TEST REPORT No. 1/07.06.22./TM-11

SIA Baltic Research Center test report for projecting long term lumen maintenance of LED light sources

Report reference No.	1/07.06.22./TM-11
Date of Issue	08.06.2022.
Project Handler	Ingmārs Felcis
Testing Laboratory	SIA Baltic Research Center
Address	Gaujas iela 11, Rīga, LV-1026, Latvia
Client	SIA VIZULO
Client number	1
Address	Bukultu iela 11, Riga, LV-1005, Latvia
Test specification	SIA Baltic Research Center test and calculation method is based on the requirements in the following standards: IES TM-21-11; ENERGY STAR® TM-21 Calculator, rev. 06.18.18
TRF originated by	SIA Baltic Research Center, Ingmārs Felcis
Copyright blank test report	This report based on the content of the standard (see above). The test report considered selected clauses of the a.m. standard(s) and experience gained with product testing. It was prepared by SIA Baltic Research Center, takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.
Number of pages (Report)	6

Compiled and approved by:
Head of Laboratory, Ingmārs Felcis
(+signature)

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Test object ID	10106202208
Type of test object	LED street and territory luminaire
Trade mark	VIZULO MICRO MARTIN
Model and/or type reference	MRUE 075 730 L05 AA016 CSN NG1
Rating(s)	AC: 230-240 V~, 50-60 Hz
Manufacturer	Same as above
Address	Same as above
Order Description	Test according to the test specification and for the following items: 1) In-situ temperature measurements test (ISTMT); 2) Temperature test of Tc point on the LED driver; 3) Lumen maintenance projection according to TM-21
Date of order	27.05.2022.
Date of receipt of test item	31.05.2022.
Date(s) of performance of test	07.06.2022.
Equipment used	AC power source T023; Digital power measuring device T024; Thermal chamber T022; Thermocouple Datalogger B010;
Lamp type	☐ Bare lamp
	☒ Cover lamp, no reflector
	☐ Lamp with reflector
	☐ Other:
Rated Voltage	230-240 V~, 50-60 Hz
Rated Power	75 W

General remarks:
Throughout this report, a point is used as the decimal separator.
The test results presented in this report relate only to the object tested.
This report shall not be reproduced except on full without the written approval of the testing laboratory.

SIA Baltic Research Center is an accredited photometric, colorimetric and photobiological safety testing laboratory by LATAK (Latvian National Accreditation Bureau) acc. to EN 17025 using testing methods based on IESNA TM-21-11 standard.

Photo of the sample:

Model No.: MRUE 075 730 L05 AA016 CSN NG1

Test results

In-situ temperature measurements test (ISTMT)

Electrical Input Results

Input voltage:	230V~, 50 Hz	Input current on LED:	716 mA	Input power:	75 W
Test time:	420 minutes	Temperature stabilization time:	120 minutes		

Temperature Results	
Maximum temperature reached T_1 °C, LED	64.1
Maximum ambient temperature reached T_4 °C	25.1

Test results	
Reported lumen maintenance life	L90 > 60 000 hours
The time in hours when $L_{90}B_{50}$ is attained	103 100 hours
The time in hours when $L_{90}B_{10}$ is attained	103 100 hours
Estimate lumen maintenance at 60 000 h	L93 (93.69%)
Estimate lumen maintenance at 100 000 h	L90 (90.26%)

Comments:
LED used in the luminaire – LUXEON 5050

Results refer to the same luminaire family with the same power or lower configuration.

The luminaire was tested as intended for use – luminous area facing downwards with a glass diffusor over the LED and driver area.

Lumen maintenance projection according to TM-21-11

LM-80 Test Inputs

Description of LED Light Source Tested (manufacturer, model, catalog number)
VIZULO SIA, MRUE 075 730 L05 AA016 CSN NG1

LM-80 Testing Details	
Total number of units tested per case temperatur	24
Number of failures:	0
Number of units measured:	24
Test duration (hours):	10000
Tested drive current (mA):	750
Tested case temperature 1 (T_c, ºC):	55
Tested case temperature 2 (T_c, ºC):	85
Tested case temperature 3 (T_c, ºC):	105

Test Data for 55ºC Case Temperature		Test Data for 85ºC Case Temperature		Test Data for 105ºC Case Temperature	
Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
0	100.00%	0	100.00%	0	100.00%
1000	99.90%	1000	99.10%	1000	98.00%
2000	99.70%	2000	98.70%	2000	97.30%
3000	99.60%	3000	98.40%	3000	96.90%
4000	99.60%	4000	98.10%	4000	96.50%
5000	99.40%	5000	97.90%	5000	96.20%
6000	99.30%	6000	97.70%	6000	95.90%
7000	99.20%	7000	97.60%	7000	95.60%
8000	99.20%	8000	97.50%	8000	95.30%
9000	99.10%	9000	97.40%	9000	94.80%
10000	98.90%	10000	97.40%	10000	94.10%

In-Situ Inputs

Drive current for each LED package/array/module (mA):	716
In-situ case temperature (T_c, ºC):	64.1
Percentage of initial lumens to project to (e.g. for L_{70}, enter 70):	90

Results

Time (t) at which to estimate lumen maintenance (hours):	100 000
Lumen maintenance at time (t) (%):	90.26%
Reported L90 (hours):	>60000

TM-21 Report

Table 1: Report at each LM-80 Test Condition					
Description of LED Light Source Tested (manufacturer, model, catalog number)	VIZULO SIA, MRUE 075 730 L05 AA016 CSN NG1				
Test Condition 1 - 55ºC Case Temp		**Test Condition 2 - 85ºC Case Temp**		**Test Condition 3 - 105ºC Case Temp**	
Sample size	24	Sample size	24	Sample size	24
Number of failures	0	Number of failures	0	Number of failures	0
DUT drive current used in the test (mA)	750	DUT drive current used in the test (mA)	750	DUT drive current used in the test (mA)	750
Test duration (hours)	10 000	Test duration (hours)	10 000	Test duration (hours)	10 000
Test duration used for projection (hour to hour)	5,000 - 10,000	Test duration used for projection (hour to hour)	5,000 - 10,000	Test duration used for projection (hour to hour)	5,000 - 10,000
Tested case temperature (ºC)	55	Tested case temperature (ºC)	85	Tested case temperature (ºC)	105
α	8.932E-07	α	1.024E-06	α	4.232E-06
B	0.998	B	0.983	B	0.984
Reported L90(10k) (hours)	>60000	Reported L90(10k) (hours)	>60000	Reported L90(10k) (hours)	21 000

Table 2: Interpolation Report (projection based on *in-situ* temperature entered)	
$T_{s,1}$ (ºC)	55.00
$T_{s,1}$ (K)	328.15
α_1	8.932E-07
B_1	0.998
$T_{s,2}$ (ºC)	85.00
$T_{s,2}$ (K)	358.15
α_2	1.024E-06
B_2	0.983
E_a/k_b	5.37E+02
A	4.584E-06
B_0	0.991
$T_{s,i}$ (ºC)	64.10
$T_{s,i}$ (K)	337.25
α_i	9.335E-07
Reported L90(10k) at	>60000

Report Generated By: Head of laboratory Mr. Ingmars Felcis	Notes: TM-21-11 report based on 20211209_LUXEON 5050 Series incl Horticulture - 10000hrs 50-100-150-200mA 55-85-105C LM-80 Report for Vizulo
Company: SIA Baltic Research Center	
Date: 07.06.2022.	