Test Report No LL2233001T

AS/NZS 2293.3-2018 Appendix D Endurance (Thermal) Test Report

Cat No. : EL-DENL-3102-800

DENSUS Emergency LED Weatherproof

Prepared for: Eagle Lighting

ORIGINAL REPORT

Activity address: 50 Redcliffe Gardens Drive, Clontarf, Qld, 4019, Australia.

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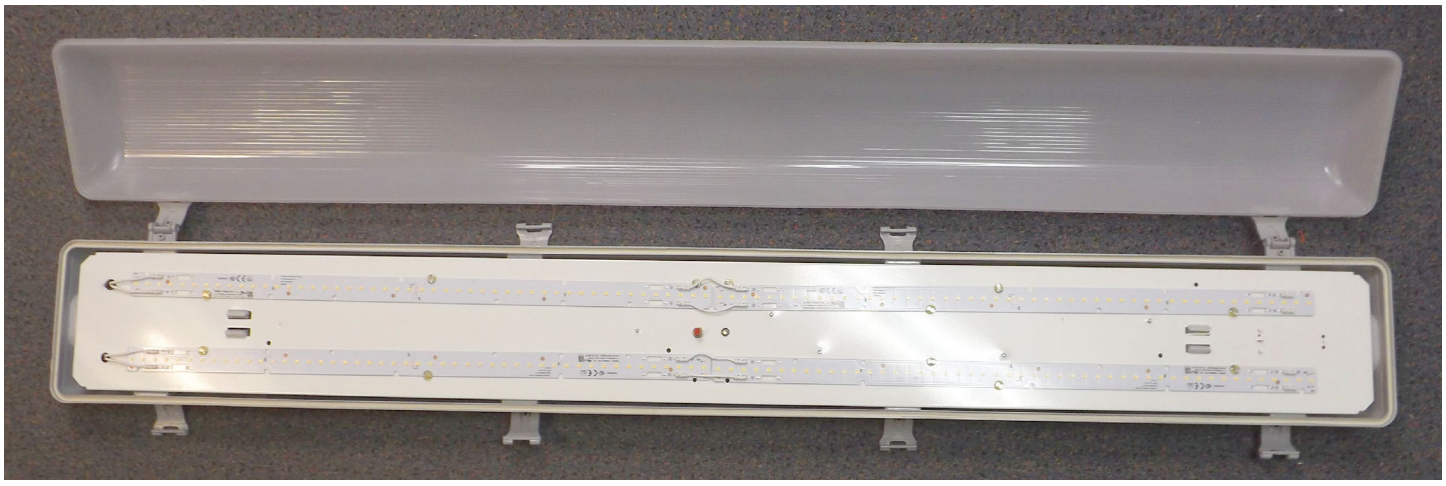
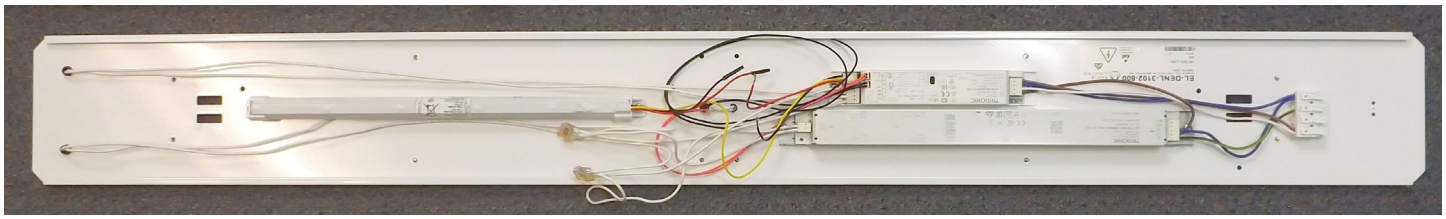
Customer	Mark Antonello Eagle Lighting 17-19 Jets Court, Melbourne Airport. VIC 3045.
Luminaire summary	DENSUS 1200 mm IP66 emergency weatherproof. Product ID:EL-DENL-3102-800. The sample comprises a grey injection moulded main housing with integral emergency light source. The housing has an opal wraparound lens and contains a white steel tray with two parallel rows of 2 LED strips. One row of LED strips are active in EM mode. Mounted on the rear face of the gear tray is a normal mode LED driver, an emergency mode LED driver and battery pack.





Authorised signatory

Toby Southgate

Date of test start 29th November, 2022

Date of report 14th December, 2022

B3002 - Report version 2.8, 12 Mar 2020

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Minimum emergency discharge duration	4:52:38	(hh:mm:ss)	(low temperature test cycle no. 1)
Minimum battery voltage at initial duration	3.173	Vdc @ 1362 mA	(low temperature test cycle no. 1)
Maximum battery temperature	51.3	°C	(high temperature test cycles nos. 2&3)

Table 1 – Measurement summary

Reference	Quantity	Value	Requirement	Result
AS/NZS 2293.3 Appendix D, Tables D1 & D2	Battery charge current	Refer Tables 5 & 6	Not more than rated cell values specified in Table 4	C
	Battery discharge current			C
	Battery charge voltage			C
	Battery temperature during charge			C
	Battery temperature during discharge			C
	Battery drain discharge current after cutoff			C
AS/NZS 2293.3 Appendix D, Tables D1 & D2	Battery discharge voltage	Refer Tables 5 & 6	Not less than rated cell values specified in Table 4	C
AS/NZS 2293.3 Appendix D, Tables D1 & D2	LED case temperature during charge	Refer Table 5	Shall not exceed the documented limits.	C
	LED case temperature during discharge			C
	LED drive current during charge			C

Reference	Requirement	Result
AS/NZS 2293.3 Appendix D, Tables D1 & D2	All emergency lighting light sources to remain illuminated during all discharge cycles	C
AS/NZS 2293.3 Appendix D, Tables D1 & D2	Battery shall remain disconnected from load following operation of the cutoff device	C
AS/NZS 2293.3 Appendix D, Tables D1 & D2	For maintained emergency luminaires and combined emergency luminaires all light sources that provide normal lighting to be illuminated during all hot charge cycles	C
AS/NZS 2293.3 Appendix D, Tables D1 & D2	Indicating lights to function correctly	Not tested

Table 2 – Compliance summary

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Customer supplied information	
Cell compliance documentation *	Cell compliance evidence cited by customer, records held by LightLab
Cell performance documentation *	Cell performance evidence cited by customer, records held by LightLab
Emergency circuit specifications – control gear *	240 V ~50 Hz [marked on device]
- emergency connection type *	Combined maintained [customer supplied documents]
- LED circuit *	Fan-out of emergency LED circuit is 4 [customer supplied documents]
Emergency LED performance specifications - LM-80 report *	LM80-08 NVLAP accredited test report RSZ180824510-10-M1, dated 12th October by Bay Area Compliance Laboratories Corp. (Dongguan). Puxinhu Industrial Area, Tanxia, Dongguan, Guangdong, China.
- chip manufacturer data *	
Luminaire mounting position documentation *	Ceiling/Surface, Wall/Surface [customer supplied documents]
Represented luminaires *	-
Product codes and product related information *	-

High & low temperature tests	
Permitted mounting positions	Ceiling/Surface, Wall/Surface
Light source pre-conditioning	Light source(s) used for test were as supplied
LED max current limit determined from	LM-80 data
LED max temperature limit determined from	LM-80 data
Cell drain current limit	Determined from limit (mA) = 0.0015 * cell rated charge capacity (mAh) = 11.25 mA
Mains supply	240 Vac, 50 Hz
Luminaire form	Settings common to both the high and low temperature tests Optics: Opal wrap-around diffuser, LED: As specified in Table 4
High temperature test	
Luminaire form	-
Luminaire mounting	Ceiling/Surface
Low temperature test	
Luminaire form	-
Luminaire mounting	Wall/Surface

Table 3 - Observations & determinations

Note: information in table 3 marked * has (a) been supplied by the customer, and (b) can affect the validity of results.

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Emergency mode control gear	Product ID	Tridonic BASIC 204 MH/LiFePO4 50V [product label]		
	Description	On Tridonic inverter mounted on reverse side of tray in main housing		
Emergency mode light source	Product ID	Tridonic LLE 24x540mm 2400lm 840 LV ADV5 [customer supplied documents]		
	Description	48 LEDs mounted onto a white PCB x 2 PCBs		
	Max temperature limit	105 °C		
	Max current limit	160 mA		
Normal mode control gear	Product ID	Tridonic LC 75W 900-1800mA flexC lp EXC [product label]		
	Description	On Tridonic driver mounted on reverse side of tray in main housing		
Normal mode light source	Product ID	Tridonic LLE 24x540mm 2400lm 840 LV ADV5 [customer supplied documents]		
	Description	48 LEDs mounted onto a white PCB x 4 PCBs		
Battery pack	Product ID	Tridonic ACCU-LiFePO4 7.5Ah 5A CON (28002325) [product label]		
	Description	One set of five cells mounted in emergency housing		
	String count per battery pack	5		
	Cell count per string	1	Total cell count per battery pack	5
Cells	Product ID	GP Battery GP18650-15HT		
	Description	One set of five cells mounted in emergency housing		
	Nominal voltage	3.2 V	Max. voltage limit	3.650 V
	Rated charge capacity	7500 mAh	Min. voltage limit	2.000 V
	Max. surface temperature limit	70.0 °C	Max. charge current limit	1500 mA
	Max. drain current limit	11.3 mA	Max. discharge current limit	3000 mA

Table 4 – Luminaire component details & specifications

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Test Report No LL2233001T

Test Conditions	Unit	Requirement	Cycle 1 (72 h charge)	Cycle 2 (16 h charge)	Cycle 3 (16 h charge)	
Ambient temperature - average measured - instantaneous	°C	40 ± 2	40.5 C	40.5 C	40.5 C	
Supply voltage - average measured - instantaneous	Vac	(106 ± 1)% of value [2a] (94 ± 1)% of value [2b]	254.9 C n/a	225.4 n/a C	225.4 n/a C	
Supply frequency - average measured - instantaneous	Hz	(100 ± 1)% of value [3]	50 C	50 C	50 C	
Charge Cycle						**Compliance**
Max. battery voltage	Vdc	< 3.650	3.608	3.388	3.388	C
Max. battery current	mA	< 1500	442	442	442	C
Max. battery temperature	°C	< 70.0	51.1	51.3	51.3	C
Max. emergency LED drive current	mA	160	506 (127)	504 (126)	504 (126)	C
Max. emergency LED case temperature (T_s)	°C	105	65.0	64.9	649	C
Battery charge	Ah	n/a	8.0	6.9	6.9	n/a
Normal mode lamp state	-	On	On	On	On	C
Emergency lamp state	-	On	On	On	On	C
Discharge Cycle						
Discharge duration	hh:mm:ss	≥ 01:59:42	5:47:53	5:08:08	5:07:23	C
Battery voltage at initial duration [4]	Vdc	> 2.000	3.216	3.201	3.201	C
Battery current at initial duration [4]	mA	< 3000	1348	1349	1348	C
Battery discharge to cut-off	Ah	n/a	7.8	6.9	6.9	n/a
Battery voltage at cutoff	Vdc	> 2.000	2.641	2.645	2.636	C
Max. battery voltage	Vdc	< 3.650	3.348	3.281	3.282	C
Max. battery current	mA	< 3000	1351	1351	1351	C
Max. battery temperature	°C	< 70.0	50.9	51.2	51.2	C
Max. emergency LED drive current [1]	mA	<= 160	117 (29)	114 (29)	114 (29)	C
Max. emergency LED case temperature (T_s)	°C	<= 105	61.6	64.0	64.0	C
Emergency lamp state [5]		On	On	On	On	C
Battery drain current after cutoff [6]	mA	< 11.3	0.1	0.1	0.1	C

Table 5 - High Temperature Test Results – compliance testing to Table D2 of reference standard

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Test Conditions	Unit	Requirement	Cycle 1 (16 h charge)	Cycle 2 (16 h charge)	Cycle 3 (16 h charge)	
Ambient temperature - average measured - instantaneous	°C	10 ± 2	10.8 C	10.8 C	10.8 C	
Supply voltage - average measured - instantaneous	Vac	(94 ± 1)% of value [2b]	225.7 C	225.7 C	225.7 C	
Supply frequency - average measured - instantaneous	Hz	(100 ± 1)% of value [3]	50 C	50 C	50 C	
Charge Cycle						**Compliance**
Max. battery voltage	Vdc	< 3.650	3.404	3.414	3.416	C
Max. battery current	mA	< 1500	450	450	449	C
Max. battery temperature	°C	< 70.0	22.0	21.7	21.8	C
Battery charge	Ah	n/a	7.0	7.0	7.0	n/a
Normal mode lamp state	-	On	On	On	On	n/a
Emergency lamp state	-	On	On	On	On	C
Discharge Cycle						
Discharge duration	hh:mm:ss	≥ 01:59:42	4:52:38	5:07:53	5:09:38	C
Battery voltage at initial duration [4]	Vdc	> 2.000	3.173	3.179	3.179	C
Battery current at initial duration [4]	mA	< 3000	1362	1362	1363	C
Battery discharge to cut-off	Ah	n/a	6.6	7.0	7.0	n/a
Battery voltage at cutoff	Vdc	> 2.000	2.611	2.607	2.610	C
Max. battery voltage	Vdc	< 3.650	3.294	3.303	3.305	C
Max. battery current	mA	< 3000	1364	1365	1365	C
Emergency lamp state [5]		On	On	On	On	C
Battery drain current after cutoff	mA	< 11.3	0.0	0.0	0.0	C

Table 6 - Low Temperature Test Results – compliance testing to Table D2 of reference standard

Notes for Tables 5 and 6

[1] The LED drive current is determined from the measurement of the emergency circuit current and the fan-out of the emergency circuit.
[2a] "Value" is the rated voltage or the highest marked voltage where a voltage range is given.
[2b] "Value" is the rated voltage or the lowest marked voltage where a voltage range is given.
[3] "Value" is the rated frequency or the frequency that results in the most onerous condition where: a frequency range is stated and if the frequency can have an effect on battery performance.
[4] Initial duration is specified in AS/NZS 2293.1-2018 Clause 2.2, being 1.33 * 90 minutes
[5] "On" represents all emergency lighting lamps were illuminated throughout the discharge until cutoff
[6] Not applicable to non-maintained operation.

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Nature of tests	(a) To measure the luminaire minimum voltage at initial duration and the minimum duration achieved, when operated in accordance with the conditions specified in appendix D1 of the reference standard: AS/NZS 2293.3-2018. (b) To determine limited compliance of operation of the luminaire with respect to appendix D1 of AS/NZS 2293.3-2018 D1. Compliance testing in this report varies the standard testing according to the following: Table D1 P45 (d) “Indicating lights to function correctly. Observations were not made.
Procedure	LightLab procedure Test-B3077. Briefly, the luminaire was mounted onto a simulated ceiling/wall in a thermal test chamber. Luminaire power was supplied by a stabilised source. Fine wire thermocouples were attached to the batteries. Battery temperature, voltage, current and lamp state were logged using a data acquisition unit connected to a PC.
Sampling	The laboratory has not participated in the selection of samples to be tested.
Applicability	This report is applicable only to the luminaire tested in the condition it was received. Testing is performed on the understanding that the significance of the report is limited to the extent that the test sample is representative of production units.
Uncertainties	Measurement uncertainties are available on request.
Notes	The tests conducted give guidance for performance at elevated and reduced temperatures. They do not imply any luminaire temperature rating (T_a) as defined in AS/NZS 60598.2.22. The decision rule used throughout this report for determining compliance with a limit: for “<=” comparison: a value in the passing region, or lying on the limit is deemed to comply for “<” comparison and “>” comparison: a value in the passing region is deemed to comply Compliance is indicated by one of the following: “n/a” means not applicable to compliance, “C” means complies with the requirement, “DNC” means does not comply with the requirement. “Not tested” means the laboratory did not perform measurements.

Table 7 – Test details

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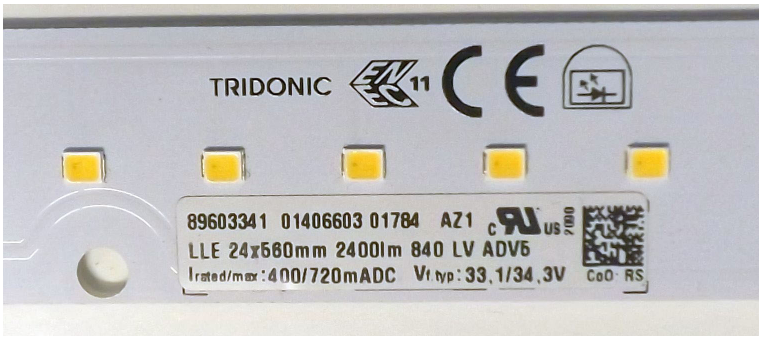
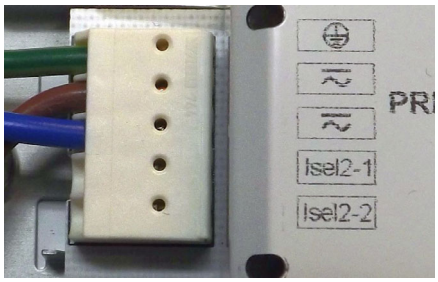
Photographs of sample





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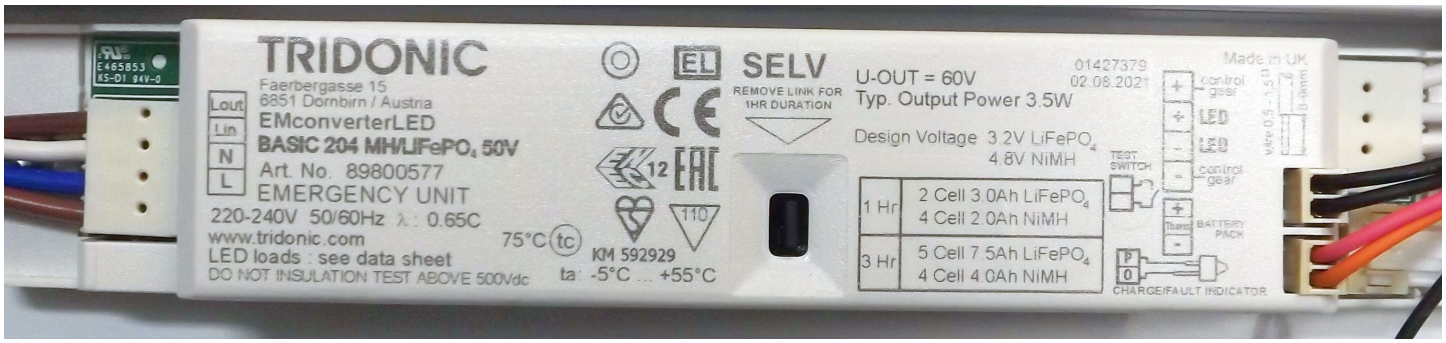

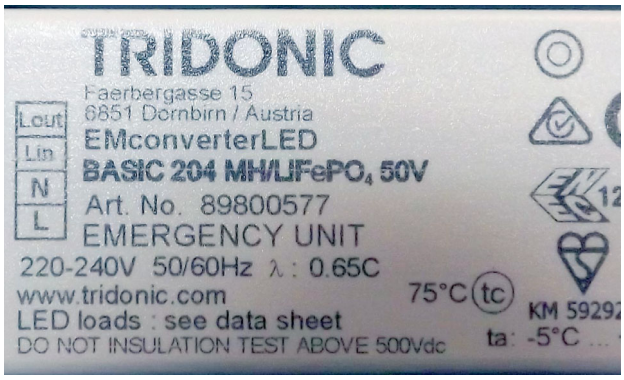

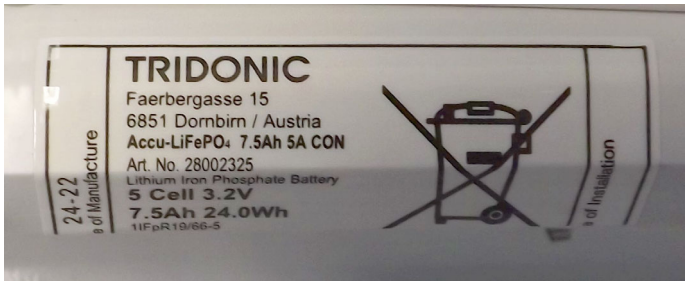

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