LNE
Le progrès, une passion à partager

LABORATOIRES DE TRAPPES
29, avenue Roger Hennequin – 78197 TRAPPES Cedex
Tél. : 01 30 69 10 00 – Fax : 01 30 69 12 34

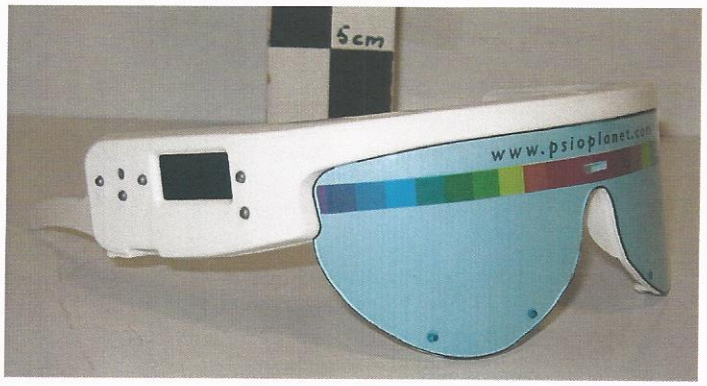
The test report P122054/3 is the english translation of the test report P122054/2 dated on 24/02/2014

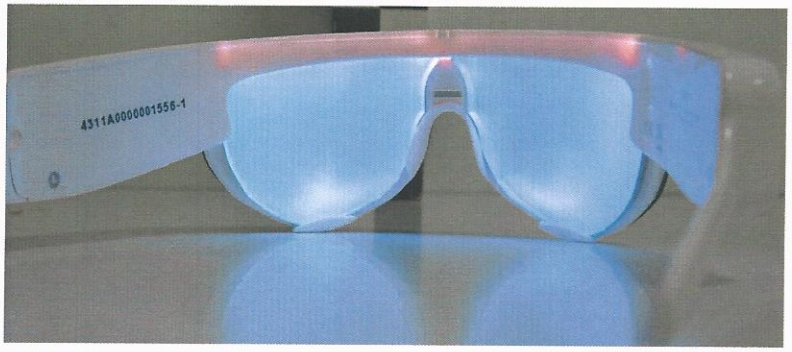
TEST REPORT

Issued to :	PSYCHOMED VIEUX CHEMIN DE WAVRE – 117A 1380 LASNE BELGIQUE
Date of request and the order :	Agreement dated on 23/01/2014 on quotation n°2014/3717
Object :	Evaluation of the spectral irradiance and risk group determination of the device « PSIO » with LED emission blue, green and red.
Reference document :	NF EN 62471 December 2008 "Photobiological safety of lamps and lamp systems"

1. IDENTIFICATION OF THE DEVICE

Manufacturer	:	Psychomed
Reference	:	Psio
Serial number	:	4311A0000001556-1
Light source	:	2 LED (Blue, Green and Red)
Power supply	:	Battery – USB rechargeable





2. TEST CONDITIONS

2.1. SUBJECT OF TEST

Measurement of the spectral irradiance at a distance of 20 mm from the screen and determination of the risk group of the device described above, according to the standard NF EN 62471 December 2008.

2.2. REFERENCE DOCUMENT

NF EN 62471 December 2008 :
"Photobiological safety of lamps and lamp systems".

2.3. DATES OF PERFORMANCE

31 January – 04 February 2014.

3. MEASUREMENTS OF THE PARAMETERS REQUIRED FOR THE RISK GROUP DETERMINATION

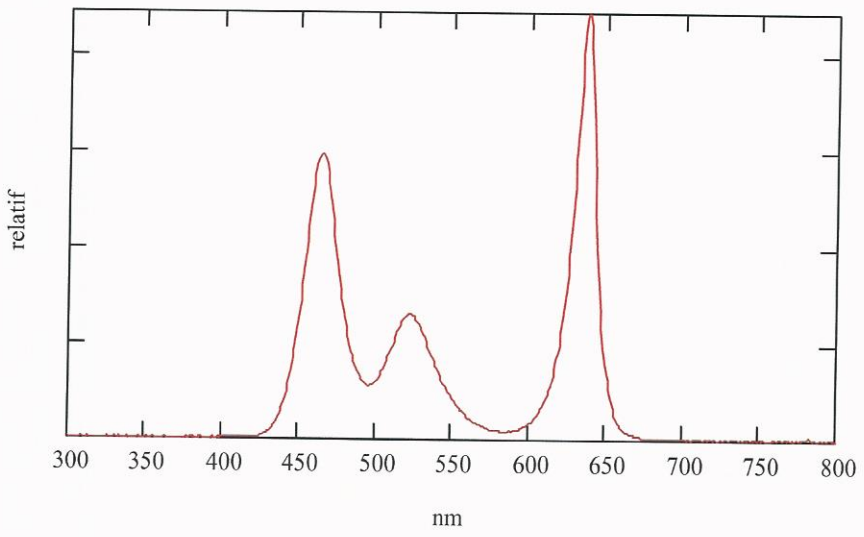
For the risk group determination, the following parameters must be measured on the device :

- Radiance and/or Irradiance
- Wavelength
- Geometry of the source
- Temporal shape of the emission

From these characteristics, the applicable risk group limits are calculated and are compared to the measured values. The measurements are performed at maximum level of emission.

3.1. EMISSION SPECTRUM CHARACTERIZATION

The emission wavelength of the device is measured using a spectroradiometer. The uncertainty of the measurement is 1 nm.



3.2. GEOMETRICAL CHARACTERISTICS OF THE SOURCE

The device consists of two emitters located on either side of spectacles. The propagation of the light is performed with two waveguides on the top of the frame and then be transmitted through the screen of the spectacles

The radiation is scattered on a surface of about 50 mm in diameter.

3.3. TEMPORAL SHAPE OF THE EMISSION

Using a silicon bias-photodiode, we characterized the temporal shape of the emission : It's a continuous wave (CW) light beam.

3.4. RADIANCE OR IRRADIANCE MEASUREMENT

The radiance of the source or the irradiance generated by the source is measured taking into account the geometrical conditions defined in the standard, in particular the acceptance angle for the integrated radiance.

The characterisation is performed at a distance of 200 mm from the source

At this distance, the apparent dimension is estimated to be 250 mrad. In those conditions, the limits are defined in radiance.

The radiance values for the different risk groups are reported in the table 1.

3.5. RISK GROUP

In the table 1 are shown the values of the integrated and weighted radiance, with the geometrical conditions of the measurements for the blue light risk (main risk taking into account the emission spectrum of the leds). The radiance L_B is calculated from the measured spectral radiance. It is integrated in the spectral range 300-700 nm and weigthed by the blue light risk function $B(\lambda)$.

	Risk Group 0 (Exempt)	Risk Group 1 (Low)	Risk Group 2 (Moderate)
Time base [s]	10 000	100	0,25
Acceptance angle [mrad]	100	11	1,7
L_B [W/m²/sr]	0,13	0,13	0,13
Group limits [W/m²/sr]	100	10 000	4 000 000

Table 1 : risk group evaluation

The integrated and weighted radiance L_B does not exceed the « exempt risk » group limit.

4. IRRADIANCE

4.1. MEASUREMENTS

Using a spectroradiometer, the spectral irradiance is measured at a distance of 20 mm from the surface and centered on the screen.

Wavelength [nm]	Spectral Irradiance [µW/cm²/nm]	Uncertainty [µW/cm²/nm]	Wavelength [nm]	Spectral Irradiance [µW/cm²/nm]	Uncertainty [µW/cm²/nm]
400	0,000159	0,0000095	575	0,0462	0,0028
405	<0,0000030	/	580	0,0382	0,0023
410	0,0000563	0,0000034	585	0,0374	0,0022
415	0,000461	0,000028	590	0,0348	0,0021
420	0,001311	0,000079	595	0,0415	0,0025
425	0,00607	0,00036	600	0,0663	0,0040
430	0,01618	0,00097	605	0,1038	0,0062
435	0,0448	0,0027	610	0,1594	0,0096
440	0,1088	0,0065	615	0,269	0,016
445	0,236	0,014	620	0,456	0,027
450	0,440	0,026	625	0,817	0,049
455	0,760	0,046	630	1,396	0,084
460	1,131	0,068	635	1,98	0,12
465	1,374	0,082	640	1,406	0,084
470	1,28	0,077	645	0,567	0,034
475	0,946	0,057	650	0,249	0,015
480	0,637	0,038	655	0,1105	0,0066
485	0,438	0,026	660	0,0484	0,0029
490	0,325	0,019	665	0,0208	0,0012
495	0,250	0,015	670	0,00946	0,00057
500	0,236	0,014	675	0,00824	0,00049
505	0,280	0,017	680	0,00514	0,00031
510	0,345	0,021	685	0,00358	0,00021
515	0,432	0,026	690	0,00377	0,00023
520	0,507	0,030	695	0,0027	0,00016
525	0,522	0,031	700	<0,000074	/
530	0,489	0,029	/	/	/
535	0,402	0,024	/	/	/
540	0,324	0,019	/	/	/
545	0,249	0,015	/	/	/
550	0,191	0,011	/	/	/
555	0,1442	0,0086	/	/	/
560	0,1086	0,0065	/	/	/
565	0,0826	0,005	/	/	/
570	0,0613	0,0037	/	/	/

Table 2 : spectral irradiance

4.2. RESULTS

The spectral irradiance values in the table 2 take into account the whole surface of emission.

4.2.1. Blue light

The blue light exempt risk group limit expressed in irradiance is evaluated at 0,79 W/m².

The irradiance value weighted by the blue light risk function is 0.27 W/m². This value is 2.9 lower than the blue light exempt risk group limit

4.2.2. Red light

In the spectral range 600-700 nm, the irradiance level is evaluated at 38.2 µW/cm².

5. CONCLUSION

The accessible radiation from the device « PSIO » with 2 LED blue, green and red emission is in the risk group 0 « exempt risk » according to the standard NF EN 62471 December 2008.

Trappes, 7 March 2014

Laboratoire national de métrologie et d'essais • LNE

Test manager

Olivier ENOUF

The results which are quoted are only applicable to the sample, the product or material submitted to LNE and which is fully described in this document.