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THE UNITED KINGDOM VEHICLE APPROVAL AUTHORITY

Rev 1/03



COMMUNICATION CONCERNING THE APPROVAL GRANTED OF A TYPE
OF REVERSING LIGHT PURSUANT TO REGULATION NO 23

Approval No: 23R-000568

1. Trade name or mark of the device: LED Autolamps
2. Manufacturer's name for the type of device: 80WME
3. Manufacturer's name and address: LED Technologies, 12 Brand Drive, Thomastown Victoria Australia 3074
4. If applicable, name and address of the manufacturer's representative: Not applicable
5. Submitted for approval on: 5 March 2009
6. Technical service responsible for conducting the approval tests: Vehicle Certification Agency
7. Date of report issued by that service: 4 May 2009
8. Number of report issued by that service: OSJ201170 (0568)
9. Concise description:

Number, category and kind of light source(s): One Non-Replaceable LED Module consisting of 13 Banks of LED's, which total 25 LED's; category: AR

Voltage and wattage: 4.0 W at 12.0 V and 5.9 W at 24.0V

Application of an electronic light source control gear:
(a) being part of the lamp: no ⁽²⁾
(b) being not part of the lamp: no ⁽²⁾

Input voltage(s) supplied by an electronic light source control gear: Not applicable



Electronic light source control gear manufacturer and identification number (when the light source control gear is part of the lamp but is not included into the lamp body): Not applicable

Light source module no ⁽²⁾

Light source module specific identification code: Not applicable

Geometrical conditions of installation and relating variations; if any: Must be mounted on rear of vehicle, pointing directly backwards, horizontal to the ground.

10. Position of the approval mark: Lens of lamp

11. Comments

This device shall be installed on a vehicle only as part of a pair of devices: No

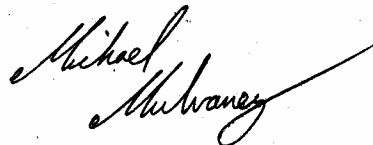
12. Reason(s) for extension (if applicable): Not applicable

13. Approval GRANTED

14. Place: BRISTOL

15. Date: 21 AUGUST 2009

16. Signature:



M J MULVANEY

17. The list of documents deposited with the Administrative Service which has granted approval is annexed to this communication and may be obtained on request.

OSJ201170

⁽²⁾ Strike out what does not apply.



TEST REPORT: Reversing Lamps

Report/Job Number: OSJ201170 (0568)

Page 1 of 2

TEST DETAILS

Subject	REVERSING LAMPS
EC Directive	-
ECE Regulation	23.00
Location of Test	Optics and Radiometry laboratory, University of New South Wales, Sydney, Australia, 2052
Date of Test	See Annexes
VCA Representative	Howard Danielson
Manufacturer's Representative	Andrew Roussou
Reason for Test	New Approval

MANUFACTURER DETAILS

Manufacturer's Name	LED Technologies
Manufacturer's Address	12 Brand Drive, Thomastown, VIC, Australia, 3074
Model Type & description	80WME; single non-replaceable light source module, 13 banks of LEDs with a total of 25 LEDs
Category	AR

CONCLUSION

The above mentioned vehicle was tested in accordance with the abovementioned legislation and was found to comply in all respects

Signature:

Name: Howard Danielson

Position: Type Approval Manager

Date: 4 May 2009

LIST OF ANNEXES

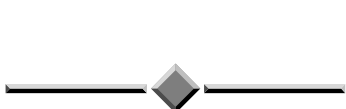
ANNEX	No of PAGES	SUBJECT
1	15	13.5VDC test results
2	15	28.0VDC test results
3		
4		

TEST REPORT: Reversing Lamps

<i>Paragraph</i>	<i>Parameter</i>	<i>Complies</i>
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TEST SPECIFICATION/WORST CASE RATIONALE: Two test programmes were required, as the lamp can be used in a 12V DC system or a 24V DC system. Each test programme required two samples to pass photometrics and colour. Also, each test programme required photometrics in a configuration whereby one bank of LEDs was failed.

✓



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**EVALUATION TESTS ON
REVERSING SIGNALS
TO UN-ECE REGULATION 23.00**

**Report Number 09019-11 (13.50VDC)
VCA Job Number OSJ201170**

for

**LED Technologies (Autolamps)
12 Brand Dr.
Thomastown, VIC 3074**

by

**Gloria Yuen
Stephen J. Dain
School of Optometry and Vision Science**

**Testing performed: 5 March 2009
Report issued: 15 April 2009**

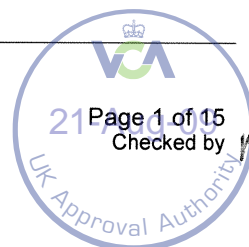
*Optics and Radiometry Laboratory
School of Optometry and Vision Science
Rm LG22, Old Main Bldg (K15)
Gate 14, Barker Street
UNSW SYDNEY NSW 2052
Phone: +61 2 9385 4622
Fax: +61 2 9313 8602
E-mail: orlab@unsw.edu.au*

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Accreditation No.
1923

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The results of the tests, calibrations and/or measurements included in this document are
traceable to Australian/national standards



EVALUATION TESTS ON REVERSING SIGNALS TO UN-ECE REGULATION 23.00

Category of lamp

Left or Right reversing lamp.
Steady (continuous) light emitted.
No infra-red emitters included

Description of samples

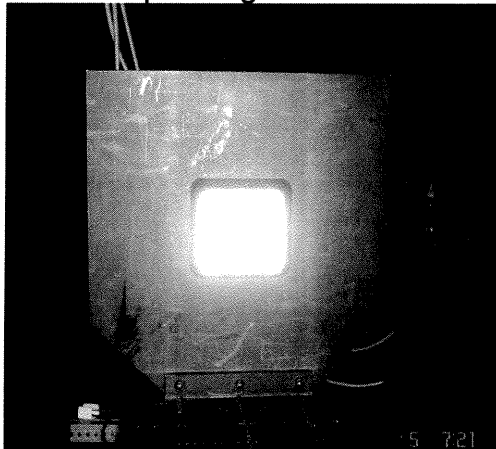
Our Reference	Manufacturer Reference	Description
09019-11- 1 to 4	80WM	80mm x 80mm white lamp with an array of 5 by 5 LEDs. Arrows in approval marking are double-headed and vertical (incorrect).

The assembly appears to be symmetrical and capable as being fitted as a left or right-handed unit and upright or inverted. It has been tested as both a right and left hand mounted with the company internet address at the top (contrary to marking) and for inverted mounting.

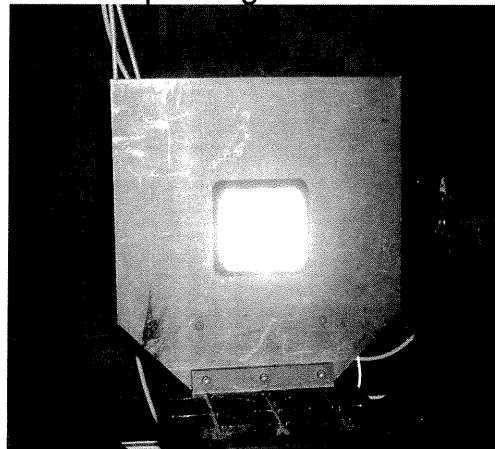
This unit has also been tested at 28.00VDC. Please see report 09019-11 (28.00VDC).

Samples 3 and 4 have the middle LED disabled.

Photograph of illuminated normal mode sample on goniometer



Photograph of illuminated failure mode sample on goniometer



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Method

UN-ECE Regulation 23.00 Reversing lamps for motor vehicles (except motor cycles) and their trailers. Revision 3 and incorporating Amendment 1.

Equipment list

ORLAB ID	Description	Calibration expiry date
148	Optronik SMS μ 10 goniophotometer	20/01/2010
20	Hewlett Packard Digital Multimeter used as a voltmeter.	20/02/2010
123	Fluke Model 45 Digital multimeter used as an ammeter	21/11/2009
228	Topcon SR-3 telespectroradiometer	27/07/2009
244	Spectralon reference white	12/09/2009

Reference plane and axis

Lamp fitted to flat surface normal to the direction of measurement.

The measurement axis passed through the geometrical centre of the front of the signal.

The centre of rotation was at the geometrical centre of the front on the faceplate.

Uncertainties of measurement

The uncertainty values stated in this report have been calculated at the 95% level of confidence. This means that the chance that a result is in error by more than the value of its uncertainty is not more than five in one hundred.

Uncertainty in luminous intensity	$\pm 1.5\%$
Uncertainty in angle	0.1°
Colour x, y & z	± 0.003

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RESULTS – REVERSING LAMP

Measurements taken at 1 minute (0,0), 30 minutes (0,0) and after the lamp had stabilised (full set) (35 minutes). The stable measurements have been scaled to the 1 minute and 30 minutes data reported here. The uncertainty has been taken into account when assessing compliance.

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Luminous Intensities (cd)**Sample 1****Voltage set 13.50 VDC****Current read 0.295 ADC****Unhanded data (cd)****30 minute**

Degrees Vertical	Horizontal	-45	-30	-10	0	10	30	45
10				109.4	125.0	103.4		
Minimum				10	15	10		
Maximum				300	300	300		
Compliance				Pass	Pass	Pass		
5	33.2			115.2	125.3	106.5		29.7
Minimum	15			20	25	20		15
Maximum	300			300	300	300		300
Compliance	Pass			Pass	Pass	Pass		Pass
0	34.1	48.1		118.2	128.5	108.0	48.8	30.4
Minimum	15	25		50	80.0	50	25	15
Maximum	300	300		300	300	300	300	300
Compliance	Pass	Pass		Pass	Pass	Pass	Pass	Pass
-5	37.3	48.6		125.3	139.9	116.7	48.9	33.9
Minimum	15	25		50	80	50	25	15
Maximum	600	600		600	600	600	600	600
Compliance	Pass	Pass		Pass	Pass	Pass	Pass	Pass

Inverted Mount data (cd)

Degrees Vertical	Horizontal	-45.0	-30.0	-10.0	0.0	10.0	30.0	45.0
5.0	33.2	47.6		115.1	125.3	106.5	47.1	29.7
Minimum	15	25		50	80	50	25	15
Maximum	600	600		600	600	600	600	600
Compliance	Pass	Pass		Pass	Pass	Pass	Pass	Pass
-5.0	37.3			125.2	140.0	116.8		33.9
Minimum	15			20	25	20		15
Maximum	300			300	300	300		300
Compliance	Pass			Pass	Pass	Pass		Pass
-10.0				116.5	135.8	111.9		
Minimum				10	15	10		
Maximum				300	300	300		
Compliance				Pass	Pass	Pass		

Maximum Values (cd)

Degrees Vertical	Horizontal L45-R45	Upright Max. Value (cd)	Compliance	Invert Max. Value (cd)	Compliance
U15-U10	128.1	-	-	8000	Pass
U10-U5	130.7	300	Pass	8000	Pass
U5-U0	130.0	300	Pass	600	Pass
U0-D5	144.2	600	Pass	300	Pass
D5-D10	145.9	8000	Pass	300	Pass
D10-D15	139.7	8000	Pass	-	-

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Luminous Intensities (cd)**Sample 1****Unhanded data (cd)****1 minute**

Degrees Vertical	Horizontal						
	-45	-30	-10	0	10	30	45
10			113.5	129.7	107.3		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		
5	34.4		119.5	130.0	110.5		30.9
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
0	35.3	49.9	122.6	133.3	112.0	50.6	31.5
Minimum	15	25	50	80.0	50	25	15
Maximum	300	300	300	300	300	300	300
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5	38.7	50.4	130.0	145.1	121.1	50.7	35.1
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Inverted Mount data (cd)

Degrees Vertical	Horizontal						
	-45.0	-30.0	-10.0	0.0	10.0	30.0	45.0
5.0	34.4	49.4	119.4	130.0	110.5	48.8	30.9
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5.0	38.7		129.9	145.2	121.2		35.1
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
-10.0			120.9	140.8	116.1		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		

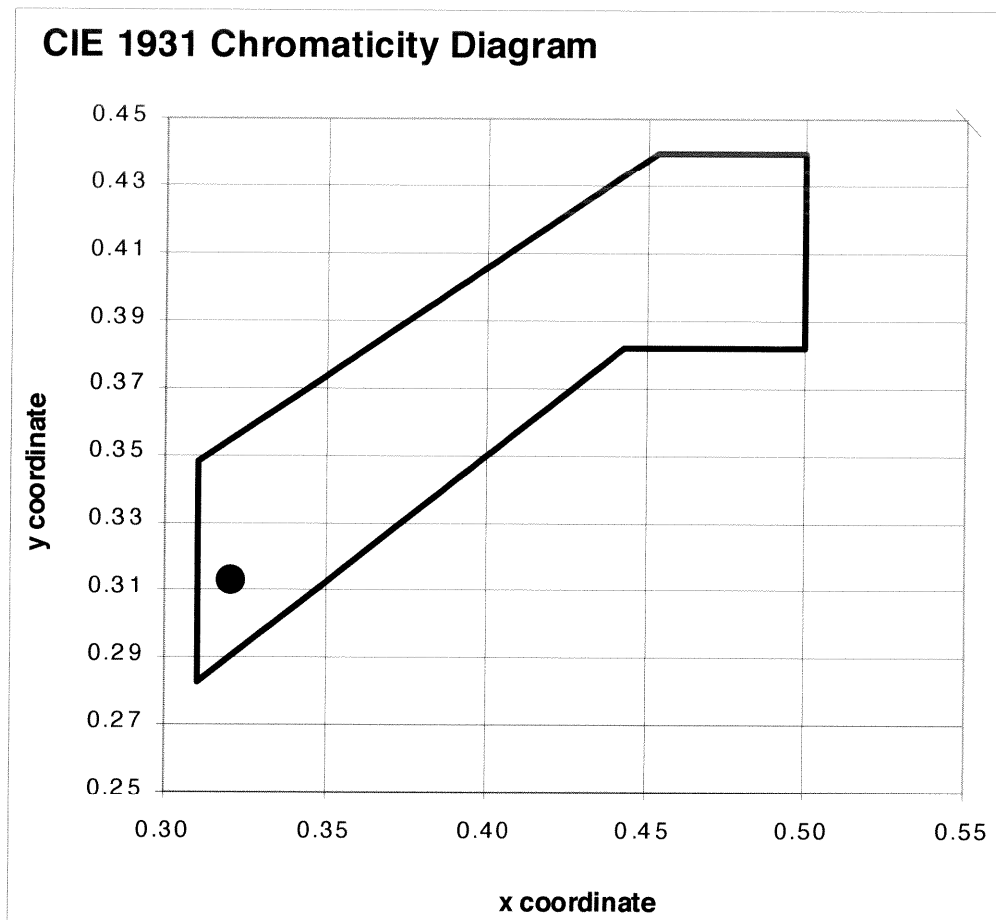
Maximum Values (cd)

Degrees Vertical	Horizontal L45-R45	Upright Max. Value (cd)	Compliance	Invert Max. Value (cd)	Compliance
U15-U10	132.9	-	-	8000	Pass
U10-U5	135.6	300	Pass	8000	Pass
U5-U0	134.9	300	Pass	600	Pass
U0-D5	149.6	600	Pass	300	Pass
D5-D10	151.3	8000	Pass	300	Pass
D10-D15	144.9	8000	Pass	-	-

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Colour Sample 1x = 0.320 \pm 0.003y = 0.313 \pm 0.003z = 0.367 \pm 0.003

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Luminous Intensities (cd)**Sample 2****Voltage set 13.50 VDC****Current read 0.295 ADC****Unhanded data (cd)****30 minute**

Degrees	Horizontal						
Vertical	-45	-30	-10	0	10	30	45
10			113.0	131.9	111.1		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		
5	36.6		119.8	133.9	117.7		28.9
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
0	32.7	47.4	117.1	134.3	114.6	51.6	31.5
Minimum	15	25	50	80.0	50	25	15
Maximum	300	300	300	300	300	300	300
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5	33.2	47.2	119.8	138.7	115.0	52.7	32.0
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Inverted Mount data (cd)

Degrees	Horizontal						
Vertical	-45.0	-30.0	-10.0	0.0	10.0	30.0	45.0
5.0	36.6	48.9	119.7	133.9	117.7	49.5	28.8
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5.0	33.2		119.8	138.7	114.9		31.9
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
-10.0			109.4	130.9	102.6		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		

Maximum Values (cd)

Degrees	Horizontal	Upright Max.	Compliance	Invert Max.	Compliance
Vertical	L45-R45	Value (cd)		Value (cd)	
U15-U10	134.3	-	-	8000	Pass
U10-U5	137.8	300	Pass	8000	Pass
U5-U0	134.9	300	Pass	600	Pass
U0-D5	140.4	600	Pass	300	Pass
D5-D10	140.0	8000	Pass	300	Pass
D10-D15	131.8	8000	Pass	-	-

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Luminous Intensities (cd)**Sample 2****Unhanded data (cd)****1 minute**

Degrees Vertical	Horizontal						
	-45	-30	-10	0	10	30	45
10			118.1	137.9	116.1		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		
5	38.3		125.3	140.0	123.1		30.2
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
0	34.2	49.6	122.4	140.5	119.8	54.0	32.9
Minimum	15	25	50	80.0	50	25	15
Maximum	300	300	300	300	300	300	300
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5	34.7	49.4	125.3	145.0	120.2	55.1	33.4
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Inverted Mount data (cd)

Degrees Vertical	Horizontal						
	-45.0	-30.0	-10.0	0.0	10.0	30.0	45.0
5.0	38.3	51.1	125.2	140.0	123.1	51.8	30.1
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5.0	34.7		125.3	145.0	120.1		33.3
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
-10.0			114.4	136.9	107.2		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		

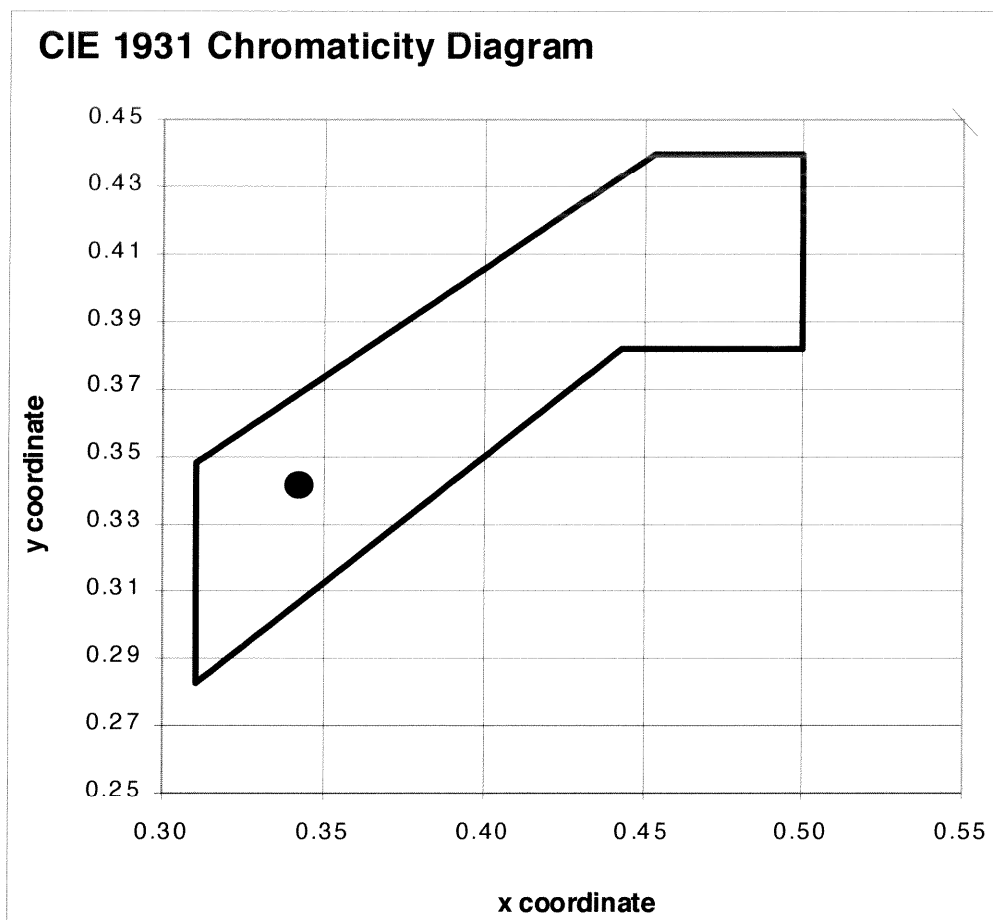
Maximum Values (cd)

Degrees Vertical	Horizontal L45-R45	Upright Max. Value (cd)	Compliance	Invert Max. Value (cd)	Compliance
U15-U10	140.5	-	-	8000	Pass
U10-U5	144.0	300	Pass	8000	Pass
U5-U0	141.1	300	Pass	600	Pass
U0-D5	146.8	600	Pass	300	Pass
D5-D10	146.3	8000	Pass	300	Pass
D10-D15	137.8	8000	Pass	-	-

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Colour Sample 2x = 0.342 \pm 0.003y = 0.342 \pm 0.003z = 0.317 \pm 0.003

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Checked by

Luminous Intensities (cd)**Sample 3****Voltage set 13.50 VDC****Current read 0.293 ADC****Unhanded data (cd)****30 minute**

Degrees	Horizontal						
Vertical	-45	-30	-10	0	10	30	45
10			95.2	123.6	108.6		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		
5	31.4		99.1	118.3	105.3		34.8
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
0	30.8	50.8	95.0	109.9	97.6	46.2	32.0
Minimum	15	25	50	80.0	50	25	15
Maximum	300	300	300	300	300	300	300
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5	29.6	50.4	94.7	115.5	103.3	47.4	35.2
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Inverted Mount data (cd)

Degrees	Horizontal						
Vertical	-45.0	-30.0	-10.0	0.0	10.0	30.0	45.0
5.0	31.3	49.4	98.9	118.2	105.3	48.2	34.8
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5.0	29.4		94.5	115.5	103.4		35.2
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
-10.0			84.9	110.0	101.3		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		

Maximum Values (cd)

Degrees	Horizontal	Upright Max.	Compliance	Invert Max.	Compliance
Vertical	L45-R45	Value (cd)		Value (cd)	
U15-U10	124.7	-	-	8000	Pass
U10-U5	125.7	300	Pass	8000	Pass
U5-U0	119.1	300	Pass	600	Pass
U0-D5	116.7	600	Pass	300	Pass
D5-D10	119.4	8000	Pass	300	Pass
D10-D15	111.5	8000	Pass	-	-

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Luminous Intensities (cd)**Sample 3****Unhanded data (cd)****1 minute**

Degrees	Horizontal						
Vertical	-45	-30	-10	0	10	30	45
10			101.3	131.6	115.6		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		
5	33.4		105.5	126.0	112.1		37.0
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
0	32.7	54.1	101.1	117.0	103.9	49.2	34.0
Minimum	15	25	50	80.0	50	25	15
Maximum	300	300	300	300	300	300	300
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5	31.6	53.7	100.8	123.0	110.0	50.5	37.4
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Inverted Mount data (cd)

Degrees	Horizontal						
Vertical	-45.0	-30.0	-10.0	0.0	10.0	30.0	45.0
5.0	33.3	52.6	105.3	125.9	112.1	51.3	37.0
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5.0	31.4		100.6	123.0	110.1		37.4
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
-10.0			90.4	117.1	107.8		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		

Maximum Values (cd)

Degrees	Horizontal	Upright Max.	Compliance	Invert Max.	Compliance
Vertical	L45-R45	Value (cd)		Value (cd)	
U15-U10	132.8	-	-	8000	Pass
U10-U5	133.9	300	Pass	8000	Pass
U5-U0	126.8	300	Pass	600	Pass
U0-D5	124.3	600	Pass	300	Pass
D5-D10	127.1	8000	Pass	300	Pass
D10-D15	118.7	8000	Pass	-	-

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Luminous Intensities (cd)**Sample 4****Voltage set 13.50 VDC****Current read 0.294 ADC****Unhanded data (cd)****30 minute**

Degrees	Horizontal						
Vertical	-45	-30	-10	0	10	30	45
10			96.6	112.3	105.3		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		
5	27.7		95.8	113.8	105.1		33.1
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
0	26.0	46.9	90.5	113.5	100.9	50.2	33.5
Minimum	15	25	50	80.0	50	25	15
Maximum	300	300	300	300	300	300	300
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5	27.2	45.2	95.1	116.0	105.7	52.6	33.9
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Inverted Mount data (cd)

Degrees	Horizontal						
Vertical	-45.0	-30.0	-10.0	0.0	10.0	30.0	45.0
5.0	27.6	48.4	95.8	113.8	105.0	49.9	33.1
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5.0	27.2		95.1	116.0	105.7		34.0
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
-10.0			91.0	109.5	102.7		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		

Maximum Values (cd)

Degrees	Horizontal	Upright Max.	Compliance	Invert Max.	Compliance
Vertical	L45-R45	Value (cd)		Value (cd)	
U15-U10	114.6	-	-	8000	Pass
U10-U5	117.1	300	Pass	8000	Pass
U5-U0	114.8	300	Pass	600	Pass
U0-D5	117.1	600	Pass	300	Pass
D5-D10	117.6	8000	Pass	300	Pass
D10-D15	111.8	8000	Pass	-	-

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Luminous Intensities (cd)**Sample 4****Unhanded data (cd)****1 minute**

Degrees	Horizontal						
Vertical	-45	-30	-10	0	10	30	45
10			102.5	119.1	111.7		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		
5	29.4		101.7	120.7	111.5		35.2
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
0	27.6	49.8	96.0	120.4	107.1	53.3	35.6
Minimum	15	25	50	80.0	50	25	15
Maximum	300	300	300	300	300	300	300
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5	28.9	48.0	100.9	123.1	112.1	55.8	36.0
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Inverted Mount data (cd)

Degrees	Horizontal						
Vertical	-45.0	-30.0	-10.0	0.0	10.0	30.0	45.0
5.0	29.3	51.4	101.7	120.7	111.4	53.0	35.2
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5.0	28.9		100.9	123.1	112.1		36.1
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
-10.0			96.5	116.2	108.9		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		

Maximum Values (cd)

Degrees	Horizontal	Upright Max.	Compliance	Invert Max.	Compliance
Vertical	L45-R45	Value (cd)		Value (cd)	
U15-U10	121.6	-	-	8000	Pass
U10-U5	124.3	300	Pass	8000	Pass
U5-U0	121.8	300	Pass	600	Pass
U0-D5	124.3	600	Pass	300	Pass
D5-D10	124.8	8000	Pass	300	Pass
D10-D15	118.6	8000	Pass	-	-

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This reversing lamp meets the photometric and colorimetric requirements of UN-ECE Regulation 23.00 at a testing voltage 13.50VDC.



Gloria Yuen MBiomedEng



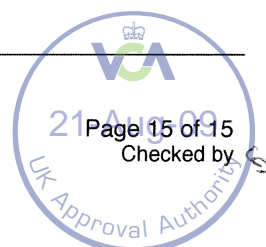
Stephen Dain PhD
NATA Authorised Signatory

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EVALUATION TESTS ON REVERSING SIGNALS TO UN-ECE REGULATION 23.00

**Report Number 09019-11 (28.00VDC)
VCA Job Number OSJ201170**

for

**LED Technologies (Autolamps)
12 Brand Drive
Thomastown, VIC 3074**

by

**Gloria Yuen
Stephen J. Dain
School of Optometry and Vision Science**

**Testing performed: 24 March 2009
Report issued: 15 April 2009**

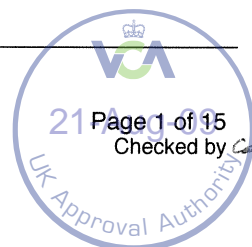
*Optics and Radiometry Laboratory
School of Optometry and Vision Science
Rm LG22, Old Main Bldg (K15)
Gate 14, Barker Street
UNSW SYDNEY NSW 2052
Phone: +61 2 9385 4622
Fax: +61 2 9313 8602
E-mail: orlab@unsw.edu.au*

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EVALUATION TESTS ON REVERSING SIGNALS TO UN-ECE REGULATION 23.00

Category of lamp

Left or Right reversing lamp.
Steady (continuous) light emitted.
No infra-red emitters included

Description of samples

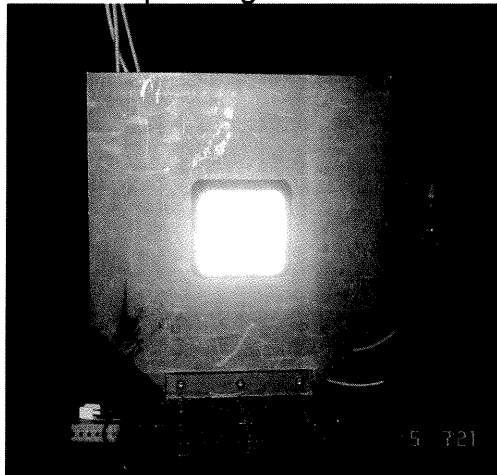
Our Reference	Manufacturer Reference	Description
09019-11- 1 to 4	80WM	80mm x 80mm white lamp with an array of 5 by 5 LEDs. Arrows in approval marking are double-headed and vertical (incorrect).

The assembly appears to be symmetrical and capable as being fitted as a left or right-handed unit and upright or inverted. It has been tested as both a right and left hand mounted with the company internet address at the top (contrary to marking) and for inverted mounting.

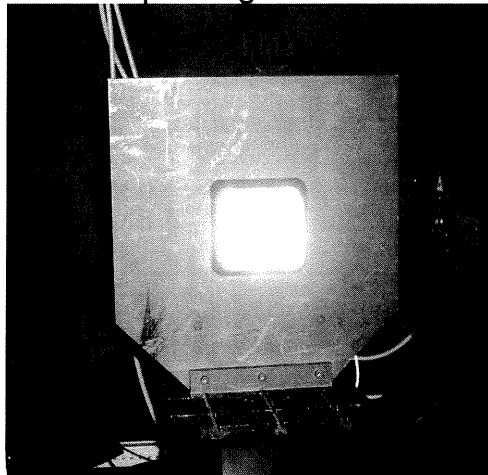
This unit has also been tested at 13.50VDC. Please see report 09019-11 (13.50VDC).

Samples 3 and 4 have the middle LED disabled.

Photograph of illuminated normal mode sample on goniometer



Photograph of illuminated failure mode sample on goniometer

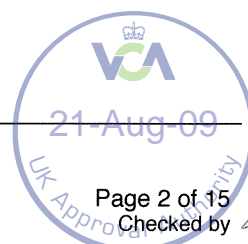


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Method

UN-ECE Regulation 23.00 Reversing lamps for motor vehicles (except motor cycles) and their trailers. Revision 3 and incorporating Amendment 1.

Equipment list

ORLAB ID	Description	Calibration expiry date
148	Optronik SMS μ 10 goniophotometer	20/01/2010
27	Keithley Digital multimeter used as an ammeter.	17/02/2010
237	Agilent Digital Multimeter used as a voltmeter.	22/12/2009
228	Topcon SR-3 telespectroradiometer	27/07/2009
244	Spectralon reference white	12/09/2009

Reference plane and axis

Lamp fitted to flat surface normal to the direction of measurement.

The measurement axis passed through the geometrical centre of the front of the signal.

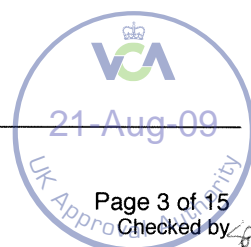
The centre of rotation was at the geometrical centre of the front on the faceplate.

Uncertainties of measurement

The uncertainty values stated in this report have been calculated at the 95% level of confidence. This means that the chance that a result is in error by more than the value of its uncertainty is not more than five in one hundred.

Uncertainty in luminous intensity	$\pm 1.5\%$
Uncertainty in angle	0.1°
Colour x, y & z	± 0.003

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RESULTS – REVERSING LAMP

Measurements taken at 1 minute (0,0), 30 minutes (0,0) and after the lamp had stabilised (full set) (35 minutes). The stable measurements have been scaled to the 1 minute and 30 minutes data reported here. The uncertainty has been taken into account when assessing compliance.

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Luminous Intensities (cd)**Sample 1****Voltage set 28.00 VDC****Current read 0.213 ADC****Unhanded data (cd)****30 minute**

Degrees	Horizontal						
Vertical	-45	-30	-10	0	10	30	45
10			124.8	142.7	118.0		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		
5	37.8		131.5	143.0	121.5		33.9
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
0	38.9	54.9	134.9	146.7	123.2	55.7	34.6
Minimum	15	25	50	80.0	50	25	15
Maximum	300	300	300	300	300	300	300
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5	42.5	55.4	143.0	159.6	133.2	55.8	38.6
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Inverted Mount data (cd)

Degrees	Horizontal						
Vertical	-45.0	-30.0	-10.0	0.0	10.0	30.0	45.0
5.0	37.8	54.3	131.3	143.0	121.5	53.7	33.9
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5.0	42.5		142.9	159.7	133.3		38.6
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
-10.0			132.9	154.9	127.7		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		

Maximum Values (cd)

Degrees	Horizontal	Upright Max.	Compliance	Invert Max.	Compliance
Vertical	L45-R45	Value (cd)		Value (cd)	
U15-U10	146.2	-	-	8000	Pass
U10-U5	149.2	300	Pass	8000	Pass
U5-U0	148.4	300	Pass	600	Pass
U0-D5	164.5	600	Pass	300	Pass
D5-D10	166.4	8000	Pass	300	Pass
D10-D15	159.4	8000	Pass	-	-

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Luminous Intensities (cd)**Sample 1****Unhanded data (cd)****1 minute**

Degrees Vertical	Horizontal	-45	-30	-10	0	10	30	45
10				136.1	155.5	128.6		
Minimum				10	15	10		
Maximum				300	300	300		
Compliance				Pass	Pass	Pass		
5	41.2			143.3	155.9	132.5		37.0
Minimum	15			20	25	20		15
Maximum	300			300	300	300		300
Compliance	Pass			Pass	Pass	Pass		Pass
0	42.4	59.8		147.1	159.9	134.3	60.7	37.8
Minimum	15	25		50	80.0	50	25	15
Maximum	300	300		300	300	300	300	300
Compliance	Pass	Pass		Pass	Pass	Pass	Pass	Pass
-5	46.4	60.4		155.9	174.0	145.2	60.8	42.1
Minimum	15	25		50	80	50	25	15
Maximum	600	600		600	600	600	600	600
Compliance	Pass	Pass		Pass	Pass	Pass	Pass	Pass

Inverted Mount data (cd)

Degrees Vertical	Horizontal	-45.0	-30.0	-10.0	0.0	10.0	30.0	45.0
5.0	41.2	59.2		143.2	155.9	132.5	58.6	37.0
Minimum	15	25		50	80	50	25	15
Maximum	600	600		600	600	600	600	600
Compliance	Pass	Pass		Pass	Pass	Pass	Pass	Pass
-5.0	46.4			155.8	174.1	145.3		42.1
Minimum	15			20	25	20		15
Maximum	300			300	300	300		300
Compliance	Pass			Pass	Pass	Pass		Pass
-10.0				144.9	168.9	139.2		
Minimum				10	15	10		
Maximum				300	300	300		
Compliance				Pass	Pass	Pass		

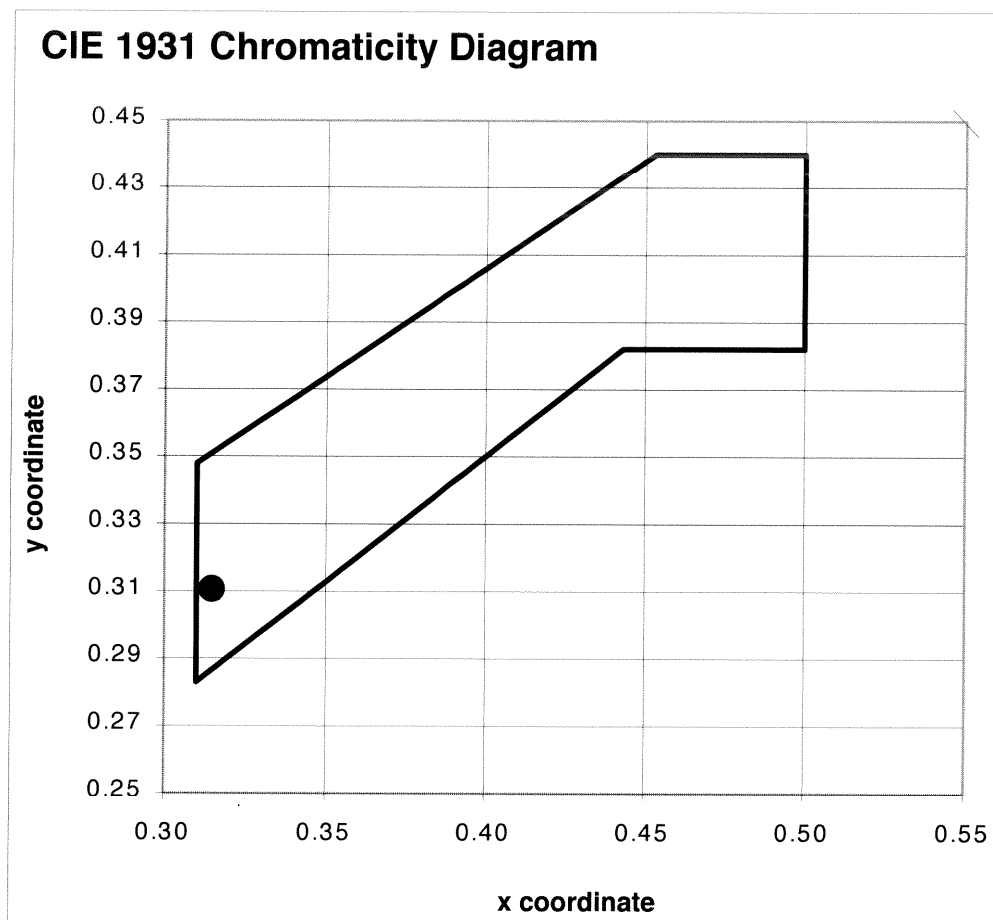
Maximum Values (cd)

Degrees Vertical	Horizontal L45-R45	Upright Max. Value (cd)	Compliance	Invert Max. Value (cd)	Compliance
U15-U10	159.4	-	-	8000	Pass
U10-U5	162.6	300	Pass	8000	Pass
U5-U0	161.8	300	Pass	600	Pass
U0-D5	179.3	600	Pass	300	Pass
D5-D10	181.4	8000	Pass	300	Pass
D10-D15	173.7	8000	Pass	-	-

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Colour Sample 1x = 0.315 \pm 0.003y = 0.311 \pm 0.003z = 0.374 \pm 0.003

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Luminous Intensities (cd)**Sample 2****Voltage set 28.00 VDC****Current read 0.213 ADC****Unhanded data (cd)****30 minute**

Degrees Vertical	Horizontal	-45	-30	-10	0	10	30	45
10				128.2	149.7	126.1		
Minimum				10	15	10		
Maximum				300	300	300		
Compliance				Pass	Pass	Pass		
5		41.5		136.0	152.0	133.6		32.8
Minimum		15		20	25	20		15
Maximum		300		300	300	300		300
Compliance		Pass		Pass	Pass	Pass		Pass
0		37.1	53.8	132.9	152.5	130.1	58.6	35.7
Minimum		15	25	50	80.0	50	25	15
Maximum		300	300	300	300	300	300	300
Compliance		Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5		37.7	53.6	136.0	157.4	130.5	59.8	36.3
Minimum		15	25	50	80	50	25	15
Maximum		600	600	600	600	600	600	600
Compliance		Pass	Pass	Pass	Pass	Pass	Pass	Pass

Inverted Mount data (cd)

Degrees Vertical	Horizontal	-45.0	-30.0	-10.0	0.0	10.0	30.0	45.0
5.0		41.5	55.5	135.9	152.0	133.6	56.2	32.7
Minimum		15	25	50	80	50	25	15
Maximum		600	600	600	600	600	600	600
Compliance		Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5.0		37.7		136.0	157.4	130.4		36.2
Minimum		15		20	25	20		15
Maximum		300		300	300	300		300
Compliance		Pass		Pass	Pass	Pass		Pass
-10.0				124.1	148.6	116.4		
Minimum				10	15	10		
Maximum				300	300	300		
Compliance				Pass	Pass	Pass		

Maximum Values (cd)

Degrees Vertical	Horizontal L45-R45	Upright Max. Value (cd)	Compliance	Invert Max. Value (cd)	Compliance
U15-U10	152.5	-	-	8000	Pass
U10-U5	156.3	300	Pass	8000	Pass
U5-U0	153.2	300	Pass	600	Pass
U0-D5	159.3	600	Pass	300	Pass
D5-D10	158.8	8000	Pass	300	Pass
D10-D15	149.6	8000	Pass	-	-

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Luminous Intensities (cd)**Sample 2****Unhanded data (cd)****1 minute**

Degrees Vertical	Horizontal						
	-45	-30	-10	0	10	30	45
10			141.0	164.6	138.6		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		
5	45.6		149.5	167.1	146.8		36.0
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
0	40.8	59.2	146.1	167.6	143.0	64.4	39.3
Minimum	15	25	50	80.0	50	25	15
Maximum	300	300	300	300	300	300	300
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5	41.4	58.9	149.5	173.0	143.5	65.8	39.9
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Inverted Mount data (cd)

Degrees Vertical	Horizontal						
	-45.0	-30.0	-10.0	0.0	10.0	30.0	45.0
5.0	45.6	61.0	149.3	167.1	146.8	61.8	35.9
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5.0	41.4		149.5	173.0	143.3		39.8
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
-10.0			136.5	163.4	127.9		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		

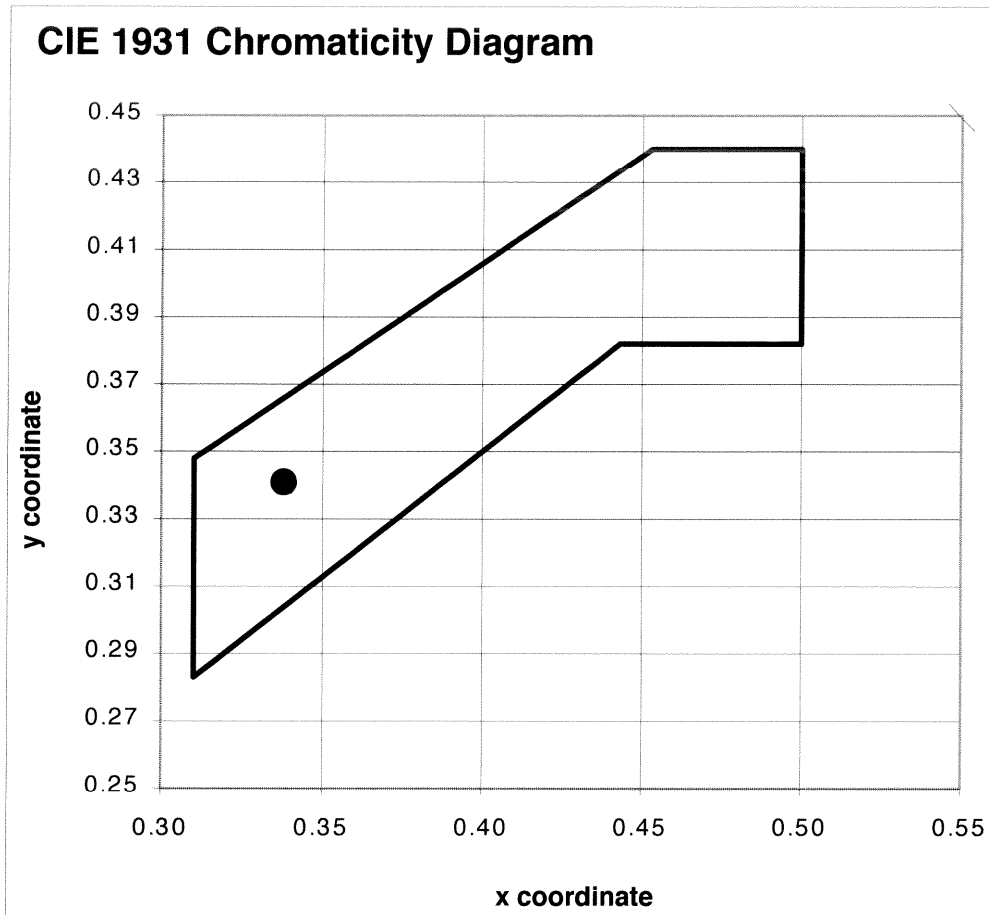
Maximum Values (cd)

Degrees Vertical	Horizontal L45-R45	Upright Max. Value (cd)	Compliance	Invert Max. Value (cd)	Compliance
U15-U10	167.6	-	-	8000	Pass
U10-U5	171.9	300	Pass	8000	Pass
U5-U0	168.4	300	Pass	600	Pass
U0-D5	175.1	600	Pass	300	Pass
D5-D10	174.6	8000	Pass	300	Pass
D10-D15	164.5	8000	Pass	-	-

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Colour Sample 2 $x = 0.338 \pm 0.003$ $y = 0.341 \pm 0.003$ $z = 0.321 \pm 0.003$ 

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Luminous Intensities (cd)**Sample 3****Voltage set 28.00 VDC****Current read 0.212 ADC****Unhanded data (cd)****30 minute**

Degrees	Horizontal						
Vertical	-45	-30	-10	0	10	30	45
10			108.4	140.8	123.6		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		
5	35.7		112.8	134.7	119.9		39.6
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
0	35.0	57.8	108.1	125.1	111.1	52.6	36.4
Minimum	15	25	50	80.0	50	25	15
Maximum	300	300	300	300	300	300	300
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5	33.8	57.4	107.8	131.5	117.6	54.0	40.0
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Inverted Mount data (cd)

Degrees	Horizontal						
Vertical	-45.0	-30.0	-10.0	0.0	10.0	30.0	45.0
5.0	35.6	56.2	112.6	134.6	119.9	54.9	39.6
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5.0	33.5		107.6	131.5	117.7		40.0
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
-10.0			96.6	125.2	115.3		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		

Maximum Values (cd)

Degrees	Horizontal	Upright Max.	Compliance	Invert Max.	Compliance
Vertical	L45-R45	Value (cd)		Value (cd)	
U15-U10	142.0	-	-	8000	Pass
U10-U5	143.2	300	Pass	8000	Pass
U5-U0	135.6	300	Pass	600	Pass
U0-D5	132.9	600	Pass	300	Pass
D5-D10	136.0	8000	Pass	300	Pass
D10-D15	127.0	8000	Pass	-	-

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Luminous Intensities (cd)**Sample 3****Unhanded data (cd)****1 minute**

Degrees	Horizontal						
Vertical	-45	-30	-10	0	10	30	45
10			120.8	156.9	137.8		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		
5	39.8		125.7	150.1	133.6		44.1
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
0	39.0	64.5	120.5	139.5	123.8	58.6	40.5
Minimum	15	25	50	80.0	50	25	15
Maximum	300	300	300	300	300	300	300
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5	37.6	63.9	120.1	146.6	131.1	60.1	44.6
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Inverted Mount data (cd)

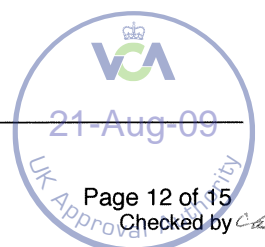
Degrees	Horizontal						
Vertical	-45.0	-30.0	-10.0	0.0	10.0	30.0	45.0
5.0	39.7	62.7	125.5	150.0	133.6	61.1	44.1
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5.0	37.4		119.9	146.6	131.2		44.6
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
-10.0			107.7	139.6	128.5		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		

Maximum Values (cd)

Degrees	Horizontal	Upright Max.	Compliance	Invert Max.	Compliance
Vertical	L45-R45	Value (cd)		Value (cd)	
U15-U10	158.3	-	-	8000	Pass
U10-U5	159.5	300	Pass	8000	Pass
U5-U0	151.2	300	Pass	600	Pass
U0-D5	148.1	600	Pass	300	Pass
D5-D10	151.5	8000	Pass	300	Pass
D10-D15	141.5	8000	Pass	-	-

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Luminous Intensities (cd)**Sample 4****Voltage set 28.00 VDC****Current read 0.212 ADC****Unhanded data (cd)****30 minute**

Degrees	Horizontal						
Vertical	-45	-30	-10	0	10	30	45
10			106.4	123.6	115.9		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		
5	30.5		105.5	125.3	115.6		36.5
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
0	28.6	51.6	99.6	124.9	111.1	55.3	36.9
Minimum	15	25	50	80.0	50	25	15
Maximum	300	300	300	300	300	300	300
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5	30.0	49.7	104.7	127.7	116.3	57.9	37.4
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Inverted Mount data (cd)

Degrees	Horizontal						
Vertical	-45.0	-30.0	-10.0	0.0	10.0	30.0	45.0
5.0	30.4	53.3	105.5	125.3	115.5	54.9	36.5
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5.0	30.0		104.7	127.7	116.3		37.5
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
-10.0			100.2	120.5	113.0		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		

Maximum Values (cd)

Degrees	Horizontal	Upright Max.	Compliance	Invert Max.	Compliance
Vertical	L45-R45	Value (cd)		Value (cd)	
U15-U10	126.1	-	-	8000	Pass
U10-U5	128.9	300	Pass	8000	Pass
U5-U0	126.4	300	Pass	600	Pass
U0-D5	128.9	600	Pass	300	Pass
D5-D10	129.5	8000	Pass	300	Pass
D10-D15	123.0	8000	Pass	-	-

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Luminous Intensities (cd)**Sample 4****Unhanded data (cd)****1 minute**

Degrees Vertical	Horizontal						
	-45	-30	-10	0	10	30	45
10			118.3	137.5	128.9		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		
5	33.9		117.3	139.3	128.6		40.6
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
0	31.9	57.4	110.8	139.0	123.6	61.5	41.1
Minimum	15	25	50	80.0	50	25	15
Maximum	300	300	300	300	300	300	300
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5	33.3	55.3	116.4	142.0	129.4	64.4	41.6
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Inverted Mount data (cd)

Degrees Vertical	Horizontal						
	-45.0	-30.0	-10.0	0.0	10.0	30.0	45.0
5.0	33.8	59.3	117.3	139.3	128.5	61.1	40.6
Minimum	15	25	50	80	50	25	15
Maximum	600	600	600	600	600	600	600
Compliance	Pass	Pass	Pass	Pass	Pass	Pass	Pass
-5.0	33.3		116.4	142.0	129.4		41.7
Minimum	15		20	25	20		15
Maximum	300		300	300	300		300
Compliance	Pass		Pass	Pass	Pass		Pass
-10.0			111.4	134.0	125.7		
Minimum			10	15	10		
Maximum			300	300	300		
Compliance			Pass	Pass	Pass		

Maximum Values (cd)

Degrees Vertical	Horizontal L45-R45	Upright Max. Value (cd)	Compliance	Invert Max. Value (cd)	Compliance
U15-U10	140.3	-	-	8000	Pass
U10-U5	143.4	300	Pass	8000	Pass
U5-U0	140.6	300	Pass	600	Pass
U0-D5	143.4	600	Pass	300	Pass
D5-D10	144.0	8000	Pass	300	Pass
D10-D15	136.9	8000	Pass	-	-

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This reversing lamp meets the photometric and colorimetric requirements of UN-ECE Regulation 23.00 at a testing voltage 28.00VDC.

Gloria Yuen MBIomedEng

Stephen Dain PhD
NATA Authorised Signatory

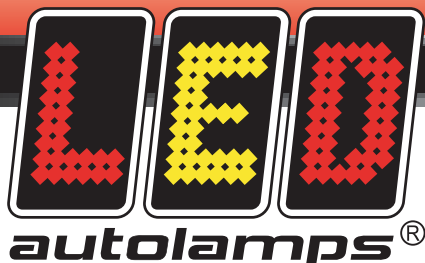
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Accreditation No. 1923

This document is issued in accordance with NATA's accreditation requirements
Accredited for compliance with ISO/IEC 17025
The results of the tests, calibrations and/or measurements included in this document are
traceable to Australian/national standards





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(Email) ledtech@bigpond.com

Regulation 23 Information Document

Trade name or mark of device:	LED Autolamps
Manufacturers name and address:	LED Technologies 12 Brand Drive Thomastown Victoria Australia 3074
Type:	80WME
Concise Description:	Device comprising a Reversing Lamp 80 x 80mm
Regulation:	Regulation 23
Number / kind of light source:	One Non-Replaceable LED Module consisting of 13 Banks of LED's, which total 25 LED's
Range of Voltage & rated maximum wattage:	12v/24v 4.0w/5.9w
Light source module identification code:	see attached drawing
Geometrical conditions of installation:	
Must be mounted on rear of vehicle, pointing directly backwards, horizontal to the ground.	
Variable Luminous Intensity:	N/A
Mounting / Testing Position:	

**Mounted with clips top & bottom.
Mounted with web address at top, &
bearing the word 'TOP'.**

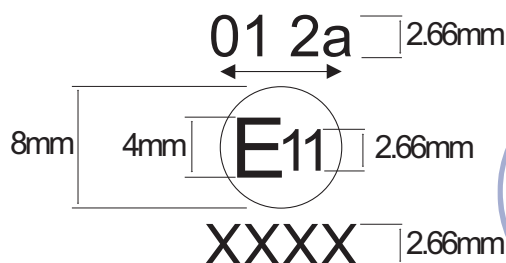


E-Mark Specifications:



Actual Markings and Sizing

Example Drawing for sizing Only



a=8mm minimum



Material List

No	Name	Drawing No.	Description	QTY
1	Lens	00-LED80C	Clear-PMMA	1
2	PCB	21-LED80W	13.5/28V white/ 25pcs Ø5	1
3	AB glue		25-JA227A	15g
			25-JA403B	7.5g

