

LM-79-08 Test Report

For

Espen Technology Inc.

(Brand Name: Espen)

12257 Florence Ave., Santa Fe Springs, CA, 90670

Integrated Retrofit Kits for 2x4 Luminaires

Model name(s): VEKT-P2x4/830;VEKT-P2x4/835
VEKT-P2x4/840;VEKT-P2x4/850

Remark: This is a multiple listed report, the original report NO. is
GZE170236-B.

Representative (Tested) Model: VEKT-P2x4/830
VEKT-P2x4/850

Model Different: All construction and rating are the same, except CCT

Test & Report By:

Bennie Zhang

Engineer: Bennie Zhang

Date: Feb.22,2017

Review By:

Tommy Liang

Manager: Tommy Liang

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Laboratory: Standard-Tech Co. Ltd Testing Center
NVLAP CODE: 201011-0

Report Format Number STD/QR4909-A/2

Address: Standard-Tech Building, No.6 Guanhong Road, Guangzhou Science City, Guangzhou 510663, China

Tel: 8620-3229 0320

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<http://www.standard-tech.com>

1.1 Product Information:

Organization Name	Eспен Technology Inc.	
Brand Name	Eспен	
Model Number	VEKT-P2x4/830;VEKT-P2x4/835 VEKT-P2x4/840;VEKT-P2x4/850	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Integrated Retrofit Kits for 2x4 Luminaires	
Rated Voltage / Frequency	120 -277Vac, 50/60 Hz	
Nominal Power	36W	
Rated Initial Lamp Lumen	--	
Declared CCT	3000K,3500K,4000K,5000K	
LED Manufacturer	EVERLIGHT ELECTRONICS CO.LTD	
LED Model	62-217D/KK5C-HXXXXXXXXX2532Z6/2T(HN)	
Sample Number	GZE170236-B1(3000K),B2(5000K)	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s
Photo		
		

1.2 Test Specifications:

Date of Receipt	Feb.20,2017
Date of Test	Feb.22,2017
Test item	1. Total Luminous Flux 2. Luminous Distribution Intensity 3. Luminous Efficacy 4. Correlated Color Temperature 5. Color Rendering Index 6. Chromaticity Coordinate 7. Electrical Parameters
Reference Standard	1. IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products 2. ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products 3. CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources 4. CIE 15-2004 Technical Report Colorimetry 5. IESNA LM-16-93 Practical Guide to Colorimetry of Light Source 6. IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems
Reference Work Instruction	QD25

1.3 Test Methods

1) Photometric and Light Distribution Measurement – Goniophotometer Method: Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$, measured at a point not more than 1 m from the sample and at the same height as the sample. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1° vertical intervals and 22.5° horizontal intervals.
2) Chromaticity Measurement – Sphere-Spectroradiometer Method: Chromaticity parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral power distribution taken at 5 nm intervals over the range of 380 to 780 nm.
3) Electrical Measurements: Electrical parameters were measured using power meters incorporated in goniophotometer or sphere-spectroradiometer system. The ambient temperature surrounding the sample was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. The sample was operated at 120 or rated Volts AC, 60Hz. It was stabilized before measurement was made. Voltage, frequency, current, power, power factor and total harmonic distortion were measured by and read from the power meter.

2.1 Electrical, Photometric and Chromaticity Measurements
(Refer to Work Instruction QD25)

Test date	2017-02-22	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	VEKT-P2x4/830		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170236-B1	120.0	60	0.2935	34.45	0.9782	10.06
	277.0	60	0.1411	34.48	0.8823	19.31
DLC Pass Criteria					$\geq 0.9(-3\%)$	$\leq 20(+5)$

Chromaticity Measurement in Lithonia 2PM3N 12 cell 2x4 parabolic
Sphere-Spectroradiometer Method:

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	83	R9	8
Frequency (Hz)	60	R2	93	R10	84
CCT (K)	3091	R3	94	R11	81
Duv	0.0007	R4	81	R12	70
Chromaticity (x, y)	x=0.4315 y=0.4038	R5	83	R13	85
Chromaticity (u', v')	u'=0.2472 v'=0.5205	R6	92	R14	98
Color Rendering Index (CRI)	83.3	R7	82	R15	74
R9	8	R8	59	--	--

Photometric Measurement in Lithonia 2PM3N 12 cell 2x4 parabolic
Goniophotometer Method:

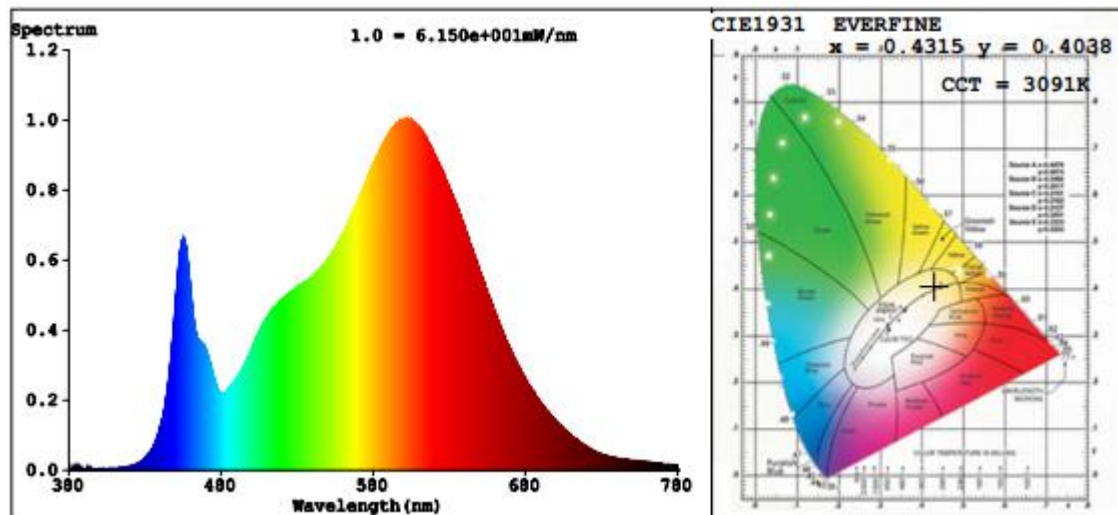
Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	4356.4	4345.4	$\geq 2000(-10\%)$	
Luminous Efficacy (lm/W)	126.46	126.04	Standard: $\geq 100(-3\%)$	Premium: $\geq 125(-3\%)$
Zonal lumens in the 0-60° zone (%)	79.2	--	$\geq 75(-3)$	
SC: 0-180° (if applicable)	1.35	--	1.0-2.0(± 0.1)	
SC: 90-270° (if applicable)	1.25	--	1.0-2.0(± 0.1)	
Beam Angle (°)	114.5	--	--	
Center Beam Candle Power (cd)	1483	--	--	

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Spectral Power Distribution & Chromaticity Diagram

Zonal Lumen Tabulation

Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	1,175.3	27%
0-40	1,940.2	44.5%
0-60	3,451.6	79.2%
60-90	904.3	20.8%
70-100	367.1	8.4%
90-120	0.0	0%
0-90	4,355.9	100%
90-180	0.0	0%
0-180	4,355.9	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	140.8	3.2%	90-100	0.0	0%
10-20	407.5	9.4%	100-110	0	0%
20-30	627.1	14.4%	110-120	0	0%
30-40	764.9	17.6%	120-130	0	0%
40-50	796.1	18.3%	130-140	0.0	0%
50-60	715.3	16.4%	140-150	0.0	0%
60-70	537.2	12.3%	150-160	0.0	0%
70-80	297.5	6.8%	160-170	0.0	0%
80-90	69.6	1.6%	170-180	0.0	0%

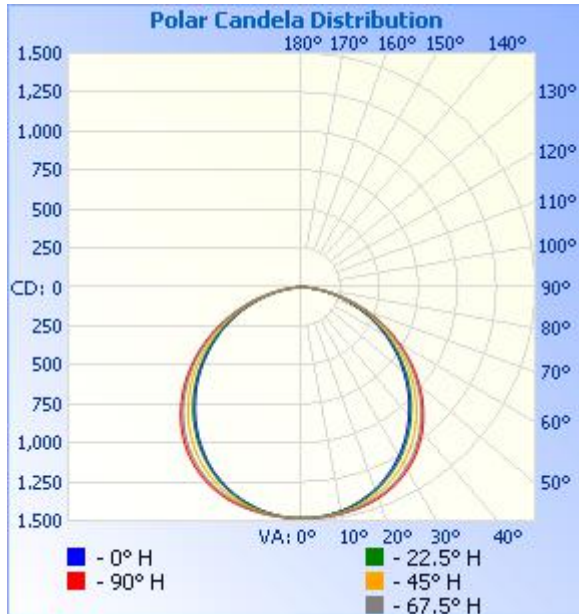
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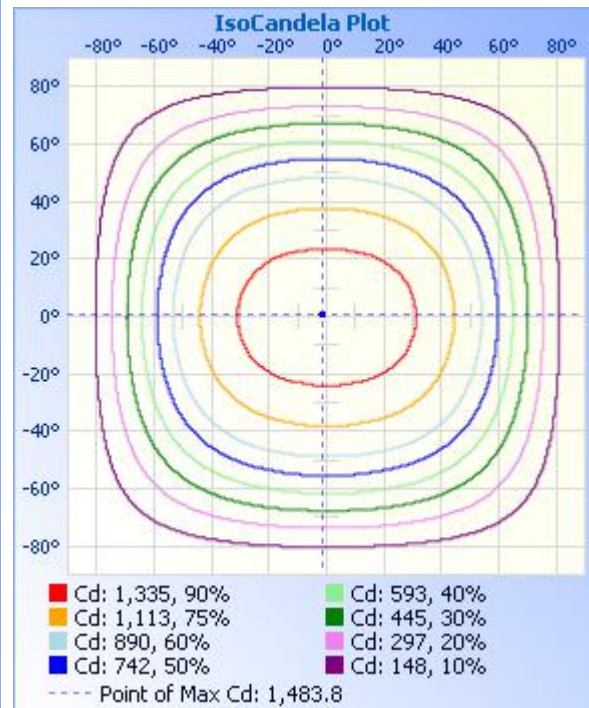
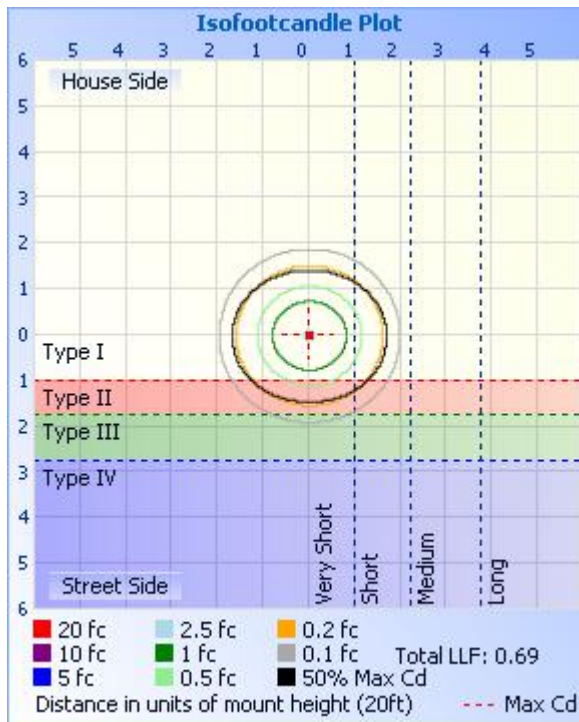
Photometric Data



Illuminance at a Distance

Center Beam fc	Beam Width	Beam Width
17.0ft	5.13 fc	48.8 ft 57.5 ft
34.0ft	1.28 fc	97.6 ft 114.9 ft
51.0ft	0.57 fc	146.3 ft 172.4 ft
68.0ft	0.32 fc	195.1 ft 229.8 ft
85.0ft	0.21 fc	243.9 ft 287.3 ft
102.0ft	0.14 fc	292.7 ft 344.8 ft

■ Vert. Spread: 110.2°
■ Horiz. Spread: 118.8°



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Table--1

UNIT: cd

C (DEG) γ (DEG)	0	23	45	68	90	113	135	158	180	203	225	248	270	293	315	338	
0	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	
5	1480	1481	1479	1478	1477	1478	1480	1481	1482	1481	1479	1477	1477	1476	1479	1479	
10	1473	1471	1466	1460	1459	1460	1469	1473	1476	1472	1466	1459	1457	1458	1466	1470	
15	1459	1455	1443	1429	1426	1432	1447	1459	1463	1457	1442	1429	1423	1427	1440	1451	
20	1436	1428	1408	1388	1381	1388	1413	1433	1441	1430	1407	1385	1376	1385	1406	1426	
25	1400	1389	1360	1331	1320	1334	1366	1394	1406	1391	1359	1328	1318	1327	1357	1386	
30	1349	1335	1298	1262	1250	1266	1306	1340	1356	1337	1296	1259	1245	1257	1296	1332	
35	1282	1266	1222	1181	1168	1186	1230	1272	1290	1267	1220	1177	1160	1175	1219	1262	
40	1197	1179	1134	1088	1073	1092	1141	1186	1205	1181	1132	1084	1065	1083	1131	1176	
45	1097	1080	1033	987	972	991	1040	1087	1104	1080	1029	981	964	981	1028	1076	
50	983	966	921	877	862	882	929	973	991	965	917	872	854	871	917	962	
55	857	842	801	762	748	765	808	848	863	840	796	755	740	755	797	839	
60	723	710	676	641	630	645	681	716	728	708	669	634	621	634	670	707	
65	582	572	544	517	507	520	550	577	587	570	538	510	499	510	540	570	
70	439	432	412	392	385	394	416	436	443	430	406	385	377	386	408	430	
75	300	294	282	269	264	271	284	298	302	292	277	263	258	260	278	293	
80	170	167	161	155	152	155	163	169	171	166	157	150	147	150	158	166	
85	58.6	59.1	58.4	56.8	55.6	56.7	58.8	59.6	60.2	58.4	54.9	51.8	50.6	51.8	54.9	58.2	
90	0.09	0.02	0.13	0.22	0.24	0.24	0.26	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
95	0.00	0.00	0.00	0.00	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	
105	0.00	0.00	0.00	0.00	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	
115	0.00	0.00	0.00	0.00	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	
125	0.00	0.00	0.00	0.00	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	
135	0.00	0.00	0.00	0.00	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	0.36	0.00	0.00	0.00	
145	0.00	0.00	0.00	0.00	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	
155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	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	0.15	0.00	0.00	0.00	
165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	
170	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.20	0.00	0.00	0.00	
175	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	
180	0.15	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	

2.2 Electrical, Photometric and Chromaticity Measurements
(Refer to Work Instruction QD25)

Test date	2017-02-22	Test Ambient:	25.2 ° C
Test Orientation	As intended	Stabilization Time (min)	90
Model Number	VEKT-P2x4/850		

Electrical Measurement in Lithonia 2PM3N 12 cell 2x4 parabolic:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE170236-B2	120.0	60	0.3002	35.21	0.9773	9.83
	277.0	60	0.1438	35.25	0.8852	18.69
DLC Pass Criteria					>= 0.9(-3%)	<= 20(+5)

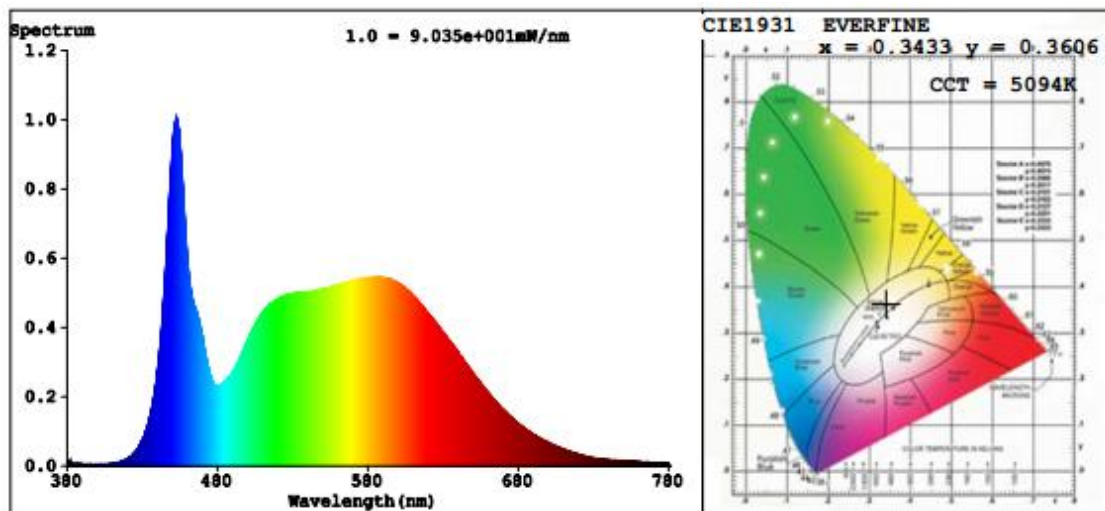
**Chromaticity Measurement in Lithonia 2PM3N 12 cell 2x4 parabolic -
Sphere-Spectroradiometer Method:**

Parameter	Result	Special Color Rendering Indices			
Test Voltage (V)	120.0	R1	82	R9	11
Frequency (Hz)	60	R2	90	R10	76
CCT (K)	5094	R3	95	R11	84
Duv	0.0052	R4	84	R12	61
Chromaticity (x, y)	x=0.3433 y=0.3606	R5	83	R13	85
Chromaticity (u', v')	u'=0.2068 v'=0.4887	R6	86	R14	97
Color Rendering Index (CRI)	84.4	R7	88	R15	77
R9	11	R8	68	--	--

**Photometric Measurement in Lithonia 2PM3N 12 cell 2x4 parabolic
Sphere-Spectroradiometer Method:**

Parameter	Result		DLC V4.0 Pass Criteria	
Test Voltage (V)	120.0	277.0	--	
Frequency (Hz)	60	60		
Total Luminous (lm)	4490.1	4481.2	>=2000(-10%)	
Luminous Efficacy (lm/W)	127.51	127.13	Standard: >= 100(-3%)	Premium: >= 125(-3%)

Spectral Power Distribution & Chromaticity Diagram



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2.3 Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
VEKT-P2x4/830	3000K	4356.4	34.45	126.46
VEKT-P2x4/835	3500K	4401 ^{*1}	34.83 ^{*2}	126.36 ^{*3}
VEKT-P2x4/840	4000K	4446 ^{*1}	34.83 ^{*2}	127.64 ^{*3}
VEKT-P2x4/850	5000K	4490.1	35.21	127.51

*1: This value is calculated and the calculation formula is as below:

$$4401 = (4490.1 - 4356.4) / 3 + 4356.4$$

$$4446 = (4490.1 - 4356.4) / 3 + 4401$$

*2: This value is calculated and the calculation formula is as below:

$$34.83 = (34.45 + 35.21) / 2$$

$$34.83 = (34.45 + 35.21) / 2$$

*3: This value is calculated and the calculation formula is as below:

$$126.36 = 4401 / 34.83$$

$$127.64 = 4446 / 34.83$$

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3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-336	2 meter Integrating Sphere	2016-07-01	2017-06-30
ST-R-331	Spectral analysis system HAAS-2000	2016-07-01	2017-06-30
D204	Standard Lamp	2016-07-01	2017-06-30
PF2010	Power Meter for Integrating Sphere	2016-07-01	2017-06-30
EE-09	Goniophotometer system	2016-07-01	2017-06-30
D908S	Standard Lamp	2016-07-01	2017-06-30
PF210	Power Meter for Goniophotometer	2016-07-01	2017-06-30
ST-R-181A	Temperature Tester	2016-07-01	2017-06-30
Uncertainty: Photometric Measurement (Sphere):1.74% Chromaticity Measurement(Sphere):14.3K Photometric Measurement(Goniophotometer):1.62%			

******* END OF REPORT *******