Hunan Lingte Technology Co., Ltd

TEST REPORT

SCOPE OF WORK
ICAO Performance Testing - Medium Intensity Type A Obstacle Light

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104223367CRT-001

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Test Report			
Company Name	Hunan Lingte Technology Co., Ltd	**Test Location**	Intertek Testing Services NA
Address	Building A4	**Address**	3933 US Rt 11
	Tongxin International Industrial Park		Cortland, NY 13045
	No. 169, Huizhi Middle Road		USA
	High-tech Zone		
	Changsha, China		
Client Contact	Tiffany Zhang	**Quote Number**	Qu-01031344-0
Phone	+0-731-8592-5707	**Test Start Date**	February 11th, 2020
Email	zds@linterk.com	**Completion Date**	March 18th, 2020

Standard(s)
International Civil Aviation Organization (ICAO), Aerodromes, Annex 14, Volume 1, Eighth Edition, dated July 2018

Spec.	Test name	Clause	Result
ICAO	Photometry Med Intensity Type A (White)	Table 6-1 & Table 6-3	Pass
ICAO	Chromaticity ICAO App. 1 (White)	2.3.1	Pass

Results Key	
Pass	Compliant
Fail	Non-compliant
TBD	Compliance not determined
NT	Not tested in this project
NA	Test not applicable

Lynette Smith
Engineer
Lighting

Christopher W. Metcalf
Engineering Supervisor
Lighting

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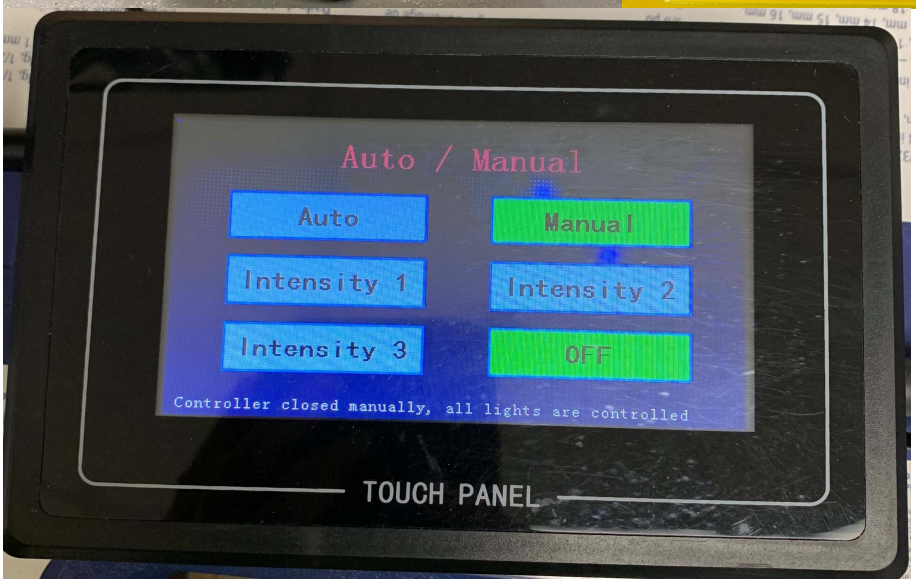
Sample Information				
Date Rec.	Intertek ID	Description	Condition	Model No.
2/3/20	CRT200203307-007a	Medium Intensity Type A	Production	LT-01-MA(L)
2/3/20	CRT200203307-007b	Controller Operating Instruction	Production	NA

Further Sample Description	
Type:	Medium Intensity Type A Obstruction Light
Options:	GPS
Light Source:	[104] White Cree USA LEDs, XPG2
Lens:	PC, BAYER Germany
Approx Size:	Height: 7.3", Length/Width: 10.3"
Electrical Input:	85-264 VAC, <8W
Casting Material:	Aluminum Alloy
Mounting:	[4] Thru-holes for tower mounting

Sample Modification Log	
Date	Modification description
3/3/20	Type A Day/Twilight: Increased flash duration from 80ms to 97ms Type A Night: Increased flash duration from 130ms to 148ms

Picture(s)


Linterk
Aviation Obstruction Light
Medium Intensity Type A
Model : LT-01-MA(L)
Weight : 5.7kg
Voltage : AC85-264V(DC24V)
Power consumption : <8W
IP Grade: IP67
Manufacturer: Hunan Lingte Technology Co., Ltd
Address: Building A4, Tongxin International Industry Park,
No.169, Huizhi Middle Road, High-tech district, China


Auto / Manual
Auto
Manual
Intensity 1
Intensity 2
Intensity 3
OFF
Controller closed manually, all lights are controlled
TOUCH PANEL

Photometry - Medium Intensity Obstacle Light (Flashing)

Energize the light by the system power supply and control unit and test for compliance with the photometric requirements in Table 6-2. Vary the input voltage to the light ± 10% from nominal voltage and measure the effective intensity at the input extremes. Make the effective intensity measurements using an integrating photometer whose calibration is traceable to an NIST steady state source. The test distance is 100ft. The horizontal beam spread is 360 degrees.

Results

ICAO Medium-Intensity, Type A (White Day)

Table 6-3 Requirements

Parameter	Requirement	Measured		Result
Flash Rate (FPM)	20-60 FPM	40	FPM	Pass
Minimum Ave Intensity (cd)	20,000 cd at 0°	22541	cd	Pass
Minimum Intensity (cd)	15,000 cd at 0°	20059	cd	Pass
Minimum Intensity (cd)	7,500 cd at -1°	10732	cd	Pass
Beam Spread		3	cd	Pass

Table 6-3 Recommendations

Parameter	Requirement	Measured		Result
Maximum Intensity (cd)	25,000cd at 0 degrees	25057	cd	NA
Maximum Intensity (cd)	11,250cd at -1 degrees	19248	cd	NA
Maximum Intensity (cd)	750cd at -10 degrees	98	cd	NA

Sample	Voltage Variation	Voltage	Position	Measured	Factor	Result
CRT200203307-007	Input Voltage	85.1	(0,0)	32900	NA	NA
	Input Voltage -10%	76.6	(0,0)	32800	100%	Pass
	Input Voltage +10%	290.6	(0,0)	32900	100%	Pass

Cable Length (ft.):	5'	Calibration Factor:	2.45E-12	Input:	85.1 Vac
Flash Duration (sec):	0.096	Neutral Density Filter:	N/A		
Flash Period (sec.):	1.50				

Effective Intensity (cd)

Vertical Position (deg)	Horizontal Position (deg.)											
	0	30	60	90	120	150	180	210	240	270	300	330
3U	9327	5410	5619	7605	4302	5896	9462	6855	7666	10273	6666	6754
2U	13845	11873	10536	11988	9408	10549	13096	12792	13123	14318	12562	12650
1U	18505	19181	17425	16412	16479	16479	17290	19721	19383	18235	19316	19181
0	22288	24989	23030	20194	22288	22355	21882	25057	22963	20059	22017	23368
1D	12143	12562	15061	16884	19248	17222	14588	11981	10732	11785	11785	11414
2D	4471	2789	4322	6842	5585	4768	5194	2965	2094	3080	1905	3107
3D	1253	654	1168	2242	1298	1580	1986	843	488	515	546	729
10D	78	76	84	94	91	81	88	82	87	98	95	86

ICAO Medium-Intensity, Type A (White Twilight)

Table 6-3 Requirements

Parameter	Requirement	Measured		Result
Flash Rate (FPM)	20-60 FPM	40	FPM	Pass
Minimum Ave Intensity (cd)	20,000 cd at 0°	22297	cd	Pass
Minimum Intensity (cd)	15,000 cd at 0°	19762	cd	Pass
Minimum Intensity (cd)	7,500 cd at -1°	10454	cd	Pass
Beam Spread	≥3° at each vertical slice (min 7,500cd)	3	cd	Pass

Table 6-3 Recommendations

Parameter	Requirement	Measured		Result
Maximum Intensity (cd)	25,000cd at 0 degrees	24820	cd	NA
Maximum Intensity (cd)	11,250cd at -1 degrees	18953	cd	NA
Maximum Intensity (cd)	750cd at -10 degrees	98	cd	NA

Sample	Voltage Variation	Voltage	Position	Measured	Factor	Result
CRT200203307-007	Input Voltage	85.1	(0,0)	32800	NA	NA
	Input Voltage -10%	76.5	(0,0)	32800	100%	Pass
	Input Voltage +10%	290.5	(0,0)	32900	100%	Pass

Cable Length (ft.):	5'	Calibration Factor:	2.45E-12	Input:	85.1 Vac
Flash Duration (sec):	0.097	Neutral Density Filter:	N/A		
Flash Period (sec.):	1.50				

Effective Intensity (cd)

Vertical Position (deg)	Horizontal Position (deg.)											
	0	30	60	90	120	150	180	210	240	270	300	330
3U	9490	5537	5686	7595	4317	5881	9476	6907	7716	10373	6697	6751
2U	14029	11857	10704	11911	9456	10461	13125	12747	13240	14231	12633	12660
1U	18548	19155	17469	16187	16457	16322	17401	19627	19492	18143	19290	19222
0	22123	24820	22730	19964	22055	22190	21718	24686	22662	19762	21785	23067
1D	11473	12235	14636	16794	18953	17064	14164	11837	10454	11776	11540	11459
2D	4148	2644	4074	6907	5524	4627	4930	2880	2030	3244	1828	3055
3D	1132	600	1072	2158	1236	1491	1895	804	453	473	513	691
10D	84	81	88	98	92	84	86	80	83	92	83	76

ICAO Medium-Intensity, Type A (White Night)

Table 6-3 Requirements

Parameter	Requirement	Measured		Result
Flash Rate (FPM)	20-60 FPM	40	FPM	Pass
Minimum Ave Intensity (cd)	2,000 cd at 0°	2193	cd	Pass
Minimum Intensity (cd)	1,500 cd at 0°	1826	cd	Pass
Minimum Intensity (cd)	750 cd at -1°	1064	cd	Pass
Beam Spread	≥3° at each vertical slice (min 750cd)	3	cd	Pass

Table 6-3 Recommendations

Parameter	Requirement	Measured		Result
Maximum Intensity (cd)	2,500cd at 0 degrees	2534	cd	NA
Maximum Intensity (cd)	1,125cd at -1 degrees	1981	cd	NA
Maximum Intensity (cd)	75cd at -10 degrees	7	cd	NA

Sample	Voltage Variation	Voltage	Position	Measured	Factor	Result
CRT200203307-007	Input Voltage	85.1	(0,0)	3650	NA	NA
	Input Voltage -10%	76.4	(0,0)	3640	100%	Pass
	Input Voltage +10%	290.6	(0,0)	3650	100%	Pass

Cable Length (ft.):	5'	Calibration Factor:	2.45E-12	Input:	85.1 Vac
Flash Duration (sec):	0.147	Neutral Density Filter:	N/A		
Flash Period (sec.):	1.50				

Effective Intensity (cd)

Vertical Position (deg)	Horizontal Position (deg.)											
	0	30	60	90	120	150	180	210	240	270	300	330
3U	839	474	523	700	397	615	986	715	705	927	595	620
2U	1273	1085	992	1126	890	1100	1382	1319	1227	1290	1138	1175
1U	1722	1785	1641	1549	1607	1722	1843	2004	1843	1664	1785	1797
0	2108	2350	2188	1918	2200	2344	2332	2534	2223	1826	2090	2200
1D	1143	1227	1503	1670	1981	1877	1630	1307	1064	1120	1152	1149
2D	462	296	460	699	608	579	634	379	253	338	222	371
3D	147	72	149	264	165	220	272	125	79	90	79	113
10D	4	5	6	6	7	7	7	6	6	6	7	6

Complies: ☑ YES ☐ NO

Tested By:	Brittany James	Signature or initials:	BJ
Engineer:	Lynette Smith	Signature or initials:	Lynette Smith
Reviewed By:	cwm	Signature or initials:	cwm
Test Equipment Used:	1, 2, 3, 4, 5, 6	Sample No:	CRT200203307-007
Amb (ºC): 26	RH% 17	Completion Date:	3/5/2020

Chromaticity ICAO

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, and 5nm increments for incandescent. Measure the color after stabilization at rated input at the main beam center and beam extremes.

Results - ICAO LED White

Sample	Color	Input	Location	x	y	z	(P/F)
CRT200203307-007	White	85.0	(0,0)	0.331	0.341	0.328	P
		220Vac					

The aviation white must be per ICAO Annex 14, Volume 1, Appendix 1, Colors for Aeronautical Ground Lights, within the following chromaticity boundaries

Boundary	Line Equation	Calc.
Yellow Boundary	x ≤ 0.440	0.331
Blue Boundary	x ≥ 0.320	0.331
Green Boundary	y ≤ 0.150 + 0.643x	0.363
Purple Boundary	y ≥ 0.050 + 0.757x	0.301

Complies: ☑ YES ☐ NO

Tested By:	Brittany James			Signature or initials:	BJ
Engineer:	Lynette Smith			Signature or initials:	Lynette Smith
Reviewed By:	cwm			Signature or initials:	cwm
Test Equipment Used:	1, 3, 4, 5, 6, 7, 8			Sample No:	CRT200203307-007
Amb (ºC):	25	RH%	14	Completion Date:	2/24/2020

Equipment list				
#	Intertek ID No.	Description	Manufacturer	Calibration Due
1	L178	100ft. Lab Goniophotometer	Labsphere	08-May-2020
2	L061	IL1700 Radiometer	International Light	14-May-2020
3	E540	Oscilloscope	Tektronix	11-Jul-2020
4	L155	Digital Protractor	Mitutoyo	03-Mar-2020
5	M244	Multimeter	Fluke	26-Mar-2020
6	L190	Hygro-Thermometer	Testo	26-Feb-2020
7	L188	Laser Distance Meter	Fluke	17-Apr-2020
8	M292	OL750S Spectroradiometer	Gooch & Housego	06-Mar-2020
9				
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Note: For measurement uncertainty, refer to the calibration certificates for all the test equipment located in the equipment files				