



REPORT

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Testing of Light bar Worldbar W2c Aero amber according to TSFS 2012:90 and ICAO requirements

(4 appendices)

Test object

Light bar Worldbar W2c Aero amber.

SP Technical Research Institute of Sweden has performed test of your Light bar Worldbar W2c Aero amber light source in accordance with requirements for obstacle lights in:

- TSFS 2012:90 (*Föreskrifter om ändring i Transportstyrelsens föreskrifter och allmänna råd (TSFS 2010:119) om drift av godkänd flygplats (omtryck)*)
- ICAO Annex 14 to the Convention on International Civil Aviation, Aerodromes, Volume I *Aerodrome Design and Operations* (July 2009).

Summary of results

The tested LED light source fulfils the requirements for obstacle light, low-intensity type C, in accordance with TSFS 2012:90 and ICAO *Aerodrome Design and Operations*.

Identification

Your reference: Johan Eng/2013-04-22

Type: Light bar Worldbar W2c Aero, amber. Left side unit has been tested, right side unit is similar.

Manufacturer: Standby AB

Product drawing: G8XXX8XXX2A

Marking drawing: X8XXX8XXX2A

Technical Description: TB8XXX8XXX2, ver A

Bill of Material: K8XXX8XXX2, ver. A

See photos in Appendix 4.

Manufacturer specification of the light source

The light source consists of two units placed at either end of a linear unit placed across the vehicle roof, perpendicular to the vehicle driving direction. Each unit contains two LED units (2 × 6 diodes) behind a clear transparent cover.

The light source (with a different flash pattern) has been further tested and approved according to ECE-regulation 65, see test report MTK3P03996-2.

Nominal voltage: +13.8 VDC.

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Measurement method

The measurement method follows SP method No. 362. The light source is connected to +13.8 VDC in accordance with the manufacturer directive.

Blinking mode according to the manufacturer settings was used. The light source has one level of intensity.

Effective luminous intensity is calculated from measurement results using the Blondel-Rey method, as defined in ICAO *Doc 9157 Aerodrome Design Manual Part 4*.

Uncertainty of measurement

- Luminous intensity: $\pm 5\%$ of reading
- Repetition frequency: ± 0.1 Hz
- Chromaticity coordinates: ± 0.005
- Pulse length: $\pm 5\%$ of reading

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 %. The standard uncertainty of measurement has been determined in accordance with EAL Publication EA-04/2.

Results

Results are presented corresponding to the requirements in:

- TSFS 2012:90: 18 §
- ICAO: Section 6.3.22, 6.3.25, 6.3.27, Table 6-3, Appendix 1.2

Colour

Table 1. Measurement results for colour of the light source.

	x coordinate	y coordinate	Note
W2c Aero amber	0.5724	0.4245	Fulfil requirement

The light source fulfils the requirement for chromaticity coordinates in ICAO, Appendix 1.2 *Colours for aeronautical ground lights*. See also diagram in Appendix 1. There is no requirement on chromaticity coordinates in TSFS 2012:90.

Flash rate

The flash rate was measured to 80.0 flashes per minute, which fulfil the requirements of TSFS 2012:90 and ICAO Table 6-3. See also pulse pattern in Appendix 2.

Each pulse train is 210 ms in length and consists of two 100-ms pulses separated by 10 ms. The train period is 750 ms.

Horizontal beam spread

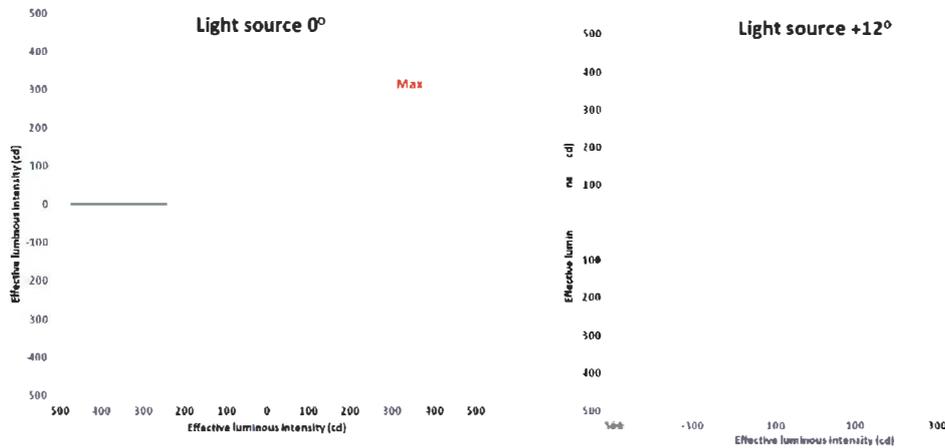
The horizontal beam spread of the light source is 360°, which fulfil the requirements of TSFS 2012:90 and ICAO 6.3.22. See also plots in the following section and detailed results in Appendix 3.

Vertical beam spread and distribution

The vertical beam spread of the light source is larger than 50°, which fulfil the requirements of TSFS 2012:90 and ICAO Table 6-3.

Figure 1 shows results for the light source at two vertical angles. See also detailed results in Appendix 3.

Figure 1. Combined effective luminous intensity for the complete light source in two vertical angles. The minimum (green) and maximum (red) requirements are also indicated.



The light source fulfils the requirements of TSFS 2012:90 and ICAO 6.3.22. regarding minimum and maximum effective luminous intensities.

The vertical distribution in two directions is shown in Figure 2.

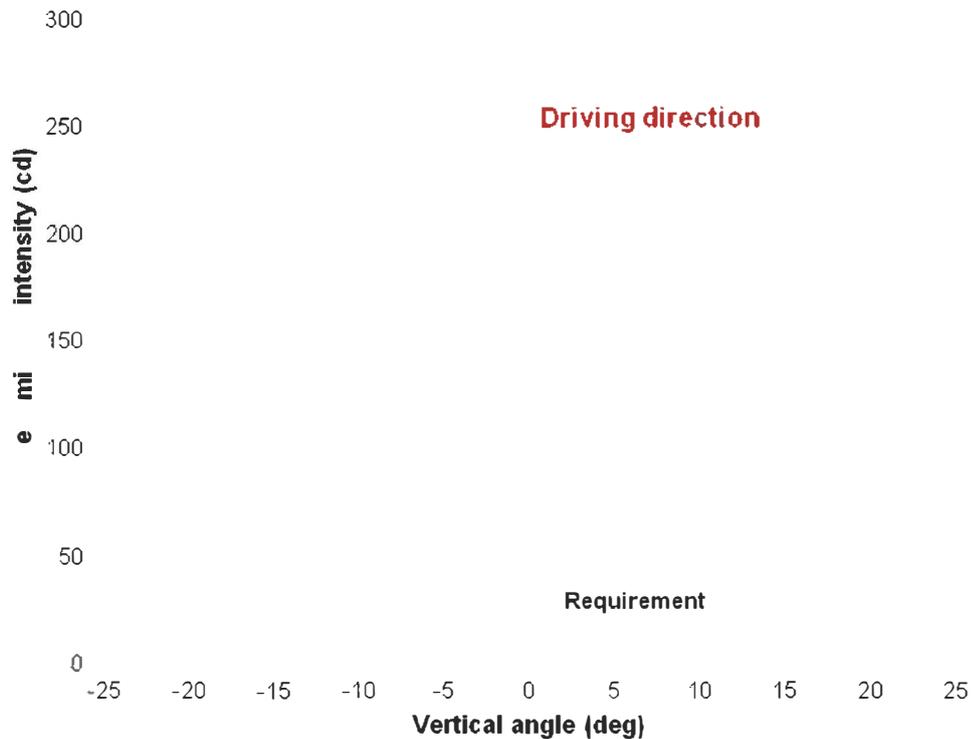


Figure 2. Vertical distribution in the driving direction and perpendicular to it.

The maximum is located in the region between 0° and +5° and the vertical beam spread (≥ 20 cd) is larger than 50°, fulfilling the requirements in TSFS 2012:90 and ICAO Table 6-3.

Remark

The measured values reported are valid only for the unit under test.

SP Technical Research Institute of Sweden Measurement Technology - Communication



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Performed by

Appendices

Appendix 1: Colour plot

Appendix 2: Pulse diagrams

Appendix 3: Measurement results effective luminous intensity

Appendix 4: Photo of units under test.