	1958	1950	1942	1941	1945	1948	1955	1958	1963	1967
4	1961	1964	1980	1990	1979	1968	1948	1938	1927	1917	1910	1918	1924	1939	1948	1955	1962
5	1946	1954	1970	1980	1973	1951	1929	1910	1895	1885	1882	1888	1899	1917	1929	1940	1944
6	1927	1939	1957	1969	1958	1929	1906	1887	1863	1856	1849	1856	1873	1892	1907	1919	1926
7	1911	1920	1939	1956	1944	1913	1885	1857	1832	1817	1812	1823	1841	1862	1883	1893	1908
8	1894	1905	1922	1938	1923	1891	1859	1826	1806	1783	1778	1792	1812	1837	1859	1876	1888
9	1867	1880	1894	1913	1898	1863	1831	1797	1763	1742	1735	1748	1771	1800	1828	1847	1866
10	1815	1833	1848	1868	1846	1818	1772	1731	1697	1673	1662	1673	1701	1733	1771	1803	1823
11	1756	1771	1786	1802	1784	1743	1692	1647	1605	1577	1570	1578	1600	1639	1682	1733	1759
12	1685	1706	1720	1724	1703	1654	1601	1557	1507	1490	1479	1481	1504	1554	1593	1651	1689
13	1610	1635	1645	1645	1617	1569	1511	1461	1419	1388	1380	1386	1414	1461	1508	1563	1607
14	1535	1564	1568	1566	1528	1494	1418	1355	1324	1287	1281	1295	1323	1379	1425	1472	1535
15	1465	1491	1502	1482	1460	1412	1328	1263	1229	1198	1190	1207	1238	1301	1344	1389	1455
16	1381	1410	1425	1401	1378	1328	1250	1180	1134	1111	1097	1116	1158	1215	1266	1305	1373
17	1303	1329	1339	1322	1305	1238	1164	1091	1043	1017	1006	1030	1072	1131	1186	1219	1286
18	1225	1246	1258	1240	1220	1149	1076	1015	955	932	926	947	986	1042	1109	1140	1200
19	1140	1170	1180	1161	1133	1060	992	937	879	855	844	867	901	954	1029	1071	1119
20	1042	1089	1097	1077	1040	969	905	855	805	776	776	796	823	875	939	993	1037
25	568	585	599	590	550	519	488	462	438	426	426	428	438	461	494	532	573
30	374	379	382	386	380	378	367	361	356	351	350	348	351	352	357	363	372
35	331	335	340	342	347	340	335	329	328	321	319	316	320	320	326	326	331
40	258	264	283	291	285	294	255	232	214	191	189	185	202	191	233	250	262
45	58	74	82	72	58	40	34	33	27	26	26	28	27	30	32	49	58
50	15	14	14	13	15	13	13	13	13	13	12	13	13	13	13	15	15
55	9	10	10	9	9	9	9	9	9	9	8	8	9	9	9	9	9
60	6	6	6	7	6	6	5	6	5	5	5	5	5	6	6	6	6
65	4	3	4	4	4	3	3	3	3	3	3	4	3	3	4	4	3
70	3	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2
70	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
80	0	1	0	1	1	1	0	1	1	1	1	1	1	1	1	0	1
85	0	- 1	1	- 0	- 0	0	0	0	- 0	- 0	- 1	- 1	0	- 0	1	1	
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05	0	0	0	0	0	0	1	1	0	1	1	0	0	1	1	0	0
100	1	1	0	1	1	1	0	1	1	0	1	1	1	1	1	1	1
100	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
110	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
115	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3
110	5	5	5	5		7	6	5	5		<del>۲</del>	5	5		5	5	5
120	J	0	0	0	0	/	10	10	0	0	0	0		J 0	0	5	
125	9	12	12	9	9	12	10	10	15	15	9	12	12	0	0	12	12
130	13	13	13	13	15	13	14	14	15	15	13	13	13	13	12	13	13
135	2/	33	34	40	305	72	82	74	36	49	32	30	2/	28	20	20	2/
140	214	232	255	294	285	291	283	264	262	250	233	191	202	185	189	191	214
145	328	329	335	340	347	342	340	335	331	326	326	320	320	316	319	321	328
150	356	361	367	378	380	386	382	379	372	363	357	352	351	348	350	351	356
155	438	462	488	519	550	590	599	585	573	532	494	461	438	428	426	426	438
160	805	855	905	969	1040	1077	1097	1089	1037	993	939	875	823	796	776	776	805
165	1229	1263	1328	1412	1460	1482	1502	1491	1455	1389	1344	1301	1238	1207	1190	1198	1229
170	1697	1731	1772	1818	1846	1868	1848	1833	1823	1803	1771	1733	1701	1673	1662	1673	1697
175	1895	1910	1929	1951	1973	1980	1970	1954	1944	1940	1929	1917	1899	1888	1882	1885	1895
180	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969





#### 3.4 Goniophotometer Test 3000K

Model No.	EXCYL4/WMDI/I	M/8CCT3S/DIM010UNV/VN/VN/BZ/CC	Sample ID.	753	37301-3
Operate ti	me (Min.)	60	Stabilization	time (Min.)	50

#### **Test Method**

1. The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning. 2. Photometric paramters were measured using a type C goniophotometer and software.

3. The ambient temperature shall be maintained at 25° C ± 1.0° C, measured at a point not more than 1 m from the sample and at the same height as the sample. The reference standard lamp is power 400W omni-directional Incandescent lamp and was calibrated by National Institute of Metrology, China.

4.The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1° vertical intervals and 22.5° horizontal intervals. Photometric distance was more than five times of the largest dimension of the test SSL product.

#### **Goniophotometer Test Conditions**

Temperature (°C)	Voltage (Vac)	Voltage (Vac) Frequency (Hz)		Power (W)	Power Factor	Orientation	
24.9	120	60	0.161	19.31	0.9982	Face down and up	

#### **Test Result**

Field / (10	Angle %)	Beam / (509	Angle %)	Flux	Luminous Efficacy
Horizontal Spread	Vertical Spread	Horizontal Spread	Vertical Spread	(lm)	(lm/W)
41.8	n/a	21.1	n/a	2170.9	112.4





## 3.4 Goniophotometer Test (Cont'd) Light Distribution Curve





IsoCandela Plot





## 3.4 Goniophotometer Test (Cont'd)

#### Zonal Lumen Summary

Zonal	Lumen S	Summary
Zone	Lumens	% Luminaire
0-30	822.1	37.9%
0-40	1,018.9	46.9%
0-60	1,082.8	49.9%
60-90	3.5	0.2%
70-100	1.7	0.1%
90-120	3.5	0.2%
0-90	1,086.3	50%
90-180	1,084.7	50%
0-180	2,170.9	100%

#### Lumens Per Zone

Lume	umens Per Zone												
Zone	Lumens	% Total	Zone	Lumens	% Total								
0-10	341.2	15.7%	90-100	0.3	0%								
10-20	299.2	13.8%	100-110	1.0	0%								
20-30	181.7	8.4%	110-120	2.1	0.1%								
30-40	196.9	9.1%	120-130	8.3	0.4%								
40-50	55.5	2.6%	130-140	55.3	2.5%								
50-60	8.3	0.4%	140-150	196.8	9.1%								
60-70	2.1	0.1%	150-160	181.6	8.4%								
70-80	1.0	0.0%	160-170	298.3	13.7%								
80-90	0.3	0.0%	170-180	340.9	15.7%								





# 3.4 Goniophotometer Test (Cont'd)

Intens	ity Dat	:a(cd)															
	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
0	4594	4594	4594	4594	4594	4594	4594	4594	4594	4594	4594	4594	4594	4594	4594	4594	4594
1	4585	4616	4625	4631	4631	4619	4615	4598	4581	4568	4553	4550	4558	4569	4580	4589	4600
2	4607	4614	4622	4631	4636	4623	4611	4597	4584	4564	4550	4543	4557	4566	4575	4589	4604
3	4583	4604	4635	4657	4649	4614	4553	4487	4437	4403	4412	4437	4485	4522	4535	4566	4582
4	4545	4533	4608	4618	4591	4515	4312	4196	4093	4047	4068	4132	4251	4361	4439	4467	4519
5	4486	4456	4474	4450	4400	4167	3958	3808	3680	3652	3696	3810	3944	4116	4300	4365	4395
6	4310	4255	4253	4225	4010	3770	3561	3454	3332	3303	3361	3464	3597	3791	4002	4164	4216
7	4076	4038	4019	3959	3689	3472	3254	3140	3030	2996	3055	3174	3305	3455	3651	3936	4017
8	3785	3788	3783	3697	3420	3203	2999	2873	2768	2747	2797	2913	3034	3195	3386	3673	3811
9	3457	3554	3500	3399	3145	2950	2752	2593	2500	2454	2493	2578	2750	2920	3105	3375	3526
10	3106	3177	3110	2940	2765	2534	2367	2186	2107	2059	2068	2150	2337	2559	2753	2931	3098
11	2678	2682	2603	2458	2294	2060	1911	1758	1687	1642	1655	1739	1884	2082	2332	2477	2599
12	2282	2206	2158	2026	1861	1674	1546	1416	1349	1334	1344	1384	1511	1675	1870	2052	2173
13	1915	1819	1784	1648	1513	1382	1252	1151	1105	1085	1093	1149	1225	1356	1519	1667	1777
14	1592	1495	1460	1341	1244	1141	1019	953	917	890	891	949	1009	1106	1239	1373	1461
15	1345	1242	1202	1125	1021	940	836	804	768	745	749	789	838	916	1014	1136	1205
16	1124	1031	985	950	848	797	710	692	660	641	652	680	716	779	839	952	1005
17	935	873	835	807	734	690	623	607	586	569	581	604	619	672	718	814	851
18	785	756	728	697	642	615	559	545	535	520	528	547	554	598	631	707	748
19	663	658	647	617	575	551	513	503	495	485	491	503	508	540	567	621	659
20	572	587	581	556	522	497	479	469	465	455	458	463	471	489	518	551	589
25	399	393	393	393	386	381	378	377	378	368	373	369	369	372	376	382	394
30	357	351	357	365	363	359	354	354	349	349	346	344	343	344	346	349	353
35	324	331	326	338	336	331	326	325	322	317	314	314	315	315	319	323	325
40	252	260	272	273	263	228	234	211	199	188	183	182	199	186	233	243	250
45	72	72	67	55	37	35	31	28	28	29	31	32	33	38	39	47	55
50	19	16	17	16	16	16	15	15	15	15	15	16	16	16	16	16	16
55	11	10	9	9	9	10	8	8	8	8	9	9	10	10	9	10	10
60	5	5	4	4	3	4	4	3	4	4	4	4	4	4	4	4	4
65	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2
70	2	1	2	1	2	1	1	1	1	1	1	2	1	1	2	1	2
75	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
80	0	1	0	0	1	1	1	1	1	0	1	0	1	1	1	1	0
85	0	0	0	1	0	0	1	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	0
05	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
100	1	1	1	1	1	0	0	1	0	1	1	1	1	0	1	0	1
105	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
110	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	1	1
115	1	1	2	1	2	2	2	1	2	1	2	1	1	2	1	1	1
120	2	2	2	2	2	2	2	2 5	2	2	2	2	1	2	2	2	Z
120	4	د ٥	4	4	3	4	4	10	4	4	4	4	4	4	4	4	4
125	0	0	0	10	9	9	9	10	10	10	9	10	10	9	9	0	0
130	15	15	15	10	10	10	17	10	10	10	10	10	10	10	15	15	15
135	28	28	31	35	37	55	67	/2	55	4/	39	38	33	32	31	29	28
140	199	211	234	228	263	2/3	2/2	260	250	243	233	186	199	182	183	188	199
145	322	325	326	331	336	338	326	331	325	323	319	315	315	314	314	317	322
150	349	354	354	359	363	365	357	351	353	349	346	344	343	344	346	349	349
155	378	377	378	381	386	393	393	393	394	382	376	372	369	369	373	368	378
160	465	469	479	497	522	556	581	587	589	551	518	489	471	463	458	455	465
165	768	804	836	940	1021	1125	1202	1242	1205	1136	1014	916	838	789	749	745	768
170	2107	2186	2367	2534	2765	2940	3110	3177	3098	2931	2753	2559	2337	2150	2068	2059	2107
175	3680	3808	3958	4167	4400	4450	4474	4456	4395	4365	4300	4116	3944	3810	3696	3652	3680
180	4594	4594	4594	4594	4594	4594	4594	4594	4594	4594	4594	4594	4594	4594	4594	4594	4594





#### 3.5 Goniophotometer Test 3000K

Model No.	EXCYL4/WMDI/M	//8CCT3S/DIM010UNV/SP/SP/BZ/CC	Sample ID.	7301-4	
Operate ti	me (Min.)	60	Stabilization	time (Min.)	50

#### **Test Method**

1. The sample was tested according to the IES LM-79-2008, and the product is assume to be brand new without seasoning. 2. Photometric paramters were measured using a type C goniophotometer and software.

3. The ambient temperature shall be maintained at 25° C  $\pm$  1.0° C, measured at a point not more than 1 m from the sample and at the same height as the sample. The reference standard lamp is power 400W omni-directional Incandescent lamp and was calibrated by National Institute of Metrology, China.

4.The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1° vertical intervals and 22.5° horizontal intervals. Photometric distance was more than five times of the largest dimension of the test SSL product.

#### **Goniophotometer Test Conditions**

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Orientation	
24.9	120	60	0.161	19.34	0.9982	Face down and up	

#### **Test Result**

Field / (10	Angle %)	Beam / (509	Angle %)	Flux	Luminous Efficacy
Horizontal Spread	Vertical Spread	Horizontal Spread	Vertical Spread	(lm)	(lm/W)
26.6	n/a	14.1	n/a	2209.7	114.3





### 3.5 Goniophotometer Test (Cont'd) Light Distribution Curve



# IsoCandela Plot







### 3.5 Goniophotometer Test (Cont'd)

#### Zonal Lumen Summary

Zonal	Lumen S	Summary
Zone	Lumens	% Luminaire
0-30	849.7	38.5%
0-40	1,038.4	47%
0-60	1,103.2	49.9%
60-90	1.9	0.1%
70-100	0.9	0%
90-120	) 1.9	0.1%
0-90	1,105.1	50%
90-180	1,104.6	50%
0-180	2,209.7	100%

#### Lumens Per Zone

Lume	ins Per 7	Zone			
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	466.5	21.1%	90-100	0.2	0%
10-20	216.5	9.8%	100-110	0.6	0%
20-30	166.7	7.5%	110-120	1.2	0.1%
30-40	188.6	8.5%	120-130	6.2	0.3%
40-50	58.7	2.7%	130-140	58.7	2.7%
50-60	6.2	0.3%	140-150	188.6	8.5%
60-70	1.2	0.1%	150-160	166.6	7.5%
70-80	0.5	0.0%	160-170	216.4	9.8%
80-90	0.2	0.0%	170-180	466.3	21.1%





### 3.5 Goniophotometer Test (Cont'd)

Intens	ity Dat	ta(cd)															
	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
0	9022	9022	9022	9022	9022	9022	9022	9022	9022	9022	9022	9022	9022	9022	9022	9022	9022
1	8924	9110	9254	9342	9324	9231	9142	9065	9010	8961	8913	8846	8761	8736	8731	8800	8943
2	8921	9108	9290	9332	9295	9187	9073	8996	8963	8906	8842	8752	8679	8633	8651	8724	8908
3	8317	9083	9204	8685	8256	7985	7827	7792	7836	7781	7664	7536	7549	7646	7767	7994	8334
4	7535	8115	8064	7663	7312	7166	6974	6859	6686	6562	6504	6542	6734	6940	7080	7284	7550
5	6984	7227	7257	6991	6853	6581	6187	5848	5539	5373	5316	5371	5620	6048	6454	6721	7009
6	6129	6492	6446	6244	6124	5576	5174	4900	4467	4200	4235	4322	4558	4833	5286	5884	6166
7	5361	5645	5632	5530	5253	4623	4293	4010	3555	3390	3410	3432	3644	3967	4319	5011	5382
8	4632	4820	4880	4770	4501	3977	3627	3308	2965	2863	2857	2867	3012	3370	3661	4221	4650
9	3797	3978	4041	3910	3660	3369	2998	2689	2457	2327	2299	2363	2483	2754	3055	3408	3785
10	2788	2940	3025	2961	2735	2550	2239	1931	1757	1645	1607	1695	1822	1994	2292	2530	2781
11	1938	2044	2117	2143	1998	1817	1591	1344	1235	1157	1151	1180	1285	1416	1621	1790	1930
12	1426	1491	1551	1552	1474	1336	1163	1019	929	882	880	900	945	1046	1182	1303	1424
13	1104	1163	1193	1176	1117	998	885	806	742	722	709	715	737	801	896	1017	1107
14	879	940	955	938	871	781	711	667	629	617	607	598	610	646	719	819	889
15	739	792	792	773	719	644	602	580	556	546	537	528	532	557	605	684	745
16	640	687	680	659	616	562	532	523	502	493	488	480	479	502	528	594	645
17	571	611	605	583	545	508	484	483	462	454	452	444	444	463	480	534	575
18	522	551	549	530	498	469	450	449	431	425	423	416	419	433	446	490	527
19	485	506	507	487	462	438	426	422	408	404	401	398	401	411	421	454	488
20	451	465	469	450	432	414	404	398	390	386	383	383	386	393	403	423	451
25	367	362	374	375	373	363	362	359	355	343	351	346	349	347	350	355	367
30	337	341	341	346	343	340	338	332	329	329	329	327	332	331	328	331	337
35	311	315	318	321	325	320	317	309	309	304	304	299	302	302	305	306	311
40	241	244	264	271	267	274	235	216	200	179	175	174	185	170	219	229	240
45	59	72	76	70	57	38	38	45	38	35	35	33	35	40	35	49	59
50	19	21	22	22	23	26	26	22	23	22	20	19	20	21	20	19	20
55	4	5	4	6	5	5	4	5	3	3	3	3	4	4	5	4	4
60	2	2	2	1	2	2	1	2	2	2	2	1	2	2	2	2	2
65	1	1	2	1	2	1	1	1	2	1	1	1	1	1	1	2	1
70	0	1	1	1	1	0	1	0	1	1	0	1	0	1	1	0	0
75	0	1	0	1	0	1	1	0	0	0	0	1	0	1	0	1	1
80	0	1	1	0	0	1	1	0	0	0	1	1	1	0	1	1	0
85	0	0	1	0	0	0	0	1	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	0
95	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
100	0	0	1	1	0	0	1	1	0	1	1	0	1	1	1	0	0
105	0	0	1	1	0	1	0	1	1	1	0	1	0	1	0	0	0
110	1	0	1	0	1	1	1	1	0	0	1	1	0	1	0	1	1
115	2	1	- 1	1	2	1	2	1	1	2	1	1	1	1	1	1	2
120	- 2	- 2	- 1	-	- 2	- 1	- 2	-	- 2	- 2	-	- 2	- 2	- 1	- 2	2	- 2
125	3	- 5	- 4	- 5	5	- 6	4	5	4	4	5	4	4	3	3	- 3	- 3
120	22	22	26	26	22	22	22	21	20	10	20	21	20	10	20	22	22
135	20	45	20	20	57	70	76	72	50	19	20	40	20	22	20	22	20
140	200	73	30	274	37	271	264	244	240	220	210	170	105	174	175	170	200
140	200	210	235	2/4	207	2/1	204	244	240	229	219	1/0	185	1/4	1/5	1/9	200
145	309	309	317	320	325	321	318	315	311	306	305	302	302	299	304	304	309
150	329	332	338	340	343	346	341	341	337	331	328	331	332	327	329	329	329
155	355	359	362	363	373	375	374	362	367	355	350	347	349	346	351	343	355
160	390	398	404	414	432	450	469	465	451	423	403	393	386	383	383	386	390
165	556	580	602	644	719	773	792	792	745	684	605	557	532	528	537	546	556
170	1757	1931	2239	2550	2735	2961	3025	2940	2781	2530	2292	1994	1822	1695	1607	1645	1757
175	5539	5848	6187	6581	6853	6991	7257	7227	7009	6721	6454	6048	5620	5371	5316	5373	5539
180	9022	9022	9022	9022	9022	9022	9022	9022	9022	9022	9022	9022	9022	9022	9022	9022	9022





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