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44-121 Gliwice
LABOREx Laboratory
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44-102 Gliwice

AB 1340

Gliwice, 29/05/2018

REPORT

from test no. 2/LL/105/2018/A

Subject: **WATEX lighting fixtures test**

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Tax identification number (NIP): PL 631-21-53-136 dated 24 April 2004
Statistical Registration No. (REGON): 273725355
Share capital – 400 000,00 PLN
KRS: 0000161774 District Court in Gliwice
X Commercial Division of the National Court Register

1. **Client's name and address:**
   AIRFAL INTERNATIONAL
   Calle Rio Esera 4,
   50830 Villanuewa de Gallego,
   Zaragoza, HISZPANIA.

2. **Contract/errand/order number:**
   0540/OBAC/3715/17/CW/18/P

3. **Case identification number given by the Laboratory:**
   LL/105/2018

4. **Place of performing tests:**
   LABOREx Laboratory
   ul. Aronii 4
   44-102 Gliwice.

5. **Date of delivery of test samples:**
   24.04.2018

6. **Description, condition and identification of the tested object:**
   Tested objects:
   - WATEX LED 24W lighting fixture with black sealing – 2 pcs.

   Serial no.: none,
   Manufacturing year: none,
   Samples submitted by the client.

7. **Date(s) of performing tests:**
   25 April ÷ 29 May 2018

8. **Tests range and identification of the method used:**

Ite	Tested parameter	Applicable standards	Accredited method
1	Indication of working temperature Determining maximum temperature of the surface	PN-EN 60079-0:2013-03 +A11:2014-02 item 26.5.1.2 PN-EN 60079-0:2013-03 +A11:2014-02 item 26.5.1.3 PN-EN 60079-31:2014-10 item 4.4.1	yes yes yes
2	Heat and cold resistance test	PN-EN 60079-0:2013-03 +A11:2014-02 item 26.826.9	yes
3	Shock resistance test	PN-EN 60079-0:2013-03 +A11:2014-02 item. 26.4.2	yes
4	IP66 protection class test	PN-EN 60079-0:2013-03 +A11:2014-02 item 26.4.5 PN-EN 60079-31:2014-10 item 6.1.1	no yes
5	Type test with additional product test	PN-EN 60079-15:2010 item 22.6.2.2	no

9. List of test devices

Name of the device	Serial/inventory no.
Roll-up tape measure	A/201/LL
Electronic caliper	A/206/LL
Videographic recorder VR-18	A/001/LL
Temperature sensor IT-CM2-Pt100	A/001/01/LL
Temperature sensor IT-CM2-Pt100	A/001/02/LL
Temperature sensor IT-CM2-Pt100	A/001/03/LL
Temperature sensor IT-CM2-Pt100	A/001/04/LL
Temperature sensor IT-CM2-Pt100	A/001/05/LL
Temperature sensor IT-CM2-Pt100	A/001/06/LL
Thermographic camera IRI 4010	A/002/LL
Autotransformer MCP	C/212/LL
Power and leakage current measure DW 6160	A/226/LL
Environmental chamber SU 2000C	C/081/LL
Impact test rig	C/076/LL
Swingle	C/076/01/LL
Electronic stopwatch	A/135/LL
Dust chamber	C/075/LL
Can vacuum gauge	A/182/LL
Thermal flow-meter	A/145/LL
Electromagnetic flow meter MAGX2-STAP	A/141/LL
IPX6 measurement inlet nozzle	C/098/LL
Vacuum pump	C/119/01/LL
Micromanometer	A/188/LL
Thermo-hygrometer LB-522B type	A/207/LL

Prior to testing, the test devices were inspected. The devices were in order.

10. Course and results of the tests

The results and uncertainty resulting thereof relate only to the sample tested and cannot apply to any batch of product / substance / materials.
Measurement uncertainty was established according to the EA-4/02 document. The uncertainty values given constitute expanded uncertainty with the 95% confidence coefficient and expansion coefficient k=2.

10.1. Determining the working temperature, maximum temperature of the surface

Environmental conditions during test which influence test results:
The test was conducted under temperature of (24.1±2.0÷25.2±2.0)°C and relative humidity of (48.7±3.0 ÷ 45.8±3.0) %.
The test was performed powering the fixture using an autotransformer:
- at 07:50 a.m. ÷ 11:07 a.m. powering with voltage U=230 V AC, current consumption I=0.126 A,
- at 11:07 a.m. ÷ 12:30 p.m. powering with voltage U=207 V AC, current consumption I=0.134 A.

Observation time was 4.5 hours.

The temperature was recorded using the sensors installed in the locations specified in Table 1. Temperature curves during heating in individual locations are presented on the recorded diagrams (Fig. 1).

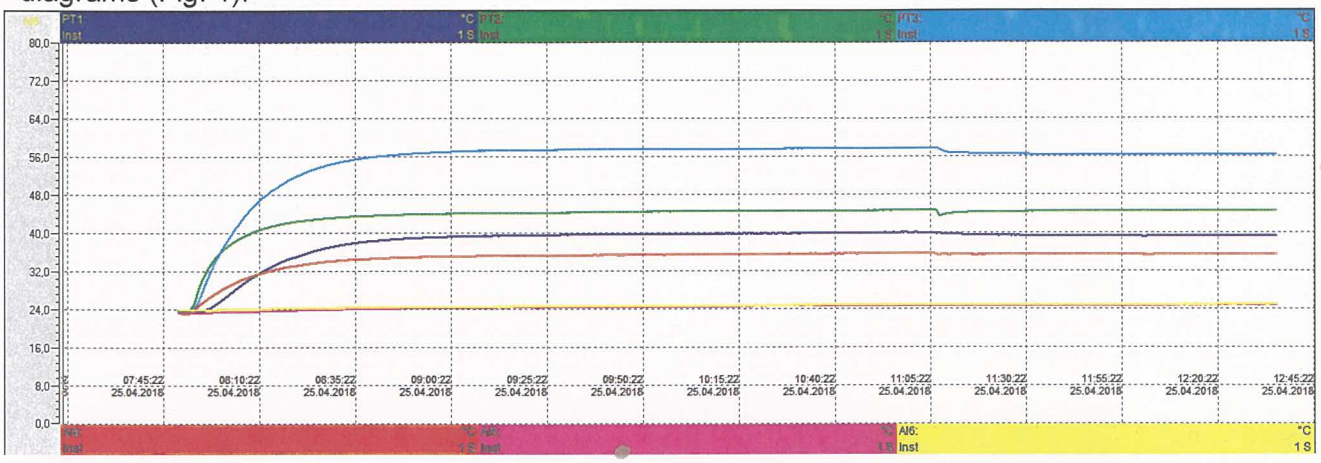

Fig. 1. Heating characteristics.

Table 1. Locations of temperature sensors.

Recorder channel no.	Colour on the chart	Locations of temperature sensors
1		housing back (above the converter)
2		LED light strip - interior
3		converter PHILIPS 30W
4		shed
5		cable gland
6		environment

The temperature values recorded with a video recorder were used for determining ambient temperature and determining the time, when the temperature of the tested object was stabilized. After the heating process ended, pictures were taken with a thermographic camera in order to determine the spots with the highest temperature. Figure 2÷3 presents the selected pictures from a thermographic camera.

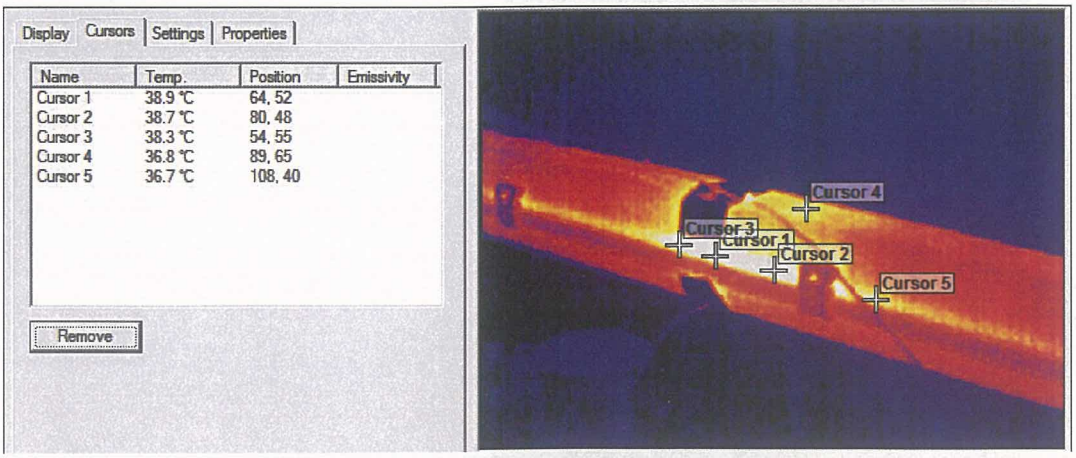

Fig. 2. Thermographic photo – housing (shed).

The highest temperature of **the external surface** recorded with a thermographic camera was (38.9±3.7)°C. At that moment, the ambient temperature was (25.2±0.8)°C.
Maximum temperature recalculated for ambient temperature of 40°C was (53.7±4.5)°C.

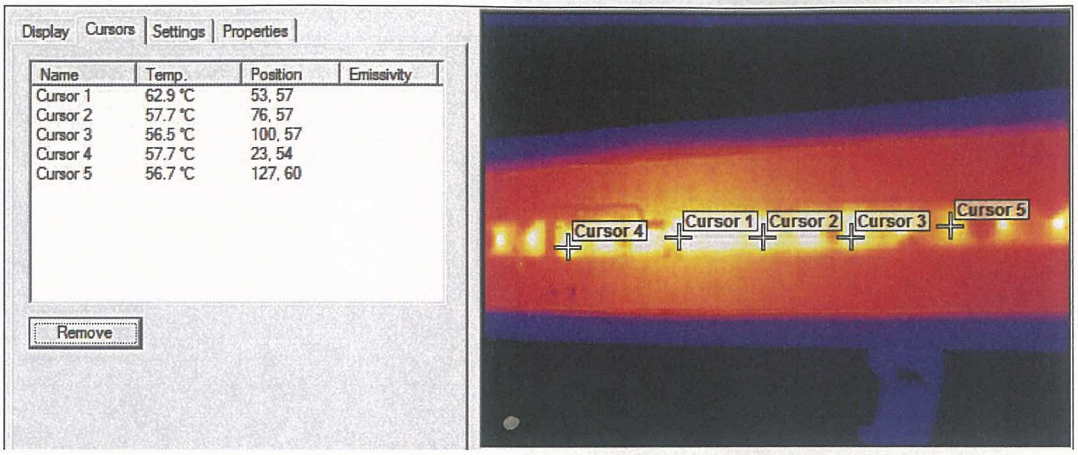

Fig. 3. Thermographic photo – interior (LED light strip).

The highest temperature of **the device** recorded with a thermographic camera was (62.9±6.0)°C. At that moment, the ambient temperature was (25.2±0.8)°C.
Maximum temperature recalculated for ambient temperature of 40°C was (77.7±6.8)°C.

Estimate of measurement results uncertainty for contact method (recorder)

$U(T) = (0.627 + 0.0053 \times w_{wsk})$ °C

w_{wsk} - value indicated by the recorder

Estimate of measurement results uncertainty for contactless method (thermographic camera)

$U(T) = (0.095 \times w_{wsk})$ °C

w_{wsk} - value indicated by the thermographic camera

10.2. Heat and cold resistance test

Heat resistance test.

The test was conducted in the environmental chamber with air temperature of (+80±2.0)°C and relative humidity of (90±3.0)%.
The test lasted 672 hours (4 weeks).

After the test, the fixtures were stored in air with a temperature of temperature of (+23±2.0)°C and relative humidity of (50±3.0)% for 24 hours.

Cold resistance test.

The test was conducted in the environmental chamber with air temperature of (-30±2.0)°C.
The test lasted 24 hours.

After completion of the test, the fixtures were subject to visual inspection.
No damage was found on the two fixtures with black sealing. No damage was found in the interior of the two fixtures with black sealing.

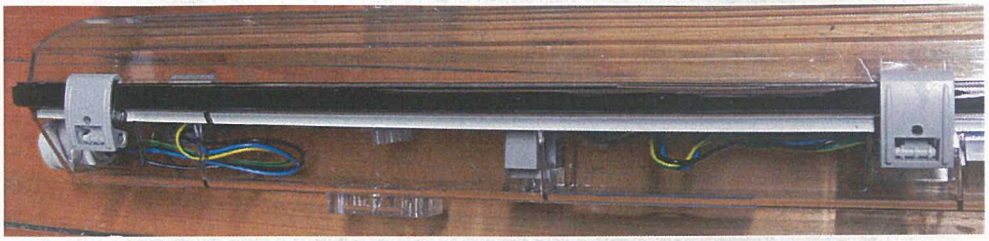

Fig. 1. Tested lighting fixture.

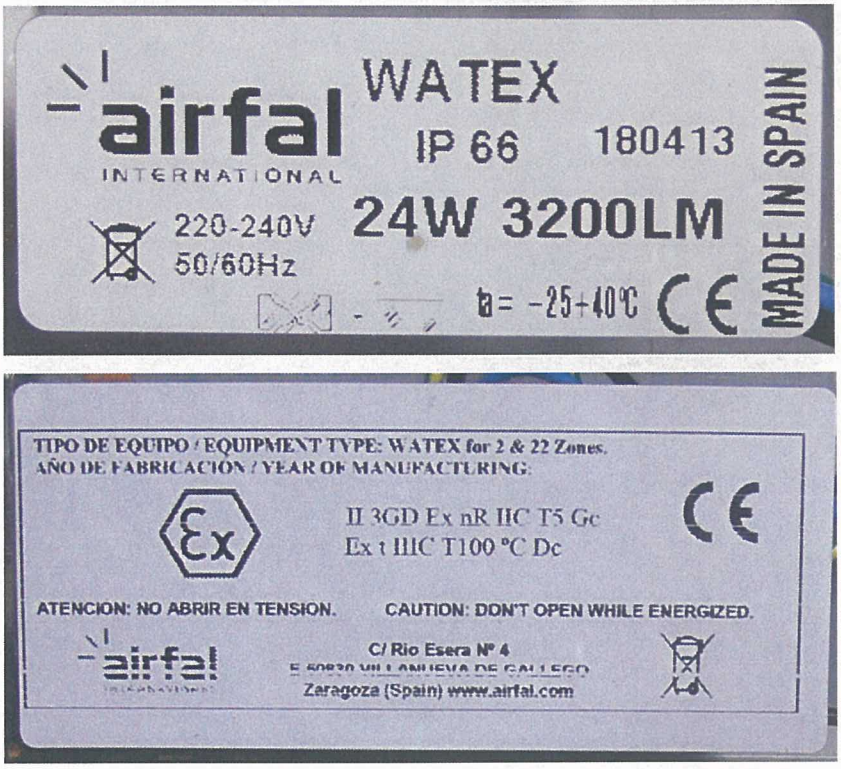

Fig. 2. Rating plates.

10.3. Impact resistance test

Environmental conditions during test which influence test results:

The tests were conducted under temperature of (21.4±2.0)°C and relative air humidity of (40.9±3.0)%.

The device was subject to impact test consisting of impact of a 1 kg swingle dropping onto the enclosure from 0.7 m.

The location of the impact is shown on fig. 3. Test results are presented in table 2.

Fig. 3. Spot of swingle impact in the fixture enclosure.

Table 2. Results of the shock resistance test.

Sample name	Impact spot	Height of impact [m]	Test result
WATEX lighting fixture 24W	fixture with black sealing		
	A	0.7	No damage
	B	0.7	No damage

The tests did not result in loss of functionality of the device.

10.4. Test of the IP66 protection class ensured by the enclosure
Environmental conditions during test which influence test results:
The tests were conducted under temperature of (21.8±2.0)°C and relative air humidity of (40.3±3.0)%.

a) Test of protection class against foreign solid bodies, marked with the first characteristic digit (IP6X).
The enclosure test was performed in a dust chamber with vacuum. Vacuum pressure was 2 kPa. Vacuum speed was less than 20-times the enclosure volume per hour. Test time was 8 hours.

After completion of test, the sample was subject to visual inspection. No traces of dust inside the enclosure were stated.

b) Test of protection class against penetration by water, marked with the second characteristic digit (IPX6).
The enclosure test was performed with an outlet nozzle for IPX6 measurement.
Water flow was 100l/minute. Test time was 3 minutes.

After completion of the test, the enclosures was subject to visual inspection. No traces of water were found inside.

The enclosure of WATEX lighting fixtures meet the requirements of IP66 protection class.
The Stucchi connector (cable glands) was installed in the enclosure of WATEX lighting fixtures during IP test.

Fig. 4. Enclosure of WATEX fixture after a dust chamber test.

Fig. 5. Enclosure of WATEX fixture after a water test.

10.5. Type test with additional product test

The Stucchi connector (cable glands) was installed in the enclosure of WATEX lighting fixtures during pressure test.

WATEX 24W lighting fixtures with black sealing:

created vacuum	Δp=0,3 kPa=300 Pa
after 90 seconds	vacuum Δp=274 Pa
after 180 seconds	vacuum Δp=249 Pa

Test result: POSITIVE.

The tests were performed by:

Date	name and surname	position	signature
29 May 2018	Leon Bieniek	specialist for research and development	.....

Authorized by:

Date	name and surname	position	signature
29 May 2018	Wojciech Bobecki	laboratory manager	.....

END OF THE REPORT