FOR THE SCOPE OF
ACCREDITATION UNDER NVLAP LAB
CODE 100402-0.

REPORT

3933 US ROUTE 11, CORTLAND, NEW YORK 13045

Project No. G101936679 Date: September 3, 2015

REPORT NO. 101936679CRT-076

TEST OF ONE PAR20 LED 5000K

MODEL NO. P20-L525-C50-B25-90-W
PART NO. 99012

RENDERED TO:

VERBATIM AMERICAS
1200 W.T. HARRIS BLVD.
CHARLOTTE, NC 28269

TESTS: Electrical and Photometric tests as required to the IESNA test standard.

STATEMENT OF LIMITATION: This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

AUTHORIZATION The testing performed was authorized by signed quote number 500565507.

STANDARDS USED:

IESNA LM-79 - 2008: Electrical and Photometric Measurements of Solid State Lighting
ANSI NEMA ANSLG C78.377: 2011: Specifications of the Chromaticity of Solid State Lighting Products

DESCRIPTION OF SAMPLE: The client submitted one production sample of model number P20-L525-C50-B25-90-W. The sample was received by Intertek on August 18, 2015 in undamaged condition and one sample was tested as received. The sample designation was CRT1508181209-001C.

DATE OF TESTS: August 24, 2015 through September 3, 2015.

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SUMMARY:

MODEL NO. P20-L525-C50-B25-90-W
PART NO. 99012
DESCRIPTION: PAR20 LED 5000K

Criteria	Integrating Sphere	Goniophotometer
Light Output (Lumens)	514.4	532.9
Total Power (W)	6.725	6.740
Lumen Efficacy (Lm/W)	76.49	79.07
Power Factor ( )	0.829	0.830

Criteria	Results
Current ATHD (%)	50.70
Correlated Color Temp. (CCT-K)	4967
Color Rendering Index (CRI - Ra)	90.3
CRI - R9	58.4
DUV ( )	0.002
Chromaticity Coordinate (x)	0.346
Chromaticity Coordinate (y)	0.348
Chromaticity Coordinate (u')	0.213
Chromaticity Coordinate (v')	0.483

EQUIPMENT LIST

Equipment Used	Model No.	Control No.	Last Cal.	Cal. Due
LSI High Speed Mirror Goniometer	6440	---	08/10/15	09/10/15
Elgar AC Power Supply	CW1251	---	VBU	VBU
Sorenson DC Power Supply	XG 150-10	---	VBU	VBU
Yokogawa Power Analyzer	WT210	E464	04/20/15	04/20/16
ExTech Hygro Thermometer	445703	T1357	12/10/14	12/10/15
M-D Building Products Digital Level	Smart Tool	L112	03/25/15	03/25/16
NIST Luminous Intensity Standard Source	NBS10322	N1427	12/12/14	12/12/15
NIST Luminous Intensity Standard Source	NBS10215	N1432	12/12/14	12/12/15
NIST Luminous Intensity Standard Source	H754	N1433	12/12/14	12/12/15
NIST Luminous Flux Standard Source	NBS10428	N1424	12/17/14	12/17/15
2M Integrating Sphere Spectrometer System	CDS 600	W/N308	07/29/15	08/29/15
Yokogawa Power Analyzer	WT1600	E473	04/22/15	04/22/16
Extech Hygro-Thermometer	445703	T1359	12/10/14	12/10/15
Fisher Scientific Stopwatch	14-649-9	N1316	12/10/14	12/10/15
Sorensen DC Power Supply	XFR 35-35	---	VBU	VBU
Xantrex DC Power Supply	XTR 150-5.6	---	VBU	VBU
Elgar AC Power Supply	CW1251	---	VBU	VBU
NIST Spectral Flux Standard Source	RF1482	N1422	12/17/14	100 Hrs of use
NIST Luminous Flux Standard Source	150-14	N1423	12/17/14	12/17/15
NIST Luminous Flux Standard Source	NBS10428	N1424	12/17/14	12/17/15
NIST Luminous Flux Standard Source	BS8830	N1425	12/17/14	12/17/15

TEST METHODS:

Seasoning in Sample Orientation – LED Products
No seasoning was performed in accordance with IESNA LM-79.

Photometric and Electrical Measurements – Integrating Sphere Method
A Labsphere Model CDS 600 CCD Array Spectroradiometer and two meter or ten foot sphere was used to measure correlated color temperature, chromaticity coordinates, and the color rendering index for each SSL unit.

Ambient temperature was measured at a position inside the sphere. Each SSL unit was operated on the client provided driver at the rated input voltage in its designated orientation. Each SSL unit was allowed to stabilize for at least thirty minutes before measurements were made. Stabilization procedures to LM-79 were followed. Electrical measurements including voltage, current, and power were measured using a power analyzer.

The calibration of the sphere photometer-spectroradiometer system is traceable to the National Institute of Standards and Technology.

Photometric and Electrical measurements – Distribution Method
A LSI Type C High Speed Model 6440 Mirror Goniometer was used to measure the intensity (candelas) at each angle of distribution for the SSL sample.

Ambient temperature was measured equal to the height of the sample mounted on the goniometer equipment. The SSL sample was operated on the client provided driver at rated input volts in its designated orientation. The SSL sample was allowed to stabilize for at least thirty minutes before measurements were made. Stabilization procedures to LM-79 were followed. Electrical measurements including voltage, current, and power were measured using a power analyzer.

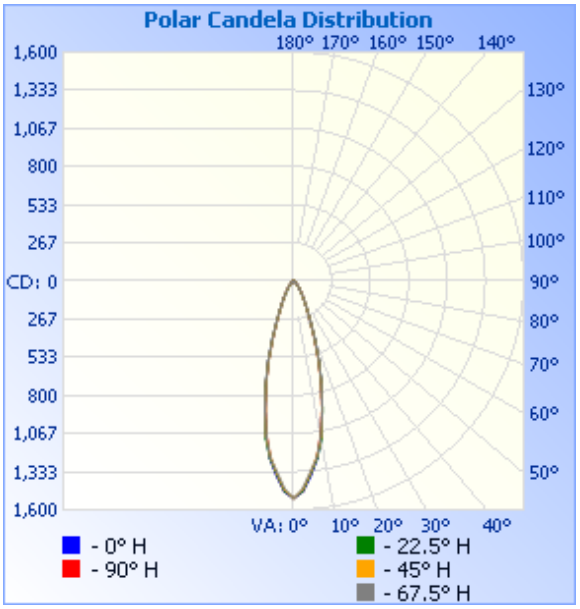
RESULTS:

Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) – Distribution Method

Intertek Control No.	Base Orientation	Input Voltage (VAC)	Input Current (mA)	Input Power (W)	Input Power Factor ( )	Light Output (Lumens)	Lumen Efficacy (lm/W)
CRT1508181209-001C	Base Up	120.0	67.65	6.740	0.830	532.9	79.07

Intensity (Candlepower) Summary at 25°C - Candelas

Angle	0	22.5	45	67.5	90
0	1519	1519	1519	1519	1519
5	1366	1355	1348	1339	1358
10	1106	1116	1101	1093	1088
15	747	751	740	748	742
20	432	430	423	428	421
25	229	226	226	230	225
30	134	133	135	139	139
35	83	83	83	86	88
40	54	53	53	55	57
45	35	34	34	35	38
50	21	21	21	22	24
55	12	12	12	14	15
60	7	7	7	8	9
65	4	4	4	4	5
70	2	2	2	2	2
75	0	0	0	0	1
80	0	0	0	0	0
85	0	0	0	0	0
90	0	0	0	0	0

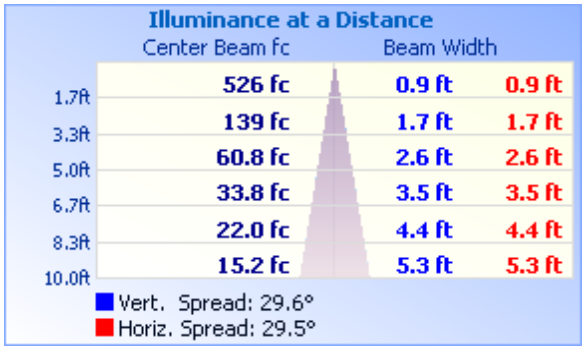


RESULTS:

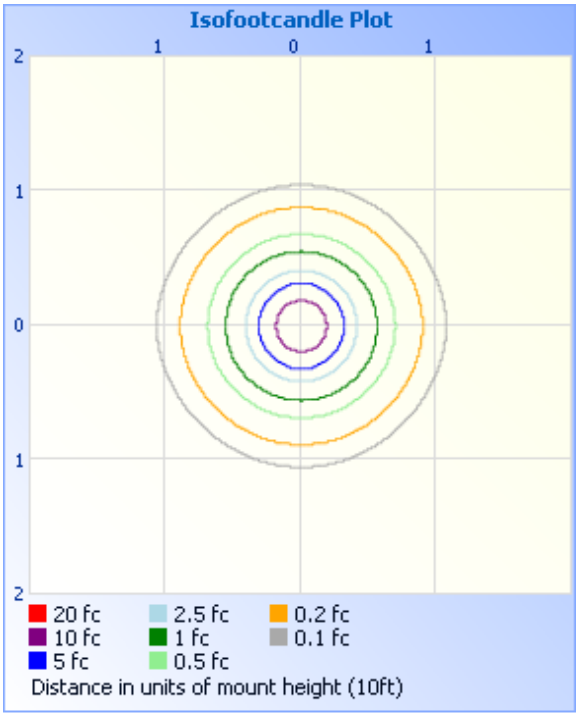
Illumination Plots

Mounting Height: 10 Feet

Illuminance - Cone of Light



Isoillumination Plot



Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens	% Luminaire
0-30	434.0	81.5
0-40	488.5	91.7
0-60	528.0	99.1
60-90	4.9	0.9
0-90	532.9	100.0
90-180	0.0	0.0
0-180	532.9	100.0

Zonal Lumens and Percentages at 25°C

Zone	Lumens	% Luminaire
0-10	121.2	22.7
10-20	202.6	38.0
20-30	110.2	20.7
30-40	54.5	10.2
40-50	27.4	5.1
50-60	12.1	2.3
60-70	4.3	0.8
70-80	0.6	0.1
80-90	0.0	0.0

RESULTS:

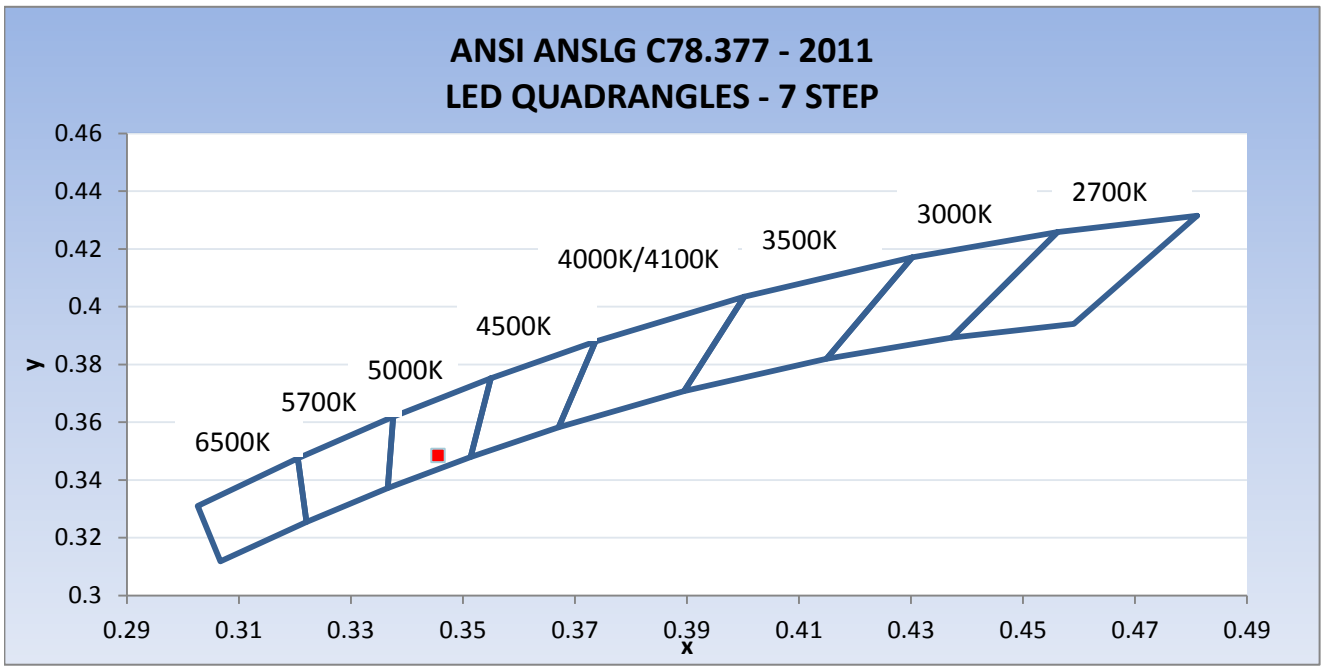
Photometric and Electrical Measurements at Ambient Temperature (25°C +/- 1°C) – Sphere Method

Intertek Control No.	Base Orientation	Input Voltage (VAC)	Input Current (mA)	Input Power (W)	Input Power Factor ( )	Current ATHD (%)
CRT1508181209-001C	Base Up	120.0	67.56	6.725	0.829	50.70

Light Output (Lumens)	Lumen Efficacy (lm/W)	Correlated Color Temperature - CCT (K)	CRI -Ra	CRI -R9	DUV ( )
514.4	76.49	4967	90.3	58.4	0.002

CIE 31' Chromaticity Coordinate (x)	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')
0.346	0.348	0.213	0.483

ANSI C78.377 SSL Chromaticity (2011 Version)

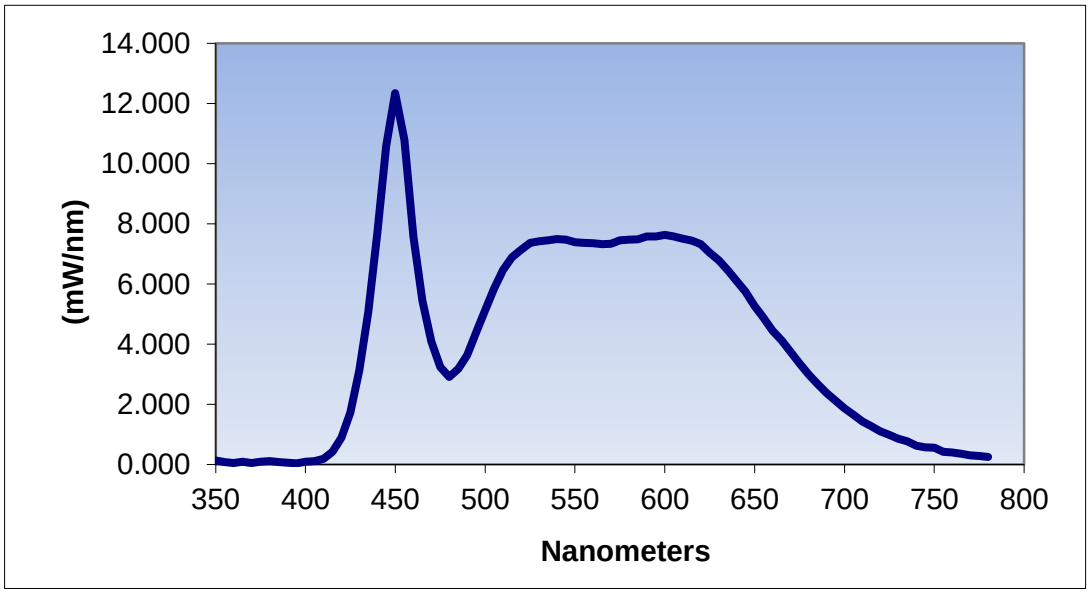


RESULTS:

Spectral Distribution Over Visible Wavelengths

nm	mW/nm	nm	mW/nm	nm	mW/nm	nm	mW/nm
350	0.131	460	7.582	570	7.338	680	2.995
355	0.075	465	5.451	575	7.457	685	2.674
360	0.041	470	4.091	580	7.479	690	2.378
365	0.084	475	3.236	585	7.484	695	2.119
370	0.044	480	2.911	590	7.576	700	1.866
375	0.083	485	3.170	595	7.584	705	1.652
380	0.104	490	3.633	600	7.636	710	1.427
385	0.081	495	4.390	605	7.586	715	1.268
390	0.052	500	5.122	610	7.508	720	1.094
395	0.036	505	5.851	615	7.448	725	0.982
400	0.088	510	6.464	620	7.327	730	0.853
405	0.113	515	6.894	625	7.040	735	0.768
410	0.187	520	7.137	630	6.795	740	0.624
415	0.418	525	7.369	635	6.468	745	0.563
420	0.883	530	7.420	640	6.099	750	0.556
425	1.722	535	7.458	645	5.736	755	0.417
430	3.133	540	7.498	650	5.274	760	0.402
435	5.065	545	7.475	655	4.882	765	0.354
440	7.664	550	7.390	660	4.453	770	0.305
445	10.60	555	7.365	665	4.119	775	0.278
450	12.35	560	7.353	670	3.738	780	0.245
455	10.79	565	7.321	675	3.352		

Spectral Data Over Visible Wavelengths



PRODUCT PICTURE:

CONCLUSION

The results tabulated in this report are representative of the actual test samples submitted for this report only. The data is provided to the client for further evaluation. Compliance to the referenced specification requirements was not determined in this report.

In Charge Of Tests:

Melanie Brittain

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Lighting Division

Report Reviewed By:

Jeffrey Davis
Engineering Supervisor
Lighting Division

Attachments: IES File - CRT1508181209-001C