

IES LM-79-19

MEASUREMENT AND TEST REPORT

For

RAB LIGHTING INC

170 Ludlow Ave PO BOX 970 Northvale, NJ 07647-2305 USA

Test Model: H10044(HID-50-EX39-850-BYP-PT-ECO)

Report Type:	Electrical and Photometric tests including: Luminous Flux, Power Factor, Chromaticity, Luminous Intensity Distribution
Reviewed By:	Hexy He 
Report Number:	R2DG201104051-10-1
Test Date:	2020-11-05 to 2020-11-09
Report Date:	2020-12-02
Approved by:	Blake Zhang / EE Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Dongguan). No.69,Pulongcun ,Puxinhu Industrial Area, Tangxia , Dongguan, Guangdong, China. Tel: +86-0769-86858888 Fax:+86-0769-86858588
Accreditation:	The IAS Accreditation Number TL-460.

1. Product Description

General Information:

One test sample was in good condition and received on 2020-11-04, and used for testing.

#Model Tested: H10044(HID-50-EX39-850-BYP-PT-ECO)

#Manufacturer: RAB LIGHTING INC

#Product Designation: Screw-base Replacements for HID Lamps in Outdoor Pole/Arm-mounted Decorative Luminaires

Burning Time Before Test: 0hour(For New Products)

#Rated Values:

Rated Voltage/Frequency: 120-277V 50/60Hz

Rated Power: 50W

Nominal CCT: 5000K

Nominal Lumen Output: 7500lm

#Family Declaration

RAB LIGHTING INC declares that there are some differences between multiple models and tested model. Details as below:

Tested Model	Multiple Models	Variations	Details
H10044(HID-50-EX39-850-BYP-PT-ECO)	HID-50-EX39-850-BYP-PT-ECO	Model number	The product is the same, except for the model number.

2. Standards Used

- ANSI/IES LM-79-19: Approved method :Optical and Electrical Measurements of Solid-State Lighting Products
- ANSI C82.77-10-2014: Harmonic Emission Limits – Related Power Quality Requirements for Lighting
- IES TM-30-18: IES Method for Evaluating Light Source Color Rendition (This method is not in IAS accreditation scope)

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
1.5m temperature integrating sphere	SENSING	SPR-600	S09008	2020-10-21	2021-10-20
High-precision rapid spectral analysis system	EVERFINE	HAAS-2000	M112048CA1361125	2020-10-21	2021-10-20
Digital power meter	YOKOGAWA	WT310	13398	2020-07-01	2021-06-30
Programmable Precision DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	2020-04-10	2021-04-09
thermometer	SENSING	NA	NA	2020-03-13	2021-03-12
Standard Light Source	EVERFINE	D204	N/A	2020-07-19	2021-07-18
Precision frequency power supply	ALL Power	APW-105N	970613	2020-03-10	2021-03-09

Device	Manufacture	Model No	Serial No	Calibration date	Calibration due date
AC POWER SUPPLY	EVERFINE	VPS1030 PWM	1012017	2020-03-13	2021-03-12
Digital CC&CV DC Power Supply	EVERFINE	WY12010	1009009	2020-03-13	2021-03-12
Digital power meter	YOKOGAWA	WT-210	91j926132	2020-03-13	2021-03-12
full-field speed goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	2020-03-13	2021-03-12
Wireless Remote Sensor	N/A	433MHz	N/A	2020-03-13	2021-03-12
Standard Light Source	EVERFINE	D908	1012003	2020-10-20	2021-10-19

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

4. Test Method

Product was tested with no seasoning. All stabilization and measurements were made in compliance with ANSI/IES LM-79-19. The product was operated at rated voltage or at voltage required by manufacturer. The ambient temperature of the sample was maintained at $25^{\circ}\text{C} \pm 1.2^{\circ}\text{C}$ during measurement. And relative humidity is maintained between 10% and 65%. The air flow around the SSL product is less than 0.2m/s.

Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, Spectroradiometer, and integrating sphere. The integrating sphere system is calibrated by standard spectrum light source before measurement.

4π geometry was used during measurement. The product was operated in its intended orientation in application and was recorded in this report.

The uncertainty of the light output (luminous flux) measurements is $U=2.1\%$ ($K=2$), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is $U=22\text{K}$ ($K=2$), at the 95% confidence level. The uncertainty of the CRI is $U=2.1(K=2)$, at the 95% confidence level.

The uncertainty of power meter AC current $U=0.39\%$ of rdg, AC Voltage $U=0.25\%$ of rdg, Power $U=0.42\%$ ($K=2$), at the 95% confidence level.

Goniophotometer System

The goniophotometer system is calibrated by standard light source before measurement.

Type C goniophotometer was used for measuring total luminous flux, luminous intensity distribution, and color spatial uniformity. The product was operated in its intended orientation in application and was recorded in this report. For luminous intensity distribution, The vertical angle (γ) test intervals were set no more than 2.5 degree, The horizontal angle (C plane) test intervals were set no more than 22.5 degree. For color spatial uniformity, The vertical angle (γ) test intervals were set no more than 90 degree, The horizontal angle (C plane) test intervals were set no more than 10 degree.

The uncertainty of the luminous intensity is $U=2.00\%$ ($K=2$), at the 95% confidence level.

Fidelity Index and Gamut Index Calculation

The R_i , R_g was calculated according to IES TM-30-18 by using calculation tools. The calculation was based on the measured SPD from 380nm to 780nm with 1nm intervals. All the colors in this report is for reference only.

5. Test Result

[Integrating Sphere System]

Total operating time for integrating sphere test: **1.0 hour**

Test orientation: **Downward**

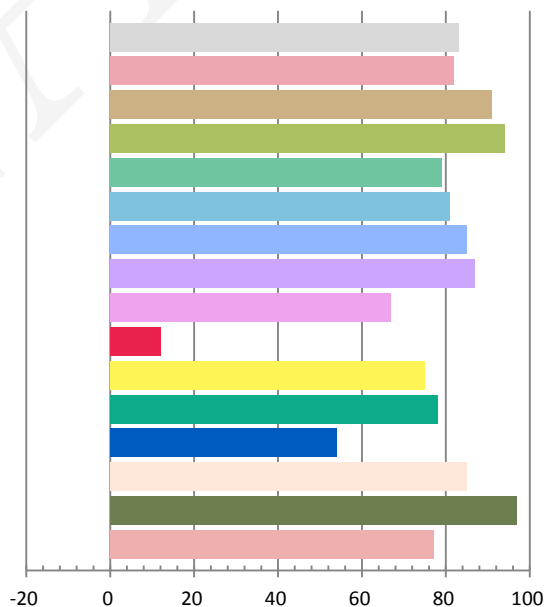
Photometric and Electrical Measurement Result

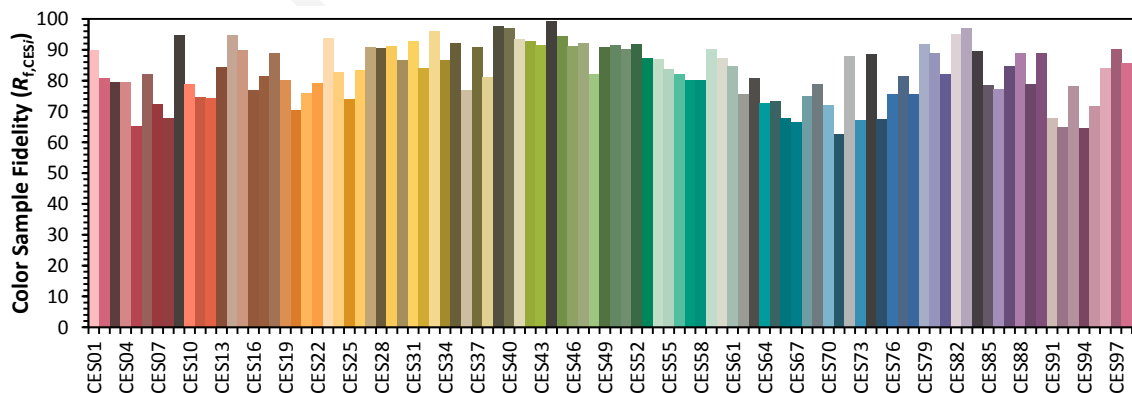
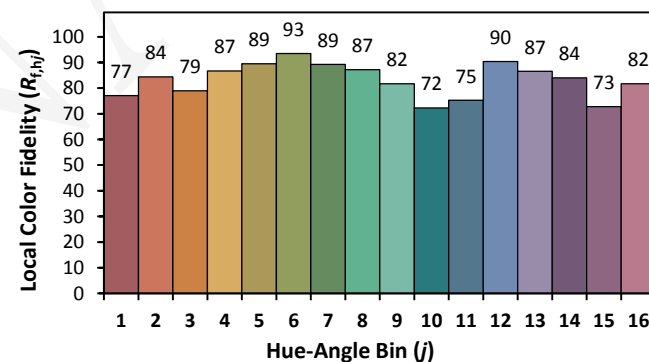
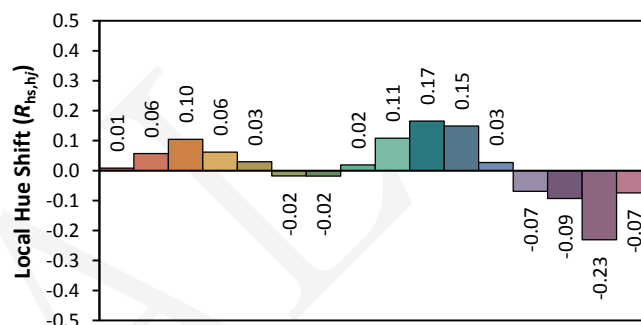
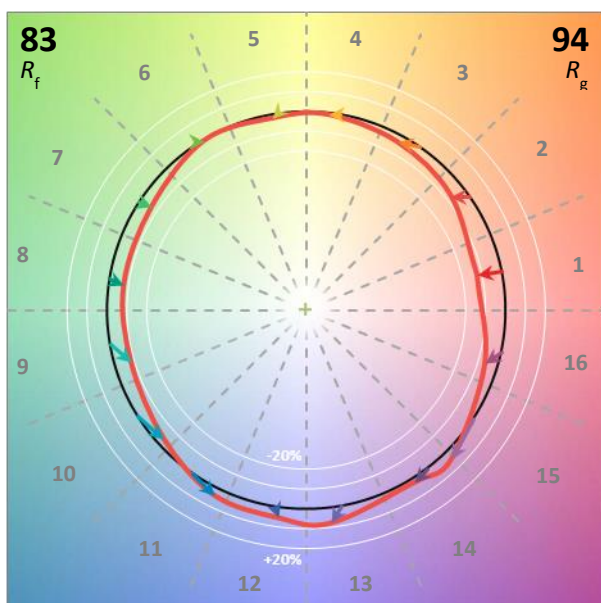
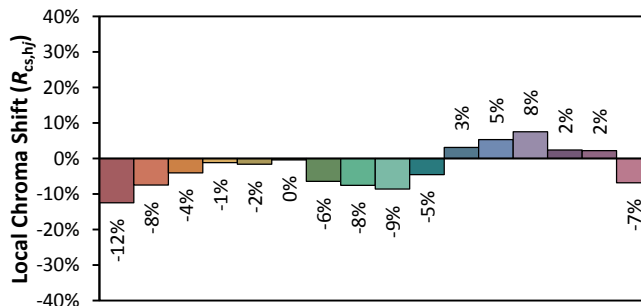
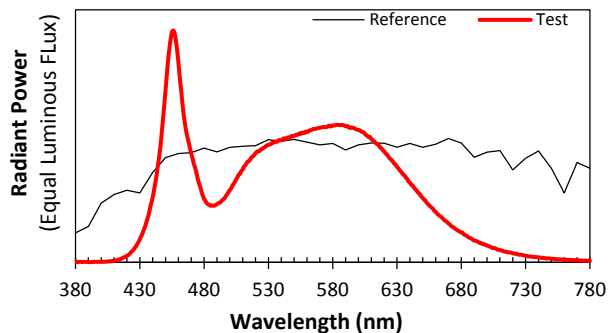
Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	Luminous Flux(lm)	Efficacy (lm/W)
120.1	60	0.4083	48.55	0.9901	5101.4	105.07

Radiant Flux (W)	CCT (K)	Duv	x	y	u'	v'
15.9	4996	0.00162	0.3455	0.3552	0.2103	0.4865

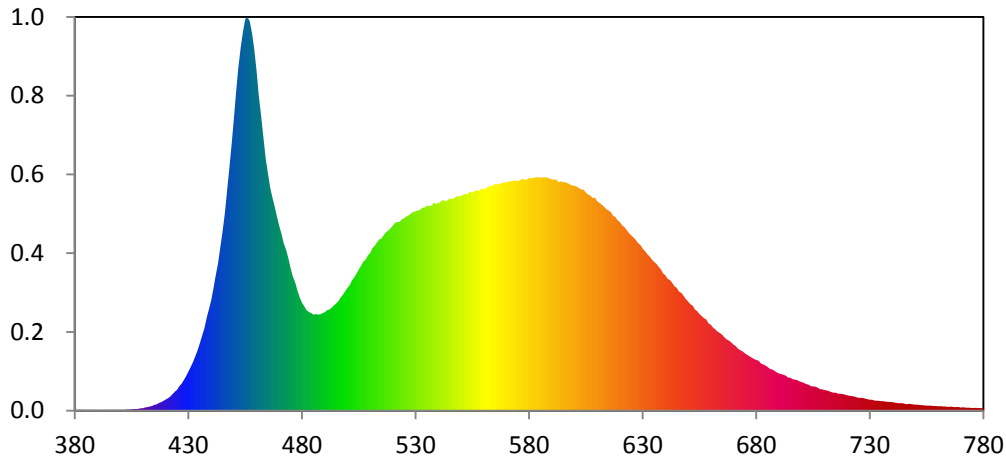
Color Rendering Index

Ra			
83.2			
R1	R2	R3	R4
82	91	94	79
R5	R6	R7	R8
81	85	87	67
R9	R10	R11	R12
12	75	78	54
R13	R14	R15	
85	97	77	





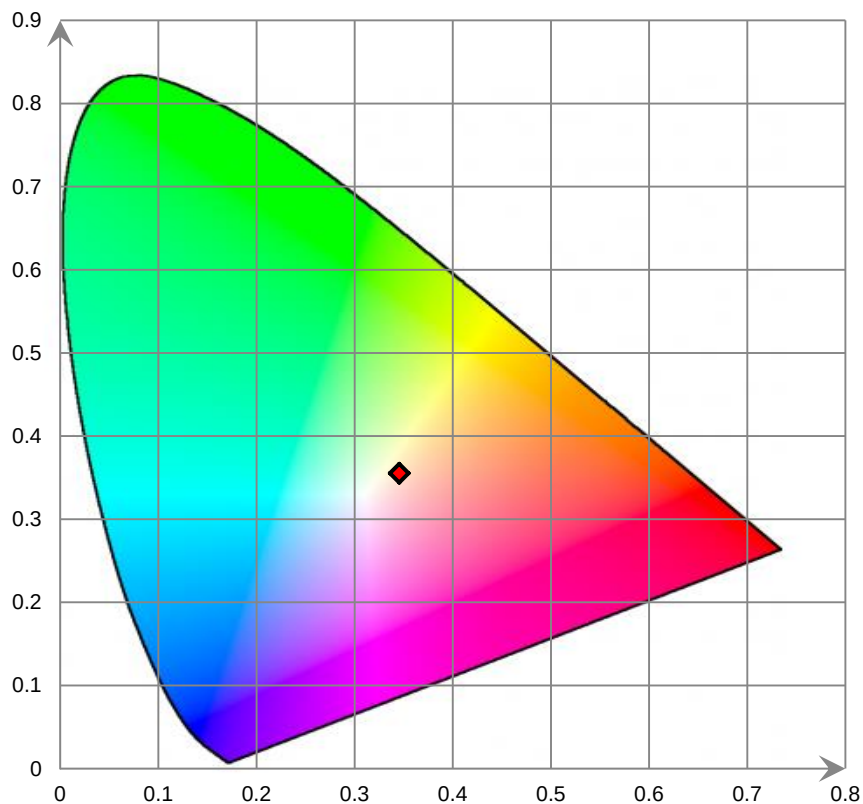
Relative Spectral Power Distribution



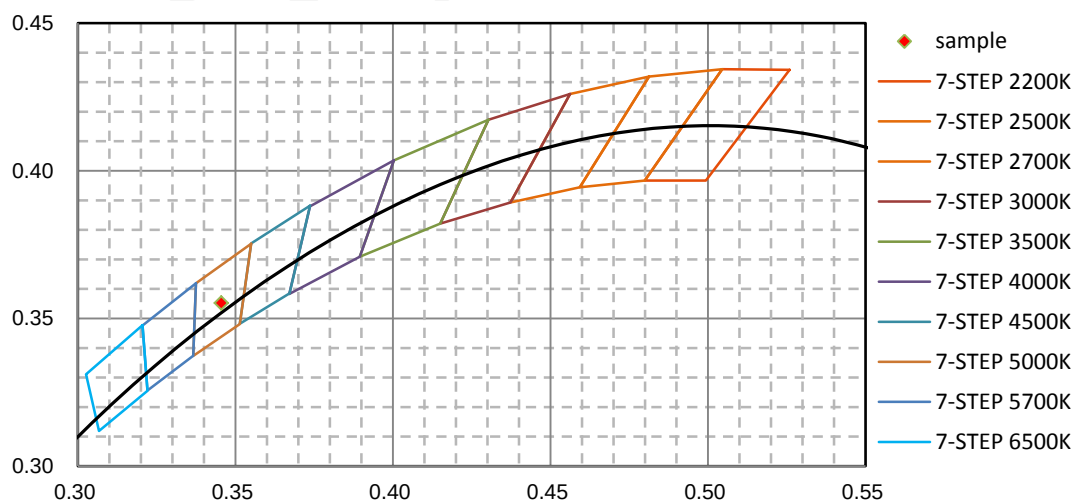
nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	4.245E-01	421	4.328E+00	462	1.029E+02	503	4.644E+01	544	7.321E+01
381	1.177E-01	422	4.938E+00	463	9.505E+01	504	4.774E+01	545	7.394E+01
382	3.013E-01	423	5.782E+00	464	8.793E+01	505	4.917E+01	546	7.368E+01
383	2.713E-01	424	6.642E+00	465	8.268E+01	506	5.047E+01	547	7.404E+01
384	3.320E-01	425	7.292E+00	466	7.777E+01	507	5.190E+01	548	7.472E+01
385	1.877E-01	426	8.505E+00	467	7.426E+01	508	5.255E+01	549	7.462E+01
386	2.259E-01	427	9.465E+00	468	7.092E+01	509	5.409E+01	550	7.481E+01
387	3.305E-01	428	1.076E+01	469	6.749E+01	510	5.496E+01	551	7.530E+01
388	2.298E-01	429	1.208E+01	470	6.432E+01	511	5.660E+01	552	7.551E+01
389	2.727E-01	430	1.362E+01	471	6.156E+01	512	5.739E+01	553	7.548E+01
390	1.166E-01	431	1.521E+01	472	5.827E+01	513	5.863E+01	554	7.631E+01
391	1.827E-01	432	1.698E+01	473	5.600E+01	514	5.967E+01	555	7.596E+01
392	1.574E-01	433	1.898E+01	474	5.305E+01	515	6.000E+01	556	7.658E+01
393	2.031E-01	434	2.101E+01	475	4.957E+01	516	6.119E+01	557	7.677E+01
394	2.772E-01	435	2.342E+01	476	4.670E+01	517	6.220E+01	558	7.650E+01
395	2.871E-01	436	2.603E+01	477	4.471E+01	518	6.270E+01	559	7.740E+01
396	2.882E-01	437	2.850E+01	478	4.178E+01	519	6.359E+01	560	7.716E+01
397	2.787E-01	438	3.232E+01	479	3.944E+01	520	6.448E+01	561	7.739E+01
398	3.468E-01	439	3.523E+01	480	3.761E+01	521	6.545E+01	562	7.815E+01
399	2.271E-01	440	3.834E+01	481	3.640E+01	522	6.570E+01	563	7.813E+01
400	3.345E-01	441	4.239E+01	482	3.503E+01	523	6.581E+01	564	7.846E+01
401	2.838E-01	442	4.693E+01	483	3.444E+01	524	6.672E+01	565	7.901E+01
402	3.416E-01	443	5.127E+01	484	3.404E+01	525	6.709E+01	566	7.881E+01
403	3.940E-01	444	5.678E+01	485	3.346E+01	526	6.762E+01	567	7.910E+01
404	4.260E-01	445	6.226E+01	486	3.364E+01	527	6.811E+01	568	7.925E+01
405	4.754E-01	446	6.839E+01	487	3.355E+01	528	6.869E+01	569	7.956E+01
406	6.139E-01	447	7.621E+01	488	3.352E+01	529	6.923E+01	570	7.953E+01
407	6.045E-01	448	8.462E+01	489	3.400E+01	530	6.949E+01	571	7.983E+01
408	6.779E-01	449	9.273E+01	490	3.432E+01	531	6.974E+01	572	7.991E+01
409	8.709E-01	450	1.016E+02	491	3.501E+01	532	6.999E+01	573	8.009E+01
410	8.644E-01	451	1.110E+02	492	3.523E+01	533	7.071E+01	574	8.009E+01
411	1.142E+00	452	1.195E+02	493	3.584E+01	534	7.079E+01	575	7.996E+01
412	1.266E+00	453	1.265E+02	494	3.665E+01	535	7.144E+01	576	8.035E+01
413	1.494E+00	454	1.320E+02	495	3.732E+01	536	7.134E+01	577	8.087E+01
414	1.655E+00	455	1.363E+02	496	3.809E+01	537	7.144E+01	578	8.036E+01
415	2.057E+00	456	1.372E+02	497	3.935E+01	538	7.237E+01	579	8.059E+01
416	2.206E+00	457	1.357E+02	498	4.033E+01	539	7.216E+01	580	8.106E+01
417	2.743E+00	458	1.314E+02	499	4.164E+01	540	7.231E+01	581	8.090E+01
418	3.018E+00	459	1.257E+02	500	4.278E+01	541	7.278E+01	582	8.112E+01
419	3.473E+00	460	1.184E+02	501	4.373E+01	542	7.340E+01	583	8.136E+01
420	3.900E+00	461	1.097E+02	502	4.536E+01	543	7.306E+01	584	8.132E+01

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
585	8.115E+01	626	6.033E+01	667	2.487E+01	708	7.530E+00	749	2.206E+00
586	8.123E+01	627	5.942E+01	668	2.439E+01	709	7.461E+00	750	2.131E+00
587	8.129E+01	628	5.834E+01	669	2.377E+01	710	7.240E+00	751	2.084E+00
588	8.123E+01	629	5.774E+01	670	2.301E+01	711	7.095E+00	752	1.992E+00
589	8.093E+01	630	5.651E+01	671	2.252E+01	712	6.856E+00	753	1.951E+00
590	8.056E+01	631	5.567E+01	672	2.160E+01	713	6.505E+00	754	1.902E+00
591	8.049E+01	632	5.452E+01	673	2.107E+01	714	6.269E+00	755	1.797E+00
592	8.047E+01	633	5.377E+01	674	2.067E+01	715	6.308E+00	756	1.787E+00
593	7.957E+01	634	5.272E+01	675	2.001E+01	716	5.944E+00	757	1.766E+00
594	7.990E+01	635	5.187E+01	676	1.948E+01	717	5.876E+00	758	1.658E+00
595	7.960E+01	636	5.122E+01	677	1.899E+01	718	5.861E+00	759	1.652E+00
596	7.960E+01	637	5.013E+01	678	1.849E+01	719	5.617E+00	760	1.570E+00
597	7.924E+01	638	4.924E+01	679	1.802E+01	720	5.386E+00	761	1.587E+00
598	7.877E+01	639	4.779E+01	680	1.766E+01	721	5.209E+00	762	1.502E+00
599	7.846E+01	640	4.720E+01	681	1.750E+01	722	5.090E+00	763	1.474E+00
600	7.837E+01	641	4.593E+01	682	1.652E+01	723	4.993E+00	764	1.388E+00
601	7.802E+01	642	4.554E+01	683	1.616E+01	724	4.726E+00	765	1.361E+00
602	7.751E+01	643	4.452E+01	684	1.577E+01	725	4.516E+00	766	1.427E+00
603	7.714E+01	644	4.336E+01	685	1.527E+01	726	4.498E+00	767	1.295E+00
604	7.697E+01	645	4.280E+01	686	1.460E+01	727	4.455E+00	768	1.250E+00
605	7.602E+01	646	4.151E+01	687	1.436E+01	728	4.215E+00	769	1.309E+00
606	7.528E+01	647	4.104E+01	688	1.394E+01	729	4.007E+00	770	1.106E+00
607	7.487E+01	648	3.999E+01	689	1.335E+01	730	3.852E+00	771	1.236E+00
608	7.408E+01	649	3.889E+01	690	1.294E+01	731	3.834E+00	772	1.125E+00
609	7.422E+01	650	3.807E+01	691	1.277E+01	732	3.557E+00	773	1.054E+00
610	7.292E+01	651	3.713E+01	692	1.251E+01	733	3.491E+00	774	1.076E+00
611	7.237E+01	652	3.658E+01	693	1.216E+01	734	3.422E+00	775	9.590E-01
612	7.174E+01	653	3.526E+01	694	1.154E+01	735	3.316E+00	776	1.005E+00
613	7.104E+01	654	3.463E+01	695	1.153E+01	736	3.302E+00	777	9.700E-01
614	7.020E+01	655	3.372E+01	696	1.097E+01	737	3.153E+00	778	9.180E-01
615	6.974E+01	656	3.298E+01	697	1.088E+01	738	3.114E+00	779	9.590E-01
616	6.910E+01	657	3.228E+01	698	1.063E+01	739	3.028E+00	780	9.265E-01
617	6.784E+01	658	3.173E+01	699	1.025E+01	740	2.996E+00		
618	6.740E+01	659	3.042E+01	700	9.954E+00	741	2.817E+00		
619	6.631E+01	660	3.000E+01	701	9.669E+00	742	2.723E+00		
620	6.565E+01	661	2.896E+01	702	9.310E+00	743	2.597E+00		
621	6.460E+01	662	2.829E+01	703	9.065E+00	744	2.664E+00		
622	6.392E+01	663	2.755E+01	704	8.563E+00	745	2.473E+00		
623	6.288E+01	664	2.705E+01	705	8.430E+00	746	2.294E+00		
624	6.186E+01	665	2.644E+01	706	8.425E+00	747	2.402E+00		
625	6.106E+01	666	2.558E+01	707	8.084E+00	748	2.331E+00		

CIE 1931 x y Chromaticity Diagram



7-Step Chromaticity Quadrangles



[Goniophotometer System]

Total operating time for luminous intensity distribution: **1.0 hour**

Test orientation: **Downward**

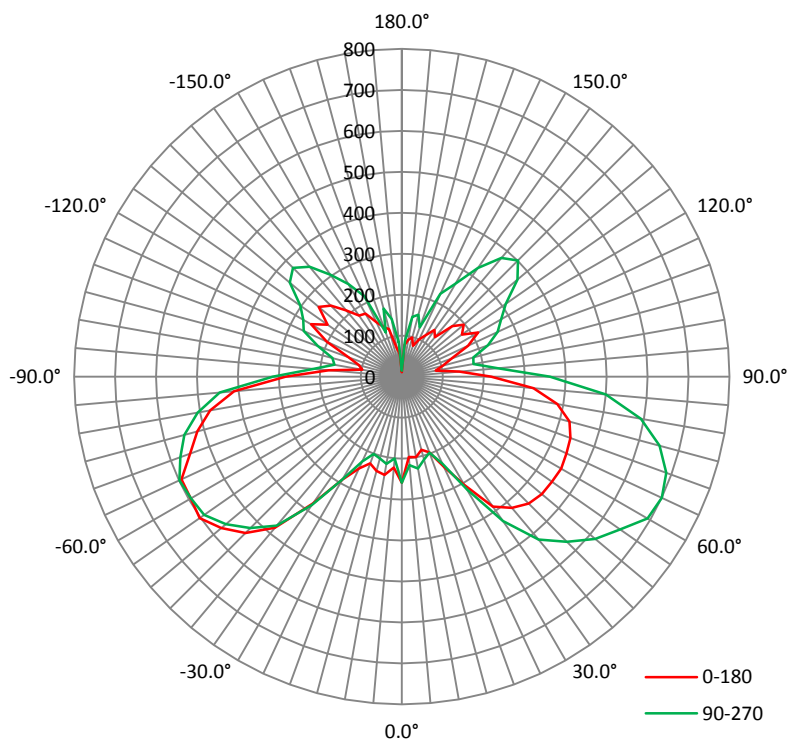
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.1	60	0.4101	48.62	0.9874

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	I _{max} (cd)	S/MH (C0/180)	S/MH (C90/270)
5119.19	105.29	855.1	2.25	2.78

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% I _{max}):	311.5	333.9	342.9	329.0	329.3
Field Angle (10% I _{max}):	356.6	357.2	358.1	357.7	357.4

Luminous Intensity (cd) Distribution Data

C y	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0°	259	259	259	259	259	259	259	259
1°	260	261	262	253	226	211	204	200
2°	259	240	228	213	205	205	200	192
3°	221	227	216	204	199	198	201	198
4°	220	224	218	206	198	197	203	199
5°	223	226	223	212	201	199	206	201
6°	227	231	226	216	206	199	208	204
7°	231	232	229	220	210	199	207	205
8°	236	233	230	223	214	197	205	207
9°	242	238	229	227	216	196	205	209
10°	244	241	227	228	216	196	204	206
11°	247	243	226	226	217	193	205	201
12°	248	243	226	225	215	191	202	198
13°	246	240	224	222	214	188	197	193
14°	243	237	221	218	211	187	192	188
15°	238	233	216	213	207	186	188	183
16°	233	229	212	208	204	184	184	178
17°	231	226	213	206	202	187	186	180
18°	230	225	212	205	201	193	192	185
19°	229	222	211	203	201	200	200	191
20°	226	217	211	203	201	209	209	198
21°	225	217	215	208	204	220	222	209
22°	228	223	224	215	209	234	236	221
23°	233	233	235	226	215	247	251	233
24°	240	245	247	238	223	261	266	246
25°	247	260	261	252	229	276	284	260
26°	256	275	278	265	240	293	301	276
27°	265	291	295	282	251	313	323	293
28°	274	305	311	296	263	331	341	310
29°	282	321	327	312	276	345	359	327
30°	290	336	342	325	290	362	380	347
31°	303	352	358	339	306	381	402	371
32°	317	369	377	356	324	406	431	397
33°	333	389	397	376	342	433	456	420
34°	354	414	422	400	362	462	485	444
35°	378	443	453	428	382	486	509	465
36°	405	476	486	457	405	510	531	482
37°	433	510	518	486	428	529	552	497
38°	456	540	545	507	447	544	566	510
39°	472	565	566	524	463	556	576	522
40°	482	588	584	539	475	568	588	535
41°	495	609	601	554	487	580	598	547
42°	510	627	619	568	497	594	609	559
43°	522	644	633	583	507	607	620	568
44°	531	661	645	595	518	619	632	577
45°	540	678	658	613	523	628	640	586
46°	548	694	672	626	535	636	648	594
47°	557	709	684	640	543	645	657	599
48°	565	723	696	650	550	651	666	606
49°	571	737	707	658	553	660	670	614

Luminous Intensity (cd) Distribution Data

$\begin{matrix} C \\ \backslash \\ Y \end{matrix}$	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
50°	575	749	717	668	560	668	679	625
51°	584	763	726	677	569	676	690	633
52°	591	775	739	689	575	685	702	638
53°	598	785	748	700	581	694	707	646
54°	601	796	755	705	586	700	712	650
55°	602	802	760	712	589	704	711	647
56°	599	806	762	715	589	706	708	648
57°	595	807	759	712	583	702	710	651
58°	595	809	761	716	587	709	717	656
59°	595	812	764	723	589	714	723	664
60°	595	820	770	731	594	726	731	664
61°	600	831	780	741	599	735	732	664
62°	602	836	786	742	599	730	731	667
63°	602	844	788	748	601	731	729	659
64°	599	845	789	744	596	730	723	658
65°	594	843	784	746	599	720	721	648
66°	586	835	779	739	586	716	704	640
67°	572	825	768	725	577	701	692	639
68°	567	817	756	716	582	697	699	639
69°	559	809	750	716	573	696	690	634
70°	550	800	742	708	575	695	692	632
71°	544	798	733	709	572	690	687	622
72°	537	788	735	700	562	680	672	621
73°	535	782	723	692	565	677	674	610
74°	526	775	719	685	551	664	662	605
75°	517	760	704	673	550	665	662	605
76°	508	751	696	672	546	665	661	594
77°	504	742	689	667	534	649	640	585
78°	499	731	679	651	527	635	632	577
79°	486	716	661	641	520	621	622	559
80°	475	702	646	629	506	613	612	558
81°	463	688	636	617	506	605	597	540
82°	452	665	616	601	486	580	568	516
83°	437	643	593	578	468	565	555	514
84°	427	627	577	565	468	555	540	494
85°	411	601	559	549	446	534	514	471
86°	390	566	524	517	423	510	486	443
87°	368	527	499	489	399	484	457	412
88°	336	489	464	454	369	451	426	387
89°	307	450	433	414	338	415	393	353
90°	284	418	403	389	315	390	371	332
91°	272	395	382	369	294	367	352	318
92°	259	374	360	348	270	342	326	293
93°	238	338	339	324	248	316	307	260
94°	209	303	316	302	228	299	282	237
95°	179	275	283	280	216	280	258	224
96°	156	237	251	246	193	243	231	188
97°	140	198	226	222	179	219	210	159
98°	132	153	209	206	173	205	197	120
99°	119	121	197	197	168	196	187	101

Luminous Intensity (cd) Distribution Data

$\gamma \backslash C$	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
100°	98	113	187	192	167	192	176	106
101°	89	123	176	190	166	190	165	122
102°	86	140	168	189	165	191	155	134
103°	89	147	162	191	166	194	147	141
104°	99	154	156	194	168	200	143	145
105°	109	158	153	202	176	210	143	146
106°	117	162	157	212	188	219	147	147
107°	123	165	167	221	198	224	153	150
108°	128	171	179	225	206	225	162	155
109°	134	178	188	230	213	230	173	161
110°	139	188	196	235	218	233	184	171
111°	147	201	204	240	226	236	199	181
112°	157	216	214	246	236	244	212	193
113°	171	232	225	252	245	247	228	207
114°	187	249	237	255	255	252	243	222
115°	202	265	250	258	264	254	257	237
116°	216	282	263	265	269	261	270	251
117°	230	297	273	271	271	264	281	264
118°	241	312	285	280	273	270	289	277
119°	248	325	297	287	274	277	293	285
120°	256	336	306	295	278	283	299	296
121°	260	344	317	301	283	292	303	304
122°	262	347	327	312	285	302	304	309
123°	262	351	337	324	287	315	309	311
124°	251	351	350	338	293	332	314	311
125°	221	349	363	355	302	348	323	309
126°	201	344	375	369	315	363	332	300
127°	204	341	386	382	326	376	344	287
128°	241	333	397	394	338	386	353	275
129°	274	322	409	402	349	395	362	260
130°	265	310	417	407	357	399	370	246
131°	245	301	422	409	362	404	377	228
132°	249	286	427	411	365	409	386	212
133°	256	272	429	414	369	411	394	202
134°	252	262	432	414	373	411	398	193
135°	245	254	432	415	376	410	400	186
136°	238	249	430	413	376	408	398	184
137°	228	246	423	409	373	403	394	183
138°	221	245	414	401	367	394	385	183
139°	218	240	403	394	359	385	375	182
140°	211	238	391	384	350	374	362	181
141°	192	239	378	373	341	363	345	189
142°	177	240	360	359	331	349	324	195
143°	175	243	339	346	321	335	302	200
144°	177	247	318	331	312	321	278	203
145°	182	249	297	320	303	307	255	198
146°	192	247	278	308	295	293	235	190
147°	197	245	262	298	286	279	216	181
148°	191	243	248	286	278	265	197	175
149°	184	242	231	273	271	252	185	175

Luminous Intensity (cd) Distribution Data

$\begin{matrix} C \\ \backslash \\ y \end{matrix}$	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
150°	177	241	215	258	261	240	173	178
151°	173	240	197	246	249	232	162	179
152°	169	238	180	237	237	227	150	175
153°	163	238	167	228	230	221	147	163
154°	156	233	164	212	225	210	148	146
155°	147	227	167	196	217	197	154	129
156°	137	221	170	171	199	173	162	118
157°	129	218	170	141	183	149	167	119
158°	126	213	168	124	146	139	170	128
159°	127	210	159	118	119	142	177	134
160°	129	209	150	117	115	150	182	148
161°	131	208	141	121	121	165	186	157
162°	132	201	131	125	133	179	188	160
163°	132	184	116	132	153	187	183	164
164°	129	164	104	129	168	185	175	167
165°	120	145	101	124	172	178	170	166
166°	106	124	97	122	169	173	168	163
167°	90	105	94	117	166	167	165	163
168°	77	92	95	113	160	162	162	164
169°	73	86	95	108	152	156	157	158
170°	70	90	94	104	143	153	152	150
171°	67	92	94	100	134	144	145	140
172°	66	87	91	93	118	131	136	131
173°	65	82	86	86	105	118	128	120
174°	63	76	81	78	95	104	117	111
175°	57	65	71	68	84	90	99	97
176°	50	54	58	58	72	78	82	77
177°	39	43	46	49	57	62	64	58
178°	24	27	33	36	42	46	46	41
179°	11	14	17	21	25	31	28	23
180°	0	1	1	6	8	15	10	5

Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} C \\ \backslash \\ Y \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0°	259	259	259	259	259	259	259	259
1°	206	204	206	215	223	243	264	263
2°	190	194	201	213	211	221	237	263
3°	190	195	202	212	215	219	224	231
4°	192	196	201	210	215	221	229	225
5°	197	201	202	210	217	226	228	226
6°	197	203	203	210	221	234	232	231
7°	199	202	200	212	225	238	236	234
8°	200	204	199	209	228	242	240	238
9°	201	203	196	206	229	241	241	242
10°	200	201	194	202	228	238	238	244
11°	197	196	192	198	226	235	236	244
12°	194	193	190	195	224	229	236	243
13°	190	189	188	192	220	221	234	241
14°	187	186	185	189	216	215	229	237
15°	185	181	182	186	209	211	224	234
16°	184	179	180	183	206	206	220	230
17°	184	180	180	185	201	202	216	227
18°	187	187	186	188	197	200	214	226
19°	192	198	196	198	195	200	213	224
20°	197	210	213	212	198	203	216	223
21°	204	222	227	229	204	212	224	224
22°	212	237	242	243	213	223	235	229
23°	221	252	260	260	220	235	249	239
24°	231	270	279	277	227	248	264	250
25°	243	290	301	296	235	265	280	265
26°	256	310	324	317	248	281	296	279
27°	270	330	347	338	263	299	314	295
28°	281	352	368	359	281	318	335	313
29°	293	374	390	382	299	339	351	330
30°	305	398	416	408	318	360	367	346
31°	322	423	444	437	339	383	389	364
32°	339	450	473	467	360	409	416	384
33°	357	478	503	499	384	438	446	408
34°	373	505	532	529	409	467	479	436
35°	387	527	557	556	430	498	516	470
36°	397	545	577	578	455	527	552	505
37°	406	561	595	599	474	556	582	538
38°	411	575	610	614	491	579	606	568
39°	415	587	621	630	507	599	627	592
40°	418	604	636	645	519	617	647	614
41°	426	618	653	659	531	633	667	634
42°	432	633	667	674	542	649	685	649
43°	436	645	679	688	552	664	703	663
44°	437	656	689	698	563	675	715	678
45°	438	668	698	705	570	689	728	691
46°	439	679	708	711	583	699	741	706
47°	439	685	718	718	590	707	752	717
48°	441	694	727	723	599	718	763	728
49°	444	703	734	734	609	728	773	740

Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} C \\ \backslash \\ Y \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
50°	446	718	747	745	616	738	783	748
51°	453	727	758	756	626	747	796	758
52°	454	734	767	764	635	760	809	767
53°	453	738	769	765	645	769	820	776
54°	451	740	767	767	651	772	823	782
55°	447	746	770	767	651	779	825	785
56°	445	750	775	773	658	780	825	786
57°	447	756	785	780	665	780	827	785
58°	449	761	789	789	673	792	834	788
59°	450	766	792	794	683	798	839	792
60°	449	778	795	796	693	808	848	799
61°	450	773	793	798	700	811	847	804
62°	451	778	796	799	707	816	854	812
63°	449	770	786	796	709	815	855	814
64°	445	762	779	785	705	811	851	812
65°	444	755	772	780	700	806	841	802
66°	440	759	770	779	702	800	831	794
67°	439	750	766	779	700	790	820	778
68°	440	748	763	769	697	797	820	775
69°	438	737	753	762	693	791	811	766
70°	438	744	753	760	687	785	808	761
71°	439	739	749	762	686	786	803	754
72°	437	736	745	758	680	785	803	751
73°	431	723	731	746	670	774	798	748
74°	424	716	724	737	661	762	787	733
75°	424	713	722	738	651	760	782	724
76°	417	709	711	732	648	756	774	714
77°	408	696	704	725	636	755	769	706
78°	400	682	688	704	625	735	760	702
79°	392	670	681	697	609	726	740	682
80°	386	660	662	675	593	706	730	670
81°	375	642	642	658	577	692	706	650
82°	357	613	621	637	559	673	684	633
83°	351	605	610	626	545	659	670	612
84°	341	587	586	606	526	643	656	602
85°	323	553	553	568	500	607	616	572
86°	303	522	522	543	471	583	576	537
87°	282	487	494	514	444	550	552	512
88°	256	455	458	481	416	514	507	473
89°	234	420	425	441	389	480	466	434
90°	218	392	401	418	362	454	431	403
91°	207	367	377	393	334	425	409	380
92°	193	347	354	366	310	398	385	361
93°	169	312	324	340	285	372	358	334
94°	155	277	294	312	259	340	327	293
95°	141	254	263	270	235	309	290	259
96°	126	217	227	239	210	274	247	222
97°	120	184	209	220	190	247	224	194
98°	112	145	198	204	181	227	209	172
99°	96	115	191	198	178	215	199	142

Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} C \\ \backslash \\ Y \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
100°	84	110	186	195	178	209	193	116
101°	83	124	177	194	177	205	184	107
102°	86	143	166	193	176	203	171	115
103°	92	151	159	195	176	202	157	130
104°	97	158	152	198	177	204	143	138
105°	104	161	149	206	181	214	133	145
106°	111	160	151	216	192	223	130	146
107°	116	163	156	225	205	230	132	146
108°	119	167	165	227	215	230	138	149
109°	124	174	177	229	220	230	148	152
110°	130	185	186	233	224	230	165	159
111°	137	196	197	236	230	233	183	167
112°	145	210	210	241	237	237	203	178
113°	155	225	225	245	244	241	222	193
114°	166	242	240	247	252	243	244	209
115°	178	259	255	251	258	249	264	224
116°	190	275	271	256	264	254	282	240
117°	199	290	283	265	267	262	296	257
118°	202	304	292	274	270	272	308	272
119°	208	314	300	284	273	281	317	287
120°	215	328	307	294	280	292	325	301
121°	220	337	312	306	286	301	328	312
122°	223	343	319	321	288	313	328	319
123°	217	344	327	335	292	326	327	326
124°	199	342	337	352	300	341	329	331
125°	179	336	346	368	310	358	334	334
126°	168	328	357	383	322	370	340	331
127°	177	318	369	395	333	382	348	326
128°	208	307	379	403	348	393	357	315
129°	223	293	391	411	360	404	369	300
130°	197	284	402	417	369	415	381	286
131°	187	270	410	423	379	422	393	275
132°	198	256	417	430	386	429	402	261
133°	196	244	423	434	394	433	408	245
134°	186	234	426	436	399	435	417	227
135°	174	225	425	436	401	439	422	217
136°	163	214	419	434	401	438	421	209
137°	152	209	411	428	397	435	417	206
138°	143	198	397	419	391	431	411	210
139°	132	189	387	409	385	425	407	212
140°	126	182	373	397	378	415	397	200
141°	120	179	356	384	368	401	382	191
142°	118	177	333	368	356	384	361	192
143°	125	176	308	351	345	366	337	195
144°	132	174	281	335	334	349	316	201
145°	139	166	258	318	324	335	295	209
146°	141	158	238	304	312	322	276	208
147°	135	151	220	289	300	306	257	208
148°	127	146	202	272	289	290	242	204
149°	121	149	182	258	278	273	226	199

Luminous Intensity (cd) Distribution Data (cont.)

$\begin{matrix} C \\ \backslash \\ Y \end{matrix}$	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
150°	117	152	165	243	262	259	210	191
151°	114	151	149	232	250	245	192	189
152°	112	147	134	221	241	235	176	189
153°	111	134	120	208	236	228	159	188
154°	108	120	119	183	232	221	143	184
155°	100	104	122	157	223	205	135	184
156°	95	94	127	142	198	177	130	185
157°	90	88	130	137	164	146	126	188
158°	87	87	139	143	143	131	117	191
159°	82	89	147	149	129	117	109	193
160°	80	92	152	155	128	115	102	189
161°	82	96	154	160	140	127	97	173
162°	86	101	158	162	152	146	94	158
163°	91	104	157	165	155	151	90	143
164°	96	107	155	166	156	156	87	126
165°	99	107	152	165	156	157	84	113
166°	99	105	148	164	162	163	85	106
167°	99	104	148	164	160	161	87	104
168°	96	100	148	160	157	160	89	104
169°	94	95	147	156	155	158	89	102
170°	91	93	144	152	148	144	87	96
171°	91	93	138	144	139	129	85	91
172°	92	92	127	132	123	117	83	91
173°	91	91	116	121	109	103	81	86
174°	85	86	104	112	99	93	77	78
175°	77	78	91	96	88	84	69	70
176°	66	67	76	76	75	72	60	59
177°	54	54	56	58	59	54	49	45
178°	38	39	39	40	42	39	35	33
179°	22	23	22	26	27	24	21	18
180°	11	11	10	12	14	15	13	11

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	5.1	0.10
5-10	15.6	0.30
10-15	25.3	0.50
15-20	33.5	0.65
20-25	49.2	0.96
25-30	77.9	1.52
30-35	119.9	2.35
35-40	174.7	3.41
40-45	222.2	4.34
45-50	263.4	5.14
50-55	301.8	5.90
55-60	329.6	6.44
60-65	354.0	6.91
65-70	358.1	7.00
70-75	356.4	6.96
75-80	344.0	6.72
80-85	310.9	6.07
85-90	245.6	4.80
90-95	172.6	3.37
95-100	104.4	2.04
100-105	83.7	1.63
105-110	92.1	1.80
110-115	109.9	2.15
115-120	131.5	2.57
120-125	142.6	2.78
125-130	145.3	2.84
130-135	138.9	2.72
135-140	121.3	2.37
140-145	94.9	1.85
145-150	69.0	1.35
150-155	47.6	0.93
155-160	30.9	0.60
160-165	23.4	0.46
165-170	15.4	0.30
170-175	7.5	0.14
175-180	1.4	0.03

Deg	Flux (lm)	%
0-5	5.1	0.10
0-10	20.7	0.40
0-15	46.0	0.90
0-20	79.4	1.55
0-25	128.7	2.51
0-30	206.5	4.03
0-35	326.4	6.38
0-40	501.1	9.79
0-45	723.3	14.13
0-50	986.7	19.27
0-55	1288.5	25.17
0-60	1618.0	31.61
0-65	1972.1	38.52
0-70	2330.1	45.52
0-75	2686.5	52.48
0-80	3030.5	59.20
0-85	3341.4	65.27
0-90	3587.0	70.07
0-95	3759.6	73.44
0-100	3864.0	75.48
0-105	3947.6	77.11
0-110	4039.7	78.91
0-115	4149.6	81.06
0-120	4281.1	83.63
0-125	4423.7	86.41
0-130	4569.0	89.25
0-135	4708.0	91.97
0-140	4829.3	94.34
0-145	4924.2	96.19
0-150	4993.2	97.54
0-155	5040.8	98.47
0-160	5071.7	99.07
0-165	5095.0	99.53
0-170	5110.4	99.83
0-175	5117.8	99.97
0-180	5119.2	100.00

6. Product Photo



Directions

1. The information marked "superscript #" is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report.
2. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
3. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.
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*****END OF REPORT*****