

## Photometric Test Report

### Relevant Standards

- ☒ ANSI/IES LM-79-2019
- ☒ ANSI C82.77-2017

Prepared For

**RAB Lighting Inc.**

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Issue Date: 2024-12-20

Revised Date: N/A

## 1.0 Test Summary

DLC Technical Requirements V5.1

Architectural Flood and Spot Luminaires				
Requirement Category	Test Method	Requirements		Test Value
Luminaire Output (lm) (Goniophotometer – Section 4.2)	ANSI/IES LM-79:2019	1000		1954
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2)	ANSI/IES LM-79:2019	Standard	Premium	102.3
		105	120	
Power (Input Wattage) (W) (Goniophotometer – Section 4.2)	ANSI/IES LM-79:2019	Worst Case		19.1
Total Harmonic Distortion (A%) (THD & PF – Section 4.3)	ANSI C82.77:2002 ANSI C82-77-10:2020	20.00%	1200V	15.55
Power Factor (THD & PF – Section 4.3)	ANSI C82.77:2002 ANSI C82-77-10:2020	0.9	120V	0.988
Allowable CCTs* (K) (Integrating Sphere – Section 4.1)	ANSI/IES LM-79:2019	7 steps	5029±283	5184
		4 steps	5029±220	
Minimum CRI (Integrating Sphere – Section 4.1)	ANSI/IES LM-79:2019 CIE13.3-1995	≥70		83.0
Minimum R9 (Integrating Sphere – Section 4.1)	ANSI/IES LM-79-2019 CIE13.3-1995	N/A		11
Minimum Rf (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	≥70		83
Minimum Rg (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	≥89		98
IES Rcs,h1 (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	-18%≤IES Rcs,h1≤+23%		-12%
Zonal Lumen Requirement (0°-90°) (Goniophotometer – Section 4.2)	ANSI/IES LM-79:2019	≥85%		100.0%
Input Voltage (V)				
(Goniophotometer – Section 4.2)	ANSI/IES LM-79:2019	Worst Cast		120.0
(Goniophotometer – Section 4.2)		Non-Worst Case		N/A
Input Current (A)				
(Goniophotometer – Section 4.2)	ANSI/IES LM-79:2019	Worst Case		0.161
(Goniophotometer – Section 4.2)		Non-Worst Case		N/A
Power (Input Wattage – W)				
(Goniophotometer – Section 4.2)	ANSI/IES LM-79:2019	Worst Case		19.1
(Goniophotometer – Section 4.2)		Non-Worst Case		N/A

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Build Level	Sample No.
1	Integrating Sphere Test	2024-12-18	BULLET20 @20W5000K	ES 1st ES #3-2	241216013-S1
2	Goniophotometer Test	2024-12-18	BULLET20 @20W5000K	ES 1st ES #3-2	241216013-S1
3	THD and PF Test	2024-12-18	BULLET20 @20W5000K	ES 1st ES #3-2	241216013-S1

### Remark (If any):

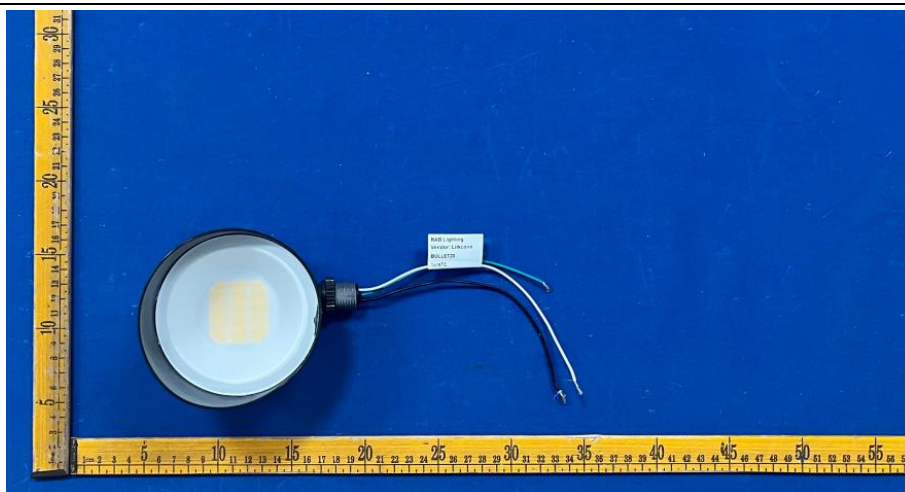
1. The results contained in this report pertain only to the tested samples.
2. This report shall not be reproduced, no limited part or full, without approval of Dongguan New Testing Centre Co., Ltd.
3. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the U.S. Government.

### 3.0 Product Description

Luminaire Description: Model No. BULLET20 @20W5000K, color tunable from 3000K, 4000K and 5000K.

Electrical Specification: 120Vac, 60Hz

#### Photos of Luminaire Characteristics



## 4.0 LM-79 Measurement and Test Results

### 4.1 Integrating Sphere Test

<b>Model No.</b>	BULLET20 @20W5000K	<b>Sample ID</b>	241216013-S1
<b>Operate time (Min.)</b>	10	<b>Stabilization time (Min.)</b>	60
<b>Temperature (°C)</b>	25.4	<b>Humidity (%RH)</b>	41.0

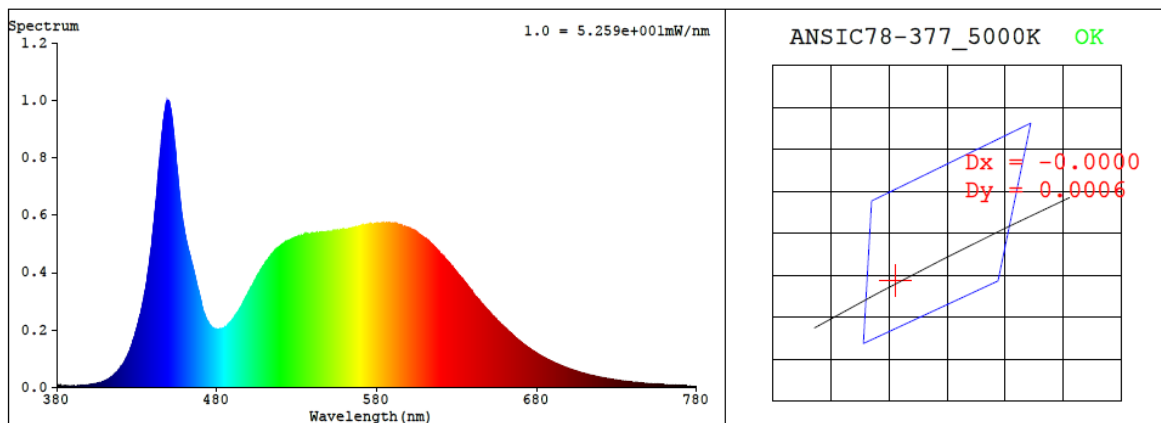
<b>Test Method</b>
<p>The Samples were tested according to the ANSI/IES LM-79:2019.</p> <p>Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25±1°C.</p> <p>The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere.</p> <p>The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ±0.2 percent under load.</p> <p>The sample was measured using 4π geometry and 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 780nm.</p>

### Test Result

<b>Voltage (Vac)</b>	<b>Frequency (Hz)</b>	<b>Current (A)</b>	<b>Power (W)</b>	<b>Power Factor</b>
120.0	60	0.161	19.1	0.988

<b>CCT (K)</b>	<b>CRI</b>	<b>R9</b>	<b>Duv</b>	<b>Rf</b>	<b>Rg</b>	<b>IES Rcs,h1</b>
5184	83.0	11	0.0003	83	98	-12%

## 4.1 Integrating Sphere Test



### Colorimetric Parameters

Chromaticity Coordinate:  $x = 0.3401$   $y = 0.3482$  /  $u' = 0.2094$   $v' = 0.4822$  ( $duv=3.03e-04$ )

CCT= 5184K Prcp WL:  $L_d=569.1nm$  Purity=6.5%

Peak WL:  $L_p=450nm$  FWHM:  $=22.2nm$  Ratio:  $R=15.6\%$   $G=80.1\%$   $B=4.3\%$

Render Index:  $R_a = 83.0$   $AvgR = 76.3$   $TM30:R_f=83$   $R_g=97$

EEL: 0.13464 A+

$R_1=82$   $R_2=87$   $R_3=89$   $R_4=84$   $R_5=83$   $R_6=82$   $R_7=87$

$R_8=70$   $R_9=11$   $R_{10}=68$   $R_{11}=84$   $R_{12}=63$   $R_{13}=83$   $R_{14}=94$   $R_{15}=78$

## 4.1 Integrating Sphere Test

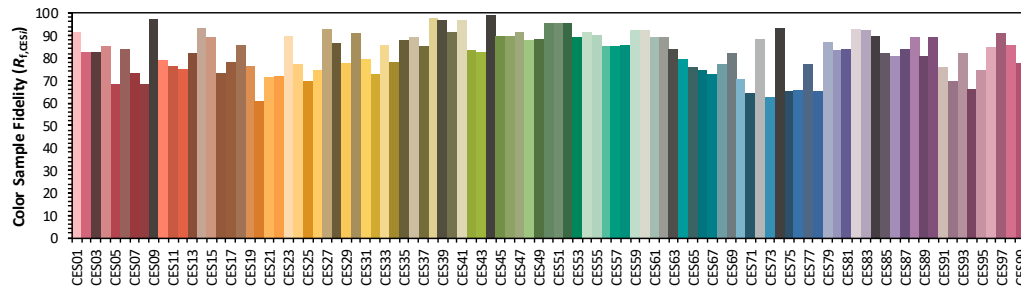
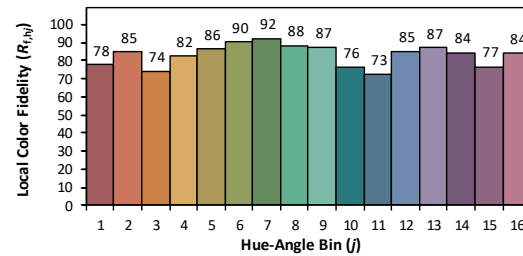
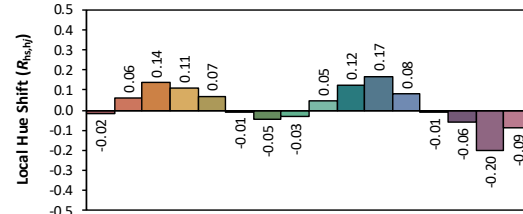
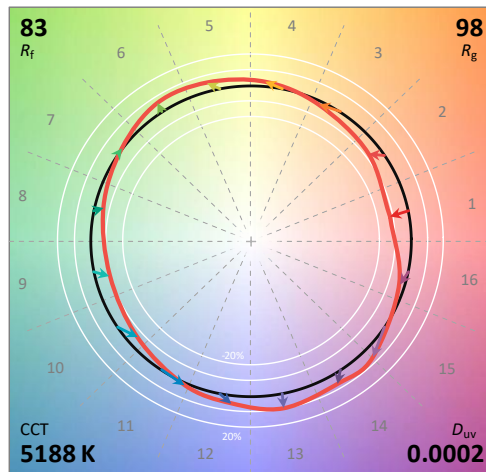
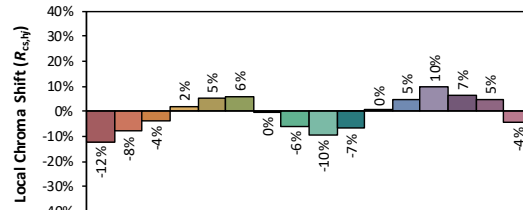
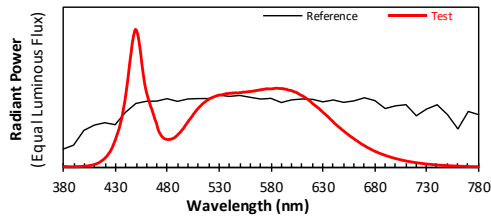
### ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: RAB Lighting Inc.

Date: 2024/12/20

Model: BULLET20 @20W5000K



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

$x$  0.3401  
 $y$  0.3480  
 $u'$  0.2094  
 $v'$  0.4821

CIE 13.3-1995  
(CRI)  
 $R_a$  83  
 $R_g$  12



## 4.1 Integrating Sphere Test

Spectral Distribution over Visible Wavelength											
WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)
380	6.60E-06	447	9.39E-04	514	4.61E-04	581	5.69E-04	648	2.78E-04	715	4.11E-05
381	6.90E-06	448	9.76E-04	515	4.66E-04	582	5.70E-04	649	2.71E-04	716	3.97E-05
382	7.70E-06	449	9.98E-04	516	4.72E-04	583	5.72E-04	650	2.66E-04	717	3.87E-05
383	5.30E-06	450	9.93E-04	517	4.78E-04	584	5.73E-04	651	2.59E-04	718	3.76E-05
384	5.30E-06	451	9.72E-04	518	4.84E-04	585	5.73E-04	652	2.53E-04	719	3.62E-05
385	5.90E-06	452	9.39E-04	519	4.89E-04	586	5.74E-04	653	2.48E-04	720	3.52E-05
386	5.70E-06	453	8.90E-04	520	4.94E-04	587	5.72E-04	654	2.42E-04	721	3.40E-05
387	5.60E-06	454	8.37E-04	521	4.98E-04	588	5.72E-04	655	2.37E-04	722	3.30E-05
388	5.00E-06	455	7.71E-04	522	5.01E-04	589	5.70E-04	656	2.30E-04	723	3.22E-05
389	5.20E-06	456	7.12E-04	523	5.05E-04	590	5.72E-04	657	2.25E-04	724	3.09E-05
390	5.50E-06	457	6.58E-04	524	5.08E-04	591	5.71E-04	658	2.19E-04	725	3.00E-05
391	6.00E-06	458	6.09E-04	525	5.11E-04	592	5.70E-04	659	2.14E-04	726	2.91E-05
392	6.00E-06	459	5.70E-04	526	5.14E-04	593	5.67E-04	660	2.09E-04	727	2.83E-05
393	6.60E-06	460	5.38E-04	527	5.18E-04	594	5.67E-04	661	2.04E-04	728	2.74E-05
394	5.60E-06	461	5.11E-04	528	5.20E-04	595	5.65E-04	662	1.98E-04	729	2.63E-05
395	7.20E-06	462	4.86E-04	529	5.22E-04	596	5.63E-04	663	1.93E-04	730	2.57E-05
396	6.90E-06	463	4.62E-04	530	5.25E-04	597	5.60E-04	664	1.88E-04	731	2.47E-05
397	7.60E-06	464	4.39E-04	531	5.25E-04	598	5.58E-04	665	1.83E-04	732	2.41E-05
398	8.20E-06	465	4.20E-04	532	5.24E-04	599	5.58E-04	666	1.78E-04	733	2.33E-05
399	8.80E-06	466	3.95E-04	533	5.27E-04	600	5.56E-04	667	1.72E-04	734	2.28E-05
400	9.10E-06	467	3.73E-04	534	5.29E-04	601	5.53E-04	668	1.68E-04	735	2.18E-05
401	1.03E-05	468	3.47E-04	535	5.30E-04	602	5.49E-04	669	1.63E-04	736	2.12E-05
402	1.01E-05	469	3.29E-04	536	5.32E-04	603	5.46E-04	670	1.59E-04	737	2.05E-05
403	1.16E-05	470	3.04E-04	537	5.35E-04	604	5.45E-04	671	1.55E-04	738	1.98E-05
404	1.24E-05	471	2.76E-04	538	5.34E-04	605	5.42E-04	672	1.50E-04	739	1.94E-05
405	1.38E-05	472	2.57E-04	539	5.35E-04	606	5.36E-04	673	1.46E-04	740	1.87E-05
406	1.57E-05	473	2.44E-04	540	5.36E-04	607	5.33E-04	674	1.42E-04	741	1.80E-05
407	1.73E-05	474	2.32E-04	541	5.37E-04	608	5.28E-04	675	1.38E-04	742	1.74E-05
408	1.80E-05	475	2.22E-04	542	5.37E-04	609	5.23E-04	676	1.34E-04	743	1.67E-05
409	2.04E-05	476	2.15E-04	543	5.39E-04	610	5.20E-04	677	1.30E-04	744	1.64E-05
410	2.31E-05	477	2.09E-04	544	5.39E-04	611	5.16E-04	678	1.26E-04	745	1.58E-05
411	2.56E-05	478	2.06E-04	545	5.39E-04	612	5.11E-04	679	1.23E-04	746	1.53E-05
412	2.84E-05	479	2.04E-04	546	5.41E-04	613	5.07E-04	680	1.19E-04	747	1.48E-05
413	3.21E-05	480	2.02E-04	547	5.40E-04	614	5.01E-04	681	1.15E-04	748	1.46E-05
414	3.54E-05	481	2.02E-04	548	5.39E-04	615	4.97E-04	682	1.12E-04	749	1.40E-05
415	4.03E-05	482	2.04E-04	549	5.40E-04	616	4.90E-04	683	1.10E-04	750	1.37E-05
416	4.56E-05	483	2.04E-04	550	5.42E-04	617	4.85E-04	684	1.06E-04	751	1.33E-05
417	5.10E-05	484	2.06E-04	551	5.42E-04	618	4.79E-04	685	1.03E-04	752	1.27E-05
418	5.60E-05	485	2.10E-04	552	5.42E-04	619	4.72E-04	686	1.00E-04	753	1.23E-05
419	6.31E-05	486	2.12E-04	553	5.46E-04	620	4.64E-04	687	9.68E-05	754	1.20E-05
420	7.00E-05	487	2.17E-04	554	5.45E-04	621	4.58E-04	688	9.42E-05	755	1.17E-05
421	7.75E-05	488	2.23E-04	555	5.45E-04	622	4.53E-04	689	9.17E-05	756	1.13E-05
422	8.63E-05	489	2.29E-04	556	5.47E-04	623	4.47E-04	690	8.93E-05	757	1.11E-05
423	9.74E-05	490	2.37E-04	557	5.47E-04	624	4.41E-04	691	8.62E-05	758	1.07E-05
424	1.08E-04	491	2.46E-04	558	5.48E-04	625	4.35E-04	692	8.36E-05	759	1.05E-05
425	1.19E-04	492	2.51E-04	559	5.49E-04	626	4.29E-04	693	8.15E-05	760	1.00E-05
426	1.33E-04	493	2.61E-04	560	5.50E-04	627	4.23E-04	694	7.86E-05	761	9.70E-06
427	1.49E-04	494	2.69E-04	561	5.51E-04	628	4.15E-04	695	7.68E-05	762	9.30E-06
428	1.68E-04	495	2.79E-04	562	5.51E-04	629	4.08E-04	696	7.39E-05	763	9.20E-06
429	1.87E-04	496	2.88E-04	563	5.53E-04	630	4.01E-04	697	7.20E-05	764	8.90E-06
430	2.06E-04	497	3.00E-04	564	5.53E-04	631	3.94E-04	698	6.98E-05	765	8.50E-06
431	2.28E-04	498	3.11E-04	565	5.56E-04	632	3.88E-04	699	6.78E-05	766	8.40E-06
432	2.52E-04	499	3.22E-04	566	5.56E-04	633	3.81E-04	700	6.54E-05	767	8.20E-06
433	2.73E-04	500	3.32E-04	567	5.59E-04	634	3.75E-04	701	6.36E-05	768	7.80E-06
434	3.00E-04	501	3.44E-04	568	5.59E-04	635	3.68E-04	702	6.19E-05	769	7.70E-06
435	3.30E-04	502	3.51E-04	569	5.61E-04	636	3.61E-04	703	6.00E-05	770	7.40E-06
436	3.61E-04	503	3.63E-04	570	5.62E-04	637	3.53E-04	704	5.80E-05	771	7.10E-06
437	4.02E-04	504	3.71E-04	571	5.64E-04	638	3.46E-04	705	5.64E-05	772	7.00E-06
438	4.43E-04	505	3.85E-04	572	5.64E-04	639	3.39E-04	706	5.46E-05	773	6.50E-06
439	4.85E-04	506	3.93E-04	573	5.66E-04	640	3.32E-04	707	5.27E-05	774	6.40E-06
440	5.38E-04	507	4.04E-04	574	5.67E-04	641	3.23E-04	708	5.10E-05	775	6.20E-06
441	5.92E-04	508	4.12E-04	575	5.68E-04	642	3.16E-04	709	4.96E-05	776	6.10E-06
442	6.50E-04	509	4.22E-04	576	5.70E-04	643	3.10E-04	710	4.79E-05	777	5.90E-06
443	7.15E-04	510	4.30E-04	577	5.69E-04	644	3.03E-04	711	4.64E-05	778	5.90E-06
444	7.78E-04	511	4.39E-04	578	5.68E-04	645	2.97E-04	712	4.51E-05	779	5.90E-06
445	8.32E-04	512	4.45E-04	579	5.69E-04	646	2.90E-04	713	4.36E-05	780	5.90E-06
446	8.95E-04	513	4.52E-04	580	5.69E-04	647	2.85E-04	714	4.25E-05	N/A	N/A



## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

<b>Model No.</b>	BULLET20 @20W5000K	<b>Sample ID</b>	241216013-S1
<b>Operate time (Min.)</b>	30	<b>Stabilization time (Min.)</b>	60
<b>Temperature (°C)</b>	24.8	<b>Humidity (%RH)</b>	41.3

<b>Test Method</b>
<p>The Samples were tested according to the ANSI/IES LM-79:2019.</p> <p>Photometric parameters were measured using a type C goniophotometer and software.</p> <p>The ambient temperature shall be maintained at <math>25 \pm 1^{\circ}\text{C}</math>, measured at a point not more than 1 m from the sample and at the same height as the sample.</p> <p>The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within <math>\pm 0.2</math> percent under load.</p> <p>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 <math>1.0^{\circ}</math> vertical intervals and <math>15^{\circ}</math> horizontal intervals.</p>

### Test Conditions

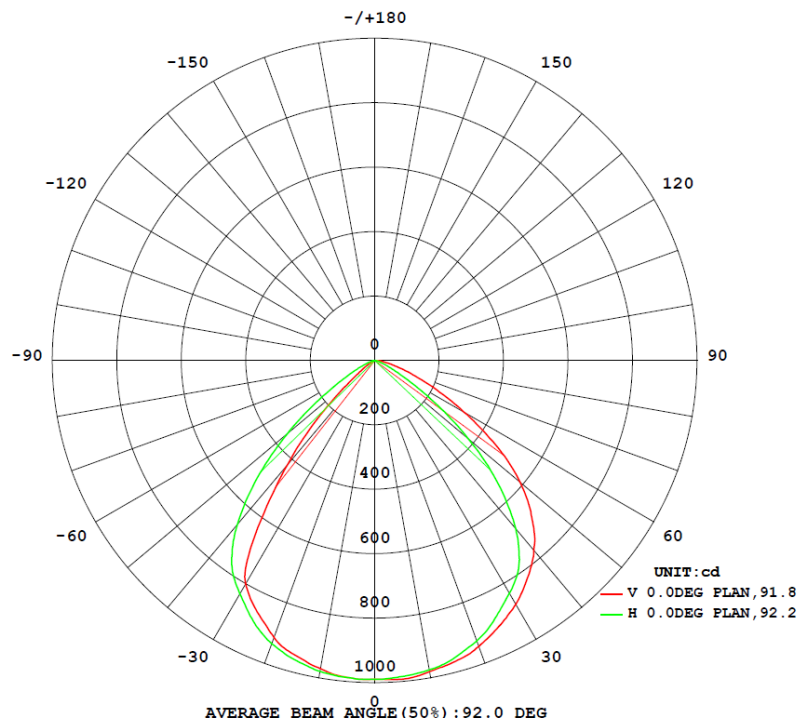
Condition	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
<b>WORST CASE</b>	120.0	60	0.161	19.1	0.988
<b>NON-WORST CASE</b>	N/A	N/A	N/A	N/A	N/A

### Test Result

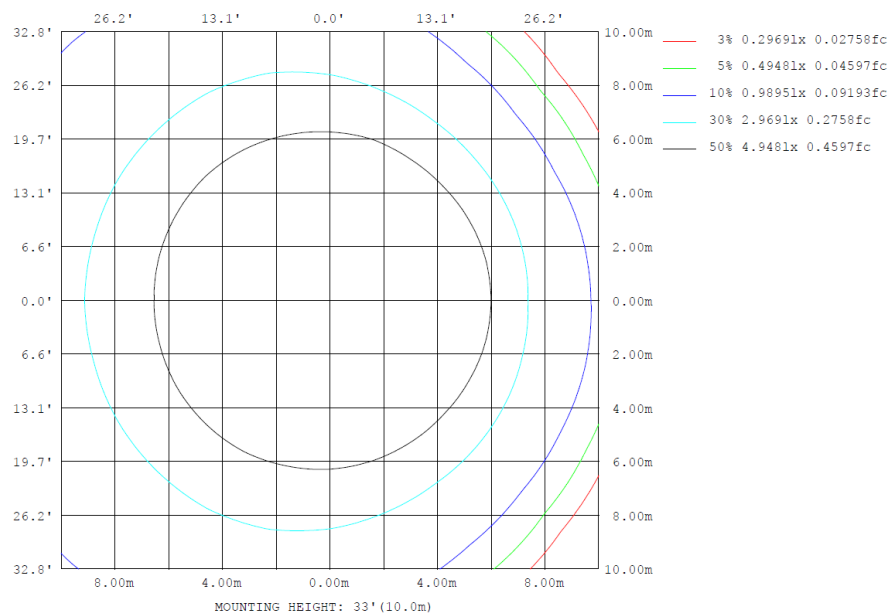
Flux (lm)	Field Angle (10%)		Beam Angle (50%)		Luminous Efficacy (lm/W)	Zonal Lumen Requirement	NEMA Type
	C0-180	C90-270	C0-180	C90-270		(0°-90°)	
1954	123.9	125.1	91.6	93.0	102.3	100.0%	6H x 6V

## 4.2 Goniophotometer Test

### Lighting Distribution Curve



### Isolux Plot



## 4.2 Goniophotometer Test

### Zonal Lumen Summary

ZONAL FLUX DIAGRAM:

$\gamma$	C0	C45	C90	C135	C180	C225	C270	C315	$\gamma$	$\Phi$ zone	$\Phi$ total	%lum, lamp
10	971.0	972.1	974.7	981.1	980.4	985.1	979.8	978.0	0~ 10	94.01	94.01	4.81, 4.81
20	914.6	914.3	926.0	942.6	943.7	944.9	935.1	921.0	10~ 20	270.5	364.5	18.7, 18.7
30	801.7	802.5	835.3	871.2	874.5	877.9	837.1	804.6	20~ 30	409.7	774.2	39.6, 39.6
40	423.0	506.8	680.5	756.8	768.6	756.5	662.6	458.8	30~ 40	464.2	1238	63.4, 63.4
50	94.83	127.2	382.6	584.4	589.2	571.4	356.1	115.7	40~ 50	374.4	1613	82.6, 82.6
60	19.44	27.63	110.1	313.6	319.7	293.6	106.3	30.83	50~ 60	217.8	1831	93.7, 93.7
70	0.0167	0.6861	23.47	104.3	120.3	99.19	25.94	1.555	60~ 70	91.03	1922	98.4, 98.4
80	0.0204	0.0202	3.846	22.37	32.57	23.39	4.983	0.0392	70~ 80	26.67	1948	99.7, 99.7
90	0	0	0	0	0	0	0	0	80~ 90	5.366	1954	100, 100
100	0	0	0	0	0	0	0	0	90~100	0	1954	100, 100
110	0	0	0	0	0	0	0	0	100~110	0	1954	100, 100
120	0	0	0	0	0	0	0	0	110~120	0	1954	100, 100
130	0	0	0	0	0	0	0	0	120~130	0	1954	100, 100
140	0	0	0	0	0	0	0	0	130~140	0	1954	100, 100
150	0	0	0	0	0	0	0	0	140~150	0	1954	100, 100
160	0	0	0	0	0	0	0	0	150~160	0	1954	100, 100
170	0	0	0	0	0	0	0	0	160~170	0	1954	100, 100
180	0	0	0	0	0	0	0	0	170~180	0	1954	100, 100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

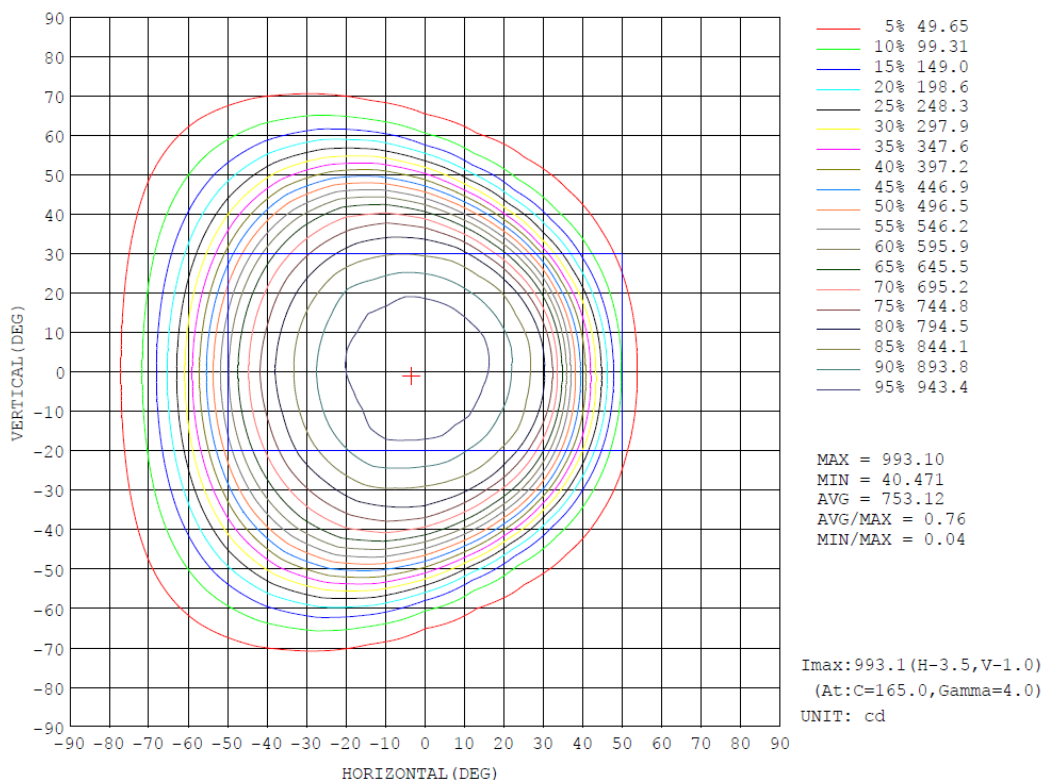
Zonal (lm)		Total (lm) Percent	
0-10	94.01	0-10	94.01 4.81%
10-20	270.47	0-20	364.48 18.66%
20-30	409.68	0-30	774.16 39.63%
30-40	464.19	0-40	1238.35 63.39%
40-50	374.37	0-50	1612.72 82.55%
50-60	217.79	0-60	1830.51 93.70%
60-70	91.03	0-70	1921.54 98.36%
70-80	26.67	0-80	1948.21 99.73%
80-90	5.37	0-90	1953.58 100.00%
90-100	0.00	0-100	1953.58 100.00%
100-110	0.00	0-110	1953.58 100.00%
110-120	0.00	0-120	1953.58 100.00%
120-130	0.00	0-130	1953.58 100.00%
130-140	0.00	0-140	1953.58 100.00%
140-150	0.00	0-150	1953.58 100.00%
150-160	0.00	0-160	1953.58 100.00%
160-170	0.00	0-170	1953.58 100.00%
170-180	0.00	0-180	1953.58 100.00%

## 4.2 Goniophotometer Test

### Area Flux Diagram

		AREA FLUX DIAGRAM																UNIT: lm		$\Phi$ t	$\Phi$ a
VERTICAL (DEG)	90	0.01	0.04	0.09	0.13	0.16	0.16	0.14	0.11	0.08	0.04	0.02	0.01	0.00	0.00	0.00	0.00	0.00	1.00	0.00	
	80	0.02	0.10	0.23	0.40	0.59	0.72	0.76	0.65	0.50	0.33	0.18	0.07	0.01	0.00	0.00	0.00	0.00	4.55	0.00	
	70	0.03	0.15	0.42	0.91	1.61	2.36	2.87	2.77	2.19	1.43	0.84	0.42	0.14	0.01	0.00	0.00	0.00	16.2	5.87	
	60	0.03	0.22	0.73	1.82	3.61	5.89	7.84	8.60	7.61	5.34	2.90	1.41	0.65	0.16	0.01	0.00	0.00	46.8	41.5	
	50	0.04	0.30	1.15	3.13	6.59	11.0	14.8	16.8	16.6	13.8	8.98	4.24	1.62	0.59	0.09	0.00	0.00	99.6	96.2	
	40	0.04	0.39	1.63	4.67	9.82	15.4	19.8	22.5	23.5	22.2	17.9	10.8	4.19	1.20	0.28	0.01	0.00	154	152	
	30	0.05	0.47	2.11	6.16	12.4	18.2	22.7	25.7	27.0	26.6	24.0	18.0	8.69	2.37	0.50	0.03	0.00	195	193	
	20	0.05	0.54	2.50	7.32	13.9	19.7	24.3	27.5	29.1	28.8	26.7	22.3	13.1	3.99	0.70	0.06	0.00	221	219	
	10	0.05	0.57	2.73	7.96	14.7	20.5	25.0	28.3	29.9	29.8	27.8	23.7	15.4	5.14	0.82	0.08	0.00	232	231	
	0	0.05	0.57	2.74	7.99	14.7	20.4	25.0	28.1	29.8	29.7	27.6	23.5	15.5	5.25	0.82	0.08	0.00	232	230	
	-10	0.05	0.54	2.52	7.42	14.0	19.7	24.3	27.4	28.9	28.6	26.5	22.3	13.5	4.22	0.69	0.06	0.00	221	219	
	-20	0.05	0.47	2.14	6.33	12.5	18.2	22.6	25.7	26.8	26.4	24.1	18.6	9.62	2.52	0.48	0.03	0.00	197	195	
	-30	0.04	0.38	1.66	4.86	10.1	15.6	19.9	22.6	23.6	22.5	18.7	12.0	4.72	1.23	0.26	0.01	0.00	158	156	
	-40	0.04	0.29	1.16	3.27	6.96	11.5	15.3	17.3	17.2	14.7	9.92	4.69	1.68	0.54	0.07	0.00	0.00	105	101	
	-50	0.03	0.21	0.72	1.88	3.84	6.31	8.44	9.23	8.17	5.68	2.98	1.37	0.57	0.13	0.00	0.00	0.00	49.6	44.5	
	-60	0.02	0.14	0.40	0.91	1.66	2.51	3.09	2.98	2.27	1.39	0.74	0.34	0.10	0.01	0.00	0.00	0.00	16.6	7.06	
	-70	0.02	0.09	0.21	0.37	0.56	0.72	0.76	0.64	0.46	0.28	0.13	0.05	0.01	0.00	0.00	0.00	0.00	4.30	0.00	
	-80	0.01	0.04	0.08	0.12	0.14	0.15	0.13	0.10	0.06	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.86	0.00	
	-90		-90	-80	-70	-60	-50	-40	-30	-20	HORIZONTAL (DEG)	20	30	40	50	60	70	80	90		
$\Phi$ t	0.64	5.51	23.2	65.6	128	189	238	267	274	258	220	164	89.5	27.4	4.72	0.37	0.00	0.00	1953	---	
$\Phi$ a	0.00	0.56	18.3	61.5	124	185	234	263	270	254	216	159	84.9	21.6	0.00	0.00	0.00	0.00	---	1892	

### Isocandela



## 4.2 Goniophotometer Test

## Luminous Distribution Intensity Data

Table--1		UNIT: °cd																	
H (DEG)	V (DEG)																		
	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
-180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-80	0.00	4.69	6.78	8.30	9.57	10.6	11.7	12.4	12.9	13.3	13.2	12.6	11.8	10.9	9.65	8.05	6.79	5.37	3.85
-70	0.00	7.09	10.6	14.0	17.7	22.0	27.1	32.7	38.5	44.6	49.8	53.3	55.8	55.6	51.5	44.7	38.8	31.7	23.5
-60	0.00	8.94	14.3	20.7	29.3	40.9	55.8	74.8	94.2	118	142	163	181	192	191	185	168	142	110
-50	0.00	10.6	18.4	29.1	45.6	69.5	99.8	141	190	244	302	356	400	438	456	460	451	422	383
-40	0.00	12.0	22.3	38.8	65.9	104	157	227	311	399	485	556	613	655	688	701	711	699	680
-30	0.00	13.3	26.1	48.6	85.4	141	218	316	428	536	619	686	739	776	809	831	840	840	835
-20	0.00	14.2	29.4	57.2	103	174	271	393	519	622	703	768	819	858	890	913	924	927	926
-10	0.00	14.9	31.6	63.4	116	197	307	442	572	672	750	807	861	899	926	947	968	974	975
0	0.00	15.1	32.6	65.6	120	205	320	459	589	689	769	825	874	911	944	967	980	993	989
10	0.00	14.9	31.8	63.4	115	196	305	438	570	673	751	812	862	899	931	955	976	978	980
20	0.00	14.4	29.7	57.6	103	171	265	384	511	621	704	769	821	860	897	915	924	936	935
30	0.00	13.5	26.5	49.3	85.5	139	212	306	414	523	616	684	737	779	809	829	839	843	837
40	0.00	12.3	22.9	39.7	66.0	103	152	218	295	381	467	544	602	648	683	693	702	687	663
50	0.00	10.9	19.2	30.1	47.0	69.3	98.3	135	179	229	283	334	376	411	430	435	425	396	356
60	0.00	9.22	15.0	22.1	30.7	42.2	56.6	73.3	91.4	112	133	151	166	178	177	170	157	135	106
70	0.00	7.36	11.3	15.2	19.4	23.6	28.5	33.9	39.3	44.7	49.0	51.6	53.2	52.3	48.9	43.2	38.5	32.7	25.9
80	0.00	4.90	7.35	9.28	10.7	12.0	13.2	13.8	14.3	14.5	14.4	13.7	12.5	11.5	10.3	8.74	7.61	6.35	4.98
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

H (DEG)																	UNIT: °cd			
V (DEG)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90		
-180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
-170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
-160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
-150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
-140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
-130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
-120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
-110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
-100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
-90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
-80	2.91	1.96	1.04	0.69	0.37	0.11	0.07	0.04	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.00		
-70	19.2	14.6	10.2	6.96	3.95	1.72	0.82	0.27	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.00		
-60	87.9	64.2	45.8	35.2	24.9	16.5	9.42	3.37	0.88	0.15	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.00		
-50	323	251	184	125	79.9	56.4	38.3	24.4	12.7	4.36	0.42	0.02	0.02	0.02	0.02	0.02	0.03	0.00		
-40	639	582	503	401	287	178	102	60.4	36.6	19.6	7.42	0.92	0.02	0.02	0.02	0.02	0.03	0.00		
-30	824	801	751	680	577	437	280	148	73.8	39.3	19.6	5.69	0.27	0.02	0.02	0.02	0.03	0.00		
-20	917	897	870	834	766	646	474	296	142	61.9	31.6	12.3	1.57	0.02	0.02	0.02	0.03	0.00		
-10	967	950	926	889	845	770	593	400	216	83.8	39.8	17.6	3.22	0.02	0.02	0.02	0.03	0.00		
0	987	971	948	915	862	802	633	423	238	94.8	42.2	19.4	3.90	0.02	0.02	0.02	0.03	0.00		
10	974	960	939	898	848	769	585	383	207	84.2	40.3	18.2	3.37	0.02	0.02	0.02	0.03	0.00		
20	926	905	875	840	762	627	441	267	135	59.9	32.7	13.1	1.73	0.02	0.02	0.02	0.03	0.00		
30	828	802	741	657	539	385	242	136	69.0	40.5	21.5	6.24	0.38	0.02	0.02	0.03	0.03	0.00		
40	614	548	462	352	250	160	93.9	58.0	38.4	22.1	8.22	1.20	0.02	0.02	0.03	0.03	0.04	0.00		
50	299	233	173	119	78.0	56.2	40.9	27.5	15.3	5.33	0.73	0.03	0.03	0.03	0.04	0.04	0.04	0.00		
60	86.7	65.7	48.8	38.5	28.7	20.2	12.1	5.00	1.61	0.37	0.05	0.03	0.03	0.04	0.04	0.04	0.04	0.00		
70	21.8	17.4	12.9	9.19	5.67	2.91	1.44	0.49	0.08	0.05	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.00		
80	3.87	2.72	1.60	1.07	0.60	0.23	0.14	0.08	0.04	0.05	0.05	0.06	0.06	0.06	0.07	0.06	0.04	0.00		
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

<b>Model No.</b>	BULLET20 @20W5000K	<b>Sample ID</b>	241216013-S1
<b>Temperature (°C)</b>	25.4	<b>Humidity (%RH)</b>	41.0

<b>Test Method</b>
<p>The samples were tested according to the and Ansi C82.77: 2002 and ANSI C82.77-10:2020</p> <p>The total harmonic distortion shall be measured to the 40th order.</p> <p>The ambient temperature shall be maintained at <math>25 \pm 1^\circ\text{C}</math>. The sample measurements were made using a digital power meter and power supply. The sample was operated at rated voltage and was stabilized before measurement. The total harmonic distortion was calculated.</p>

### Test Results

Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	iTHD(%)
120.0	60	0.161	19.1	0.988	15.55

## 5.0 Equipment List:

Equipment ID	Equipment Name	Last Cal.	Due Cal.
NTC-F01-001	Goniophotometer System	2024-11-07	2025-11-06
NTC-F01-006	2.0 meter Integrating Sphere	2024-11-07	2025-11-06
NTC-F01-012	Standard Lamp	2024-10-28	2025-10-27
NTC-F01-013	Standard Lamp	2024-10-28	2025-10-27
NTC-F01-031	Digital Power Meter	2024-08-06	2025-08-05
NTC-F01-019	Temperature & Humidity Meter	2024-10-29	2025-10-28

\*\*\*\*\*End of Report\*\*\*\*\*