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**Report No. 101744080CRT-002**

## **Hunan Chendong Technology CO., LTD**

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### **Standards**

*International Civil Aviation Organization (ICAO), Aerodrome Design and Operations, Annex 14, Volume 1, Sixth Edition, dated July 2013*

Purpose: Performance testing of ICAO Type B Medium Intensity Obstacle Light  
Model: CK-16  
Test Dates: August 13, 2014 through October 15, 2014

**Mike Guy**  
Associate Engineer  
Lighting

**Jeremy N. Downs PE**  
Staff Engineer  
Lighting

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**Sample Information**

Date Rec.	Intertek ID	Description	Condition	Model No.
7/14/14	CRT1407141532-001	Medium Intensity Type B Obstacle light	Good	CK-16
9/26/14	CRT1409261241-001	Medium Intensity Type B Obstacle light	Good	CK-16

Type:	Type B medium intensity obstacle light
Light Source:	27 red LEDs arranged in single array around the circumference, Cree part number XPERED-L1-0000-00501
Lens:	Clear plastic
Electrical Input:	100 vac - 240 vac
Casting Material:	Aluminum Alloy
Mounting:	3 through holes for base mounting
Controller:	Internal
Manufacturer's Catalog Number:	CK-16

Picture(s)



**Photometry Annex-14 retest**

Energize the light by the system power supply and control unit and test for compliance with the photometric requirements in Table 6-3. Make the effective intensity measurements using an integrating photometer whose calibration is traceable to an NIST steady state source. The test distance is 25 meters. The horizontal beam spread is 360 degrees.

**Results Table 6-3**

Parameter	Requirement	Measured	Result
Flash Rate (FPM)	20-60 FPM	20.0	Pass

Table 6.3 minimum requirements					
Spec.	min 0 deg.	min -1 deg.	vert beam spread	intensity	Minimum average intensity at 0 degrees vertical
2000cd	1500cd.	750cd.	3 deg	750cd	2000 cd

Measured data					
Spec.	min 0 deg.	min -1 deg.	vert beam spread	intensity	Average intensity in cd.at 0 degrees vertical
2000cd	2142cd.	2004cd.	4 deg.	942cd	2277

**Complies**

Tested By	Rudy Sporman	Signature or initials	<i>RS</i>	Comp. Date	10/15/14
Reviewed By	JND	Signature or initials	<i>JND</i>		
Test Equipment Used	5, 6, 7, 8, 9, 10				
Sample ID#	CRT1409261241-001	Ambient (°C)	24	RH%	53

Sample was stable after 31 minutes using Intertek ID No. N1314 at 1, 16, and 31 minute intervals.

**Photometry Annex-14 retest**

Distribution - Table 6-3 ICAO Annex 14

All intensity measurements are in candela

Cable Length:  Calibration Factor:   
 On time-one flash (s):

Flash Energy Raw Data - 5 flashes (candela seconds)

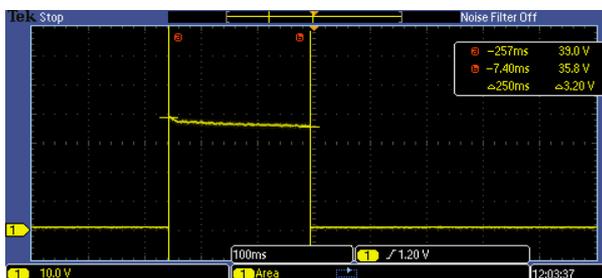
Vertical Position	Horizontal Position (deg.)											
	0	30	60	90	120	150	180	210	240	270	300	330
3U	1642	1725	1783	1823	1851	1821	1957	2040	2230	2210	2160	1913
2U	2430	2500	2330	2120	2400	2690	2760	3150	3320	3140	2640	2810
1.5U	2770	2780	2770	2590	2880	3090	3520	3830	3780	3940	4010	3500
1U	3860	3650	3360	3170	3410	4070	4330	4730	4620	4470	4440	4060
0	5200	5040	5000	5080	4850	5200	5410	5510	5310	5050	4820	5020
1D	4530	4550	4580	5050	4950	5040	5060	4820	4690	4680	4510	4200
1.5D	3880	3980	4060	4520	4590	4710	4380	4200	4110	4110	4000	3690
2D	3300	3430	3550	3830	3860	3750	3630	3320	3270	3340	3220	2920
3D	2480	2580	2670	2680	2490	2300	2260	2120	1818	1843	1697	1639
10D	25	28	27	20	24	16	19	34	44	46	45	43

Calculated Effective Intensity Data (candela)

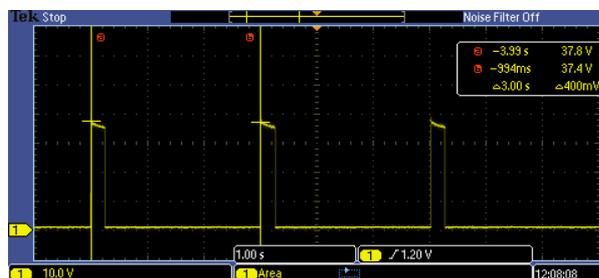
Vertical Position	Horizontal Position (deg.)											
	0	30	60	90	120	150	180	210	240	270	300	330
3U	730	767	792	810	823	809	870	907	991	982	960	850
2U	1080	1111	1036	942	1067	1196	1227	1400	1476	1396	1173	1249
1.5U	1231	1236	1231	1151	1280	1373	1564	1702	1680	1751	1782	1556
1U	1716	1622	1493	1409	1516	1809	1924	2102	2053	1987	1973	1804
0	2311	2240	2222	2258	2156	2311	2404	2449	2360	2244	2142	2231
1D	2013	2022	2036	2244	2200	2240	2249	2142	2084	2080	2004	1867
1.5D	1724	1769	1804	2009	2040	2093	1947	1867	1827	1827	1778	1640
2D	1467	1524	1578	1702	1716	1667	1613	1476	1453	1484	1431	1298
3D	1102	1147	1187	1191	1107	1022	1004	942	808	819	754	728
10 D	11	12	12	9	11	7	8	15	20	20	20	19

At all radials, there must be a peak beam intensity of 2,000 cd ± 25% at 0 degrees, and a contiguous 3 degree beam spread of 750 cd minimum.

Flash Duration



Flash Period



**Chromaticity Annex 14**

Test the fixture with the lamp, filter and optical system for color of light emitted. Chromaticity Coordinates are to be calculated from a spectral distribution measured in 2nm increments for LEDs. Measure the color after a 15 minute warm-up period at rated input at the main beam center and beam extremes.

**Results**

Sample	Color	Input	x	y	z
Type B medium	Red	120vac	0.696	0.303	0.002

**Results- Appendix 1**

The aviation red must be per ICAO Annex 14, Volume 1, Appendix 1, Colours for Aeronautical Ground Lights, at operating temperature within the following chromaticity boundaries

Boundary	Line Equation	Calc.
Purple Boundary	$y \geq 0.980 - x$	0.284
Yellow Boundary	$y \leq 0.335$	0.303

**Complies**

Tested By	Jeff Davis	Signature or initials	JD	Comp. Date	8/13/14
Reviewed By	JND	Signature or initials	JND		
Test Equipment Used	1 TO 4				
Sample ID#	CRT1407141532-001	Ambient (°C)	24.4	RH%	46

<b>Equipment list</b>				
#	Intertek ID No.	Description	Manufacturer	Calibration Due
1	E288*	Spectral Radiometer	Optronics	17-Aug-2014
2	T1366	Temp/RH Indicator	Extech	27-Nov-2014
3	M226	Digital Multimeter	Fluke	10-Sep-2014
4	NA	Power Supply	Xantrex	VBU
5	O109	Goniometer	Optronik	15-Oct-2014
6	L061	IL1700 Research Radiometer	International Light	Calibrated before use
7	E466	Oscilloscope	Tektronix	01-May-2015
8	T1360	Temperature/RH Indicator	Extech	27-Nov-2014
9	E259	Multimeter	Fluke	20-Mar-2015
10	N1314	Stopwatch	Fisher Scientific	06-Feb-2015
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

**Note: For measurement uncertainty, refer to the calibration certificates for all the test equipment located in the equipment files**

\* CAL 7-17-14 PMT 250 to 850 by 2nm.cal