Schréder
Experts in lightability™

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ROAD

Axia 3

owlet® PRO FLEX™

Proiectat pentru performanță, conceput pentru experiența clientului

În designul conceptului nostru innovator, feedback-ul clientului a jucat un rol esențial în dezvoltarea Axia 3. Acesta reprezintă mai mult decât un aparat de iluminat, este o platformă care oferă durabilitate, cost-eficiență și experiență pentru clienți, în timp ce sprijină platforme de orase inteligente. Bazându-se pe experiența a sute de mii de aparate de iluminat Axia instalate în întreaga lume, acest caparat de iluminat din a treia generație împinge granițele cu inovații fotometrice, ușurință și viteză în instalare și conectivitate FutureProof.

Disponibil în trei dimensiuni, Axia 3 permite orașelor să maximizeze eficiența atunci când ilumineză numeroase tipuri de aplicații, de la trasee de biciclete, piețe și parcări la străzi rezidențiale, autostrăzi, drumuri urbane și bulevarde mari.
Această gamă de aparate de iluminat ușoare și compacte combină iluminatul de calitate cu o amprentă minimă de carbon. Permite o instalare ușoară și întreținere fără griji, reducând costurile de operare.

IP 66 | IK 10

STRAZI URBANE & REZIDENTIALE | PODURI | PISTE BICICLETE & PIETONALE | STATII DE TRAMVAI & METROURI | PARCARI | ARII EXTINSE | PIETE & ZONE PIETONALE | DRUMURI & AUTOSTRAZI

REPUBLICA MOLDOVA CHIȘINĂU SOCIETATE PE ACȚIUNI COMPANIA ELECTRICĂ 1003600092733 «COMPANIA ELECTRICĂ» S.A.

Axia 3 | SINTEZA

Schréder

Concept

Axia 3 este un aparat de iluminat robust și compact, proiectat cu accent pe miniaturizare și eficiență superioară. Compus din aluminiu turnat sub presiune, precum și materiale composite, Axia 3 este disponibil în trei dimensiuni. Datorită greutății reduse, acest aparat de iluminat este ușor de manevrat în timpul instalării.

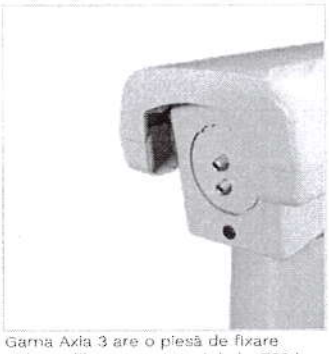
Axia 3.1, poate fi echipat cu până la 16 LED-uri, se potrivește perfect aplicațiilor cu înălțime redusă, în timp ce Axia 3.2 și Axia 3.3, cu până la 32 sau 64 de LED-uri, sunt ideale pentru iluminarea drumurilor largi, a autostrăzilor și a bulevardelor.

Gama Axia 3 este echipată cu motoare fotometrice ProFlex™, oferind cea mai mare eficiență datorită capacității lor de a maximiza fluxul luminos emis și de a furniza distribuții luminoase foarte extinse.

Axia 3 este livrat cu cablu de alimentare, deci nu este nevoie să fie deschis pentru montaj. Gama completă este disponibilă cu o piesă de fixare universală integrată, adaptată pentru montaj în vârf de stâlp și montaj pe braț pentru diferite diametre (Ø32mm cu adaptor, Ø42-48mm, Ø60mm și Ø76mm). Unghiul de înclinare poate fi ajustat la fața locului atât pentru configurațiile de montaj în vârf de stâlp (-5 ° / +15 °) cât și pentru montaj pe brat lateral (-10 ° / +10 °), ceea ce permite optimizarea distribuțiilor luminoase, reducerea consumului de energie și controlul poluării luminoase.

Acest aparat de iluminat extrem de eficient, pregătit pentru interconectare, oferă comunităților locale soluția ideală pentru a îmbunătăți nivelurile de iluminare, pentru a genera economii de energie, a spori siguranța și a reduce amprenta ecologică. Axia 3 este instrumentul ideal pentru a oferi încă 25 de ani de eficiență, sustenabilitate și siguranță.

Motorul fotometric ProFlex™ oferă eficiență maximă.



Gama Axia 3 are o piesă de fixare universală pentru ștuțuri de la Ø32 la Ø76mm.

Înclinarea este reglabilă la fața locului, pentru a optimiza distribuția fotometrică și pentru a obține economii suplimentare de energie.

Axia 3 este pregătit pentru interconectare și poate funcționa cu [illegible] și sisteme de control.

Tipuri de aplicații

- DRUMURI ȘI AUTOSTRĂZI
- STRĂZI URBANE ȘI REZIDENȚIALE
- PISTE DE BICICLETE ȘI PIETONALE
- PIEȚE SI ZONE PIETONALE
- PARCĂRI AUTO
- PODURI
- ZONE EXTINSE
- STATII DE TRAMVAI ȘI METROURI

Avantaje Cheie

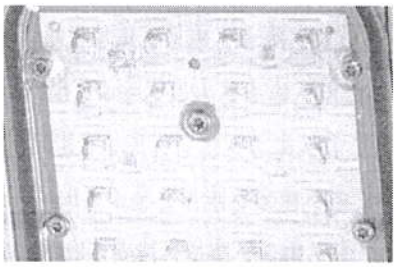
- Maximizează economiile de energie și de costuri de întreținere
- Motoare fotometrice ProFlex™, care oferă un iluminat de calitate, confort și siguranță ridicate
- 3 dimensiuni pentru a oferi soluția necesară pentru numeroase aplicații rutiere și urbane
- Instalare ușoară: pre-cablat și echipat cu piesă de fixare universală, adaptată pentru montare laterală și în vârf de stâlp
- Înclinare reglabilă, pentru distribuții luminoase și uniformități optime
- Pregătit pentru interconectare

REPUBLICA MOLDOVA, MUNICIPIUL CHIȘINĂU, SOCIETATEA PE ACȚIUNI «COMPANIA ELECTRICĂ» S.A. 1003600092733

PRO FLEX™

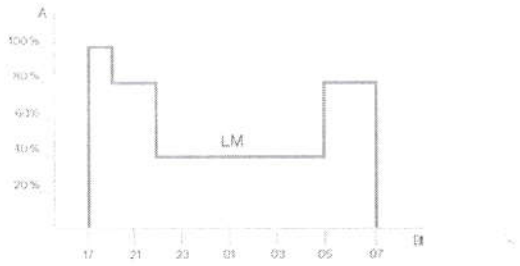
ProFlex™

Motorul fotometric ProFlex™ integrează lentilele într-un protector din policarbonat. Această integrare maximizează fluxul luminos emis de aparatul de iluminat și reduce reflexia din interiorul unității optice. Policarbonatul utilizat pentru motorul fotometric ProFlex™ oferă caracteristici esențiale, cum ar fi o claritate optică ridicată pentru o transmisie superioară a luminii, o rezistență mai bună la impact în comparație cu sticla și o durată lungă de viață, datorită tratamentului de stabilizare UV. Conceptul ProFlex™ permite un design compact, cu un compartiment optic subțire. Oferă astfel distribuții luminoase extinse, astfel încât distanța dintre aparatele de iluminat poate fi mărită.



Profil personalizat pentru reducerea fluxului luminos

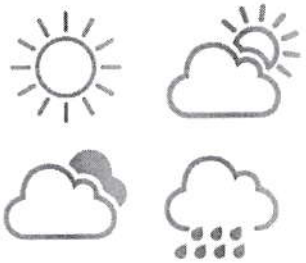
Balasturile electronice inteligente pot fi programate din fabrică, cu profiluri complexe de reducere a fluxului luminos. Sunt posibile până la 5 combinații între perioadele de timp și nivelurile de intensitate luminoasă dorite. Această funcționalitate nu necesită legături electrice suplimentare.
Intervalul de timp dintre momentul de pornire și cel de oprire este folosit pentru activarea profilului presetat. Sistemul personalizat de reducere a fluxului generează economii de energie suplimentare, respectând nivelurile de iluminat și uniformitatea iluminatului, pentru toată perioada nopții.



A. Performanță | B. Timp

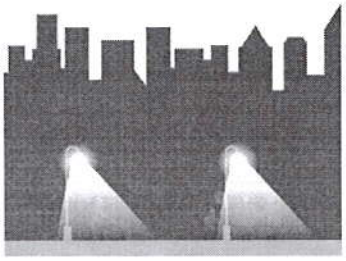
Fotocelula / senzor de lumină naturală

Fotocelula (sau senzorul de lumină naturală) pornește aparatul de iluminat, de îndată ce iluminatul natural scade sub un anumit nivel.
Aceasta poate fi programată să pornească pe timpul unei furtuni, în zilele înnorate (în zone de importanță ridicată) sau doar pe timpul nopții, astfel încât iluminatul să ofere siguranță și confort în spațiile publice.



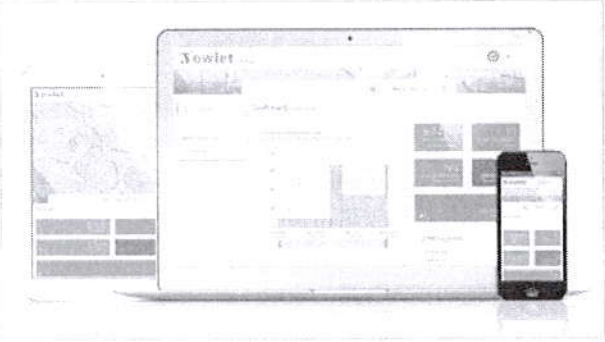
Senzor PIR: detecția mișcării

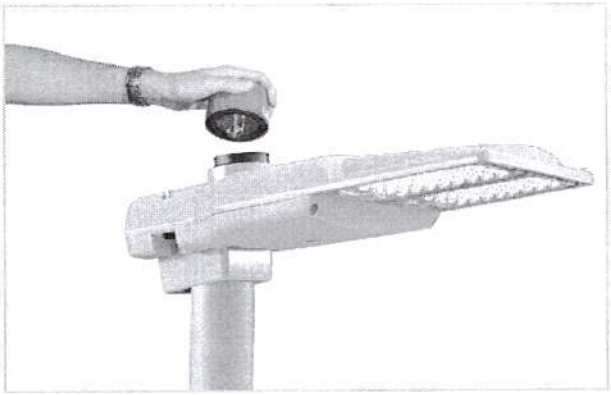
În zonele cu activitate nocturnă scăzută, fluxul luminos poate fi redus la minimum, în cea mai mare parte a nopții. Prin utilizarea unui senzor PIR, nivelul de iluminare poate fi crescut de îndată ce în zonă se detectează un pieton sau un vehicul lent. Cantitatea de flux luminos emis de fiecare aparat de iluminat poate fi configurată individual, în funcție de mai mulți parametri, precum: flux luminos minim sau maxim, interval de reacție, durată de timp de menținere pentru stările minim, maxim pornit sau oprit. Senzorii PIR pot fi folosiți într-o rețea autonomă sau interoperabilă.



Owlet IoT

Owlet IoT controlează de la distanță aparatele de iluminat din rețea, facilitând sporirea eficienței, obținerea de date în timp real și economii de energie de până la 85%.





TOTUL ÎNTR-UN SINGUR DISPOZITIV

Dispozitivul de control LUCO P7 CM dispune de cele mai avansate funcțiuni pentru administrarea rețelei. De asemenea, include o fotocelulă și funcționează cu ajutorul unui ceas astronomic, pentru adaptarea sezonieră a profilului de reducere a fluxului luminos.

UȘOR DE INSTALAT

Datorită comunicației fără fir (wireless), nu sunt necesare legături electrice suplimentare. Deasemenea, nu există constrângeri sau limitări în legătură cu rețeaua de alimentare. Astfel, sistemul de iluminat interconectat poate fi extins oricând, fără restricții, de la o singură unitate de control și până la o rețea extrem de complexă.

Pentru că dispune de funcții de geolocalizare în timp real și de detectare automată a tipului si functiilor aparatului de iluminat pe care se montează, autoconfigurarea modulului de control se face rapid și ușor.

INTERFAȚĂ PRIETENOASĂ

De îndată ce un dispozitiv de control este instalat pe aparatul de iluminat, coordonatele GPS ale aparatului apar în interfața utilizator a aplicației, pe o hartă online, în mod automat. Un panou de bord ușor de utilizat permite fiecărui utilizator să-și organizeze și să-și personalizeze ferestrele de lucru, statisticile și rapoartele. Utilizatorii pot accesa informații relevante, în timp real.

Aplicația online Owlet IoT poate fi accesată în orice moment, din orice locație de pe mapamond, printr-un dispozitiv care permite navigarea web, conectat la Internet. Aplicația se adaptează la acesta, oferind o experiență intuitivă și prietenoasă pentru utilizatori.

Notificările în timp real pot fi pre-programate, astfel încât să monitorizeze cele mai importante elemente ale sistemului de iluminat.

SIGUR

Sistemul Owlet IoT utilizează la nivel local o rețea de comunicații fără fir de tip plasă (meshnet), pentru a obține o reacție instantanee a aparatelor de iluminat, in-situ, la senzorii integrați în sistem. Acest nivel de comunicație este combinat cu un sistem de control de la distanță, care se folosește de cloud, pentru a asigura transferul de date spre și dinspre sistemul central de management.

Sistemul utilizează comunicații criptate IPV6 pentru a proteja transmisia de date în ambele direcții. Folosind un APN securizat, Owlet IoT asigură un nivel ridicat de protecție.

În cazul excepțional al unei erori de comunicație, ceasul astronomic integrat și fotocelula vor controla pornirea și de oprirea aparatelor de iluminat, iar profilul de funcționare stocat la nivel local va fi urmat, evitându-se, astfel, funcționarea defectuoasă, pe timpul nopții.

EFICIENT

Datorită senzorilor și/ sau a programărilor efectuate în avans, scenariile de iluminat pot fi adaptate cu ușurință, în funcție de evenimentele desfășurate în zonă, oferind, astfel, nivelurile de iluminat necesare, în momentul potrivit și în locul potrivit.

Contorul de energie integrat oferă cel mai înalt grad de acuratețe disponibil pe piață în acest moment, ajutând la luarea de decizii bazate pe cifre reale.

Răspunsul precis, în timp real, precum și rapoartele clare, asigură funcționarea eficientă a rețelei și optimizarea operațiunilor de întreținere.

La pornirea aparatelor de iluminat cu LED-uri, curentul de pornire absorbit de acestea poate cauza evenimente în rețeaua electrică. Owlet IoT încorporează o tehnologie care protejează rețeaua de acești curenți de pornire.

DESCHIS

Dispozitivul de control LUCO P7 CM poate fi montat prin intermediul unui conector standard tip NEMA 7 pini și controlează aparatul de iluminat prin protocol DALI sau prin protocol 1-10V.

Owlet IoT are la bază protocolul IPv6. Această metodă de adresare a dispozitivelor oferă garantia unui număr impresionant de combinații unice, permițând conecta la internet sau la o rețea de calculatoare diverse echipamente.

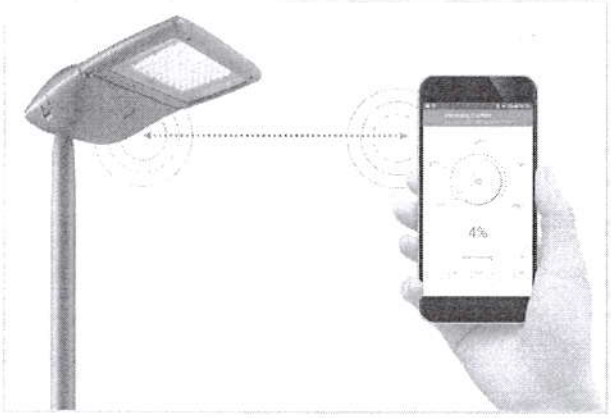
Folosindu-se de API-uri deschise, Owlet IoT poate fi integrat într-o manieră simplă în sisteme de management globale, existente sau viitoare.

Axia 3 | SOLUȚIE BLUETOOTH

Schréder

Soluția Schréder Bluetooth este compusă din 3 componente principale:

Un emițător Bluetooth conectat la driverul modular al aparatului de iluminat (transmițător BLE)
- O antenă Bluetooth montată pe aparatul de iluminat
- O aplicație smartphone numită Sirius BLE



Ușor de folosit

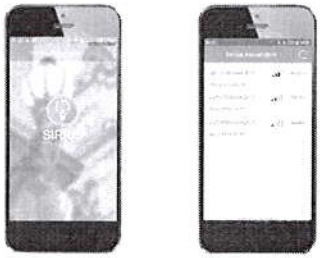
Soluția Bluetooth de la Schréder este ideală pentru configurarea individuală, in situ, a aparatelor de iluminat care utilizează Bluetooth. De la sol, utilizatorul poate să pornească sau să oprească aparatul de iluminat, să adapteze curba de reducerea fluxului luminos, să citească datele de diagnoză și multe altele. O aplicație ușor de utilizat, numită Sirius BLE, oferă un acces facil și sigur la funcțiile de control și configurare.

Indiferent dacă trebuie gestionată o rețea de iluminat într-o zonă urbană sau într-o zonă rezidențială, această soluție permite controlul facil al aparatelor de iluminat, din vecinătatea stâlpilor pe care sunt montate, fără a urca la acestea.

Împerechere rapidă și ușoară

Descărcați aplicația Sirius de la Schréder. Accesați meniul. Apăsați butonul "SCAN DEVICE (START)" pentru a căuta modulele BLE din jur. Ele vor fi afișate cu un grafic de bare (intensitatea semnalului) pentru a indica cel mai apropiat și cel mai îndepărtat modul la care vă puteți conecta din locația respectivă.

Apăsați pe pictograma aferentă dispozitivului la care doriți să vă conectați și introduceți cheia de acces personal pentru a controla aparatul de iluminat.

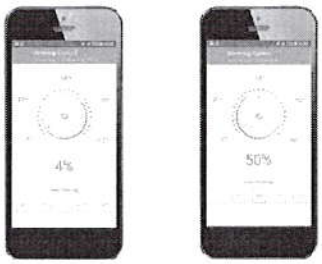


Definirea setărilor

Odată ce sunteți conectat la un aparat de iluminat, puteți ajusta diferiți parametri, cum ar fi curentul maxim de ieșire, nivelul minim de reducerea fluxului luminos și profilul personalizat pentru reducerea fluxului luminos pentru anumite intervale de timp.

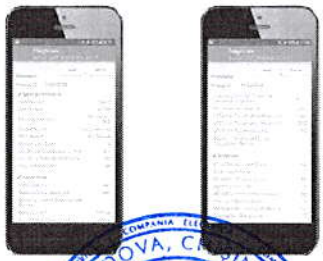
Control manual de reducere a fluxului luminos

Aplicația vă permite să efectuați o suprascriere manuală pentru a adapta instantaneu nivelurile de reducere al fluxului luminos. Este suficient să atingeți butonul "Dimming" din meniul principal și să reglați nivelul dorit folosind discul de control și butonul aferent. Pot fi utilizate imediat și niveluri deja predefinite. Valoarea corespunzătoare este afișată pe discul de control. Acest lucru vă permite să testați funcționalitățile de pornire/oprire și de reducere a fluxului luminos ale aparatului de iluminat împerecheat cu telefonul.



Diagnostic la fața locului

Atunci când un aparat de iluminat este împerecheat cu telefonul mobil, puteți accesa diverse informații de diagnoză: numărul total de porniri, timpul de funcționare al modulului LED și al balastului, consumul de energie total al driverului... etc. Puteți, de asemenea, să vizualizați evenimentele apărute în timpul funcționării (scurtcircuit, acționare protecție termică, supratensiuni, etc). Valorile afișate se pot referi la starea curentă sau pot fi valori cumulate până la momentul interogării.



Axia 3 | CARACTERISTICI

Schréder

INFORMAȚII GENERALE

Înălțime de instalare recomandată	4m până la 12m
Balast electronic inclus	Da
Marcă CE	Da
Certificat ENEC	Da
Conformitate ROHS	Da
Standard de testare	LM 79-08 (toate măsurările s-au efectuat în laborator acreditat ISO17025)

CARCASA SI FINISAJE

Carcasa	Aluminiu
Optic	Policarbonat stabilizat UV
Difuzor	Policarbonat (cu lentile integrate)
Finisaje carcasă	Vopsit în câmp electrostatic
Culori Standard	RAL 9005 Jet black RAL 7040 light grey
Grad de etanșeitate	IP 66
Rezistență la impact	IK 10
Test vibratii	Conform cu standardul modificat IEC 68-2-6 (0.5G)

CONDIȚII DE FUNCȚIONARE

Temperaturi de funcționare (Ta)	-35 °C pana la +45 °C

· În funcție de configurația aparatului de iluminat. Pentru mai multe detalii, vă rugăm să ne contactați.

INFORMAȚII ELECTRICE

Clasa Electrică	Clasa I EU
Tensiune nominală	220-240V – 50-60Hz
Factor de putere (la putere maximă)	0.9
Protecție la supratensiuni (kV)	10
Compatibilitate electromagnetică (EMC)	EN 55015 / EN 61000-3-2 / EN 61000-4-5 / EN 61547
Protocol de control	Bluetooth, DALI
Opțiuni control	Reducere personalizată a fluxului luminos, fotocelulă sau control de la distanță
Optiuni priza(e)	Conector de joasă tensiune (opțional) NEMA 3-pin (opțional) NEMA 6-pin (opțional) NEMA 7-pin (opțional)
Sisteme de control asociate	Sirius BLE Owlet IoT
Senzor	PIR (opțional)

UNITATE OPTICĂ

Temperatură de culoare LED-uri	3000K (Alb cald) 4000K (Alb neutru)
Indice de redare a culorilor (CRI)	>70 (Alb cald) >70 (Alb neutru)
Indice de emisie luminoasă în emisfera superioară (ULOR)	0%

DURATA DE VIAȚĂ A LEDURILOR @ TQ 25°C

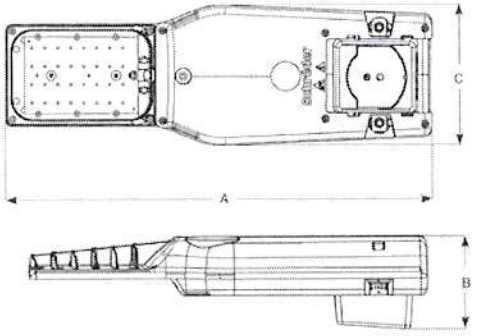
Toate configuratiile	100,000h - L90

Axia 3 | CARACTERISTICI

Schréder

DIMENSIUNI ŞI MONTAJ

AxBxC (mm)	AXIA 3.1 - 513x130x191 AXIA 3.2 - 585x130x191 AXIA 3.3 - 550x130x277
Greutate (kg)	AXIA 3.1 - 3.6 AXIA 3.2 - 4.8 AXIA 3.3 - 6
Rezistenţă aerodinamică (CxS)	AXIA 3.1 - 0.03 AXIA 3.2 - 0.03 AXIA 3.3 - 0.09
Posibilităţi de montaj	Intrare laterala– Ø32mm Intrare laterala – Ø42mm Intrare laterala – Ø48mm Intrare laterala – Ø60mm Vârf de stâlp – Ø60mm Vârf de stâlp – Ø76mm



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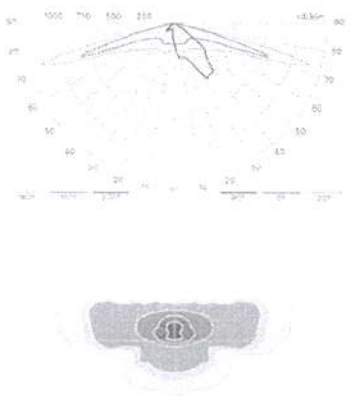

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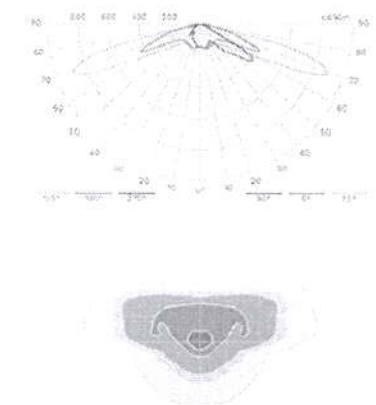

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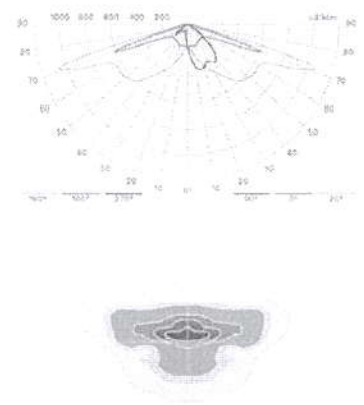

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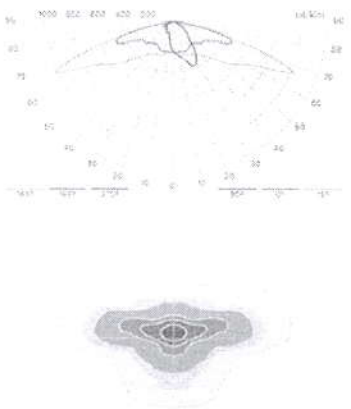

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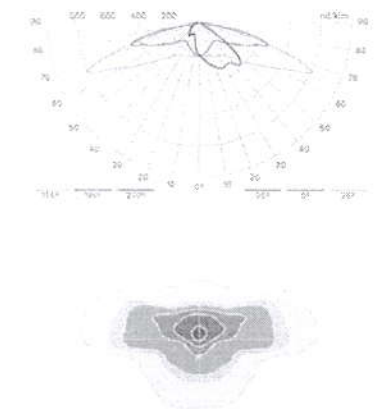

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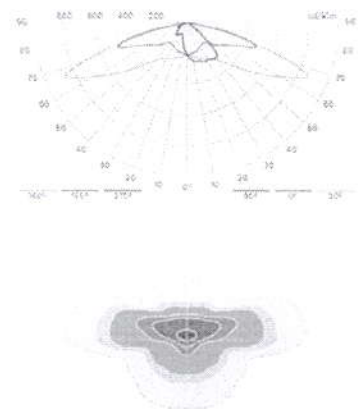
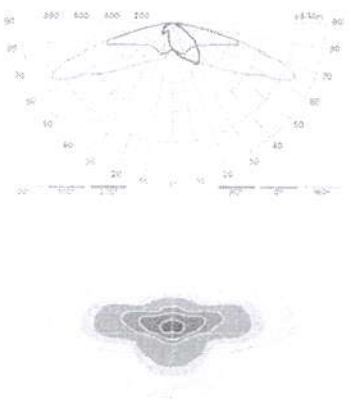


5281



Laboratory
Test report

R-Tech
Rue de Mons 3 – B-4000 Liège – Belgium
Tel.: +32 4 224 71 40 – Fax: +32 4 224 25 90
Member of Schréder Group

FORM L-54 Edition 01 – Revision 00 - Date: 14/06/2018

Electrical measurements

General information

Subject : AXIA 3.1 - 16 LEDs LG 40W

Asked by : THIJS Marcel

Created on : 19/10/2018

Validated on : 26/10/2018

Test number : D180737

Sample(s) : E180537

Folder : P-F18027

Test conditions

Luminaire : AXIA 3.1

Number of LED : 16

LED : Osram OSLON SQUARE GIANT

Driver : LG 40W 300-1000mA Prog Modular EU / 00-36-648

Driver current (mA) : 870

SPD : Vossloh Lighting Solutions SPC3 230/10 K

Measurements devices :
Fluke Norma 4000 - HF Powermeter - (E074) : Electrical measurements

Power supply :
APT 300XAC AC power supply (E103)
Supply voltages: 230 V 50 Hz

Operator : MESPOUILLE Loic

IMG_0685

Conclusion

Informative

PF : 0,99
Efficiency : 88,0%
THD : 7,0%
OK according to IEC 61000-3-2, Class C, > 25 W

Validated by :

GHYSENS Gilles

Duplicate to : THIJS Marcel, VERBEECK Philippe, JORIS Philippe, GALLOPPA Sandro, DETAILLE Ludovic, MULS Sophie, BOS Peter

LAB : 29/10/2018

Measurements

Test(s)

Name	Description	Result
Test @ 870mA		Informative

Test @ 870mA

Annex(es)

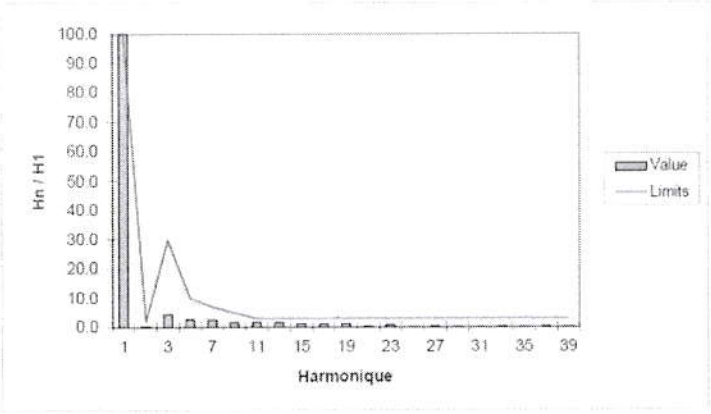
Harmonic current emissions (IEC 61000-3-2, Class C, > 25W)

Driver: LG LLP 40W 1.0A 20-67V PISE-A040Y

Date 25-10-18 Operator LCM Norma AQ number E074

Power Factor 0.9893 Cos φ (H1) 0.9918

Harmonic	Taux (%)	Limite (% H1)
1	100.0	100.0
2	0.2	2.0
3	4.4	29.7
5	2.6	10.0
7	2.6	7.0
9	1.6	5.0
11	1.7	3.0
13	1.6	3.0
15	1.1	3.0
17	1.0	3.0
19	1.2	3.0
21	0.3	3.0
23	0.9	3.0
25	0.0	3.0
27	0.4	3.0
29	0.0	3.0
31	0.0	3.0
33	0.2	3.0
35	0.1	3.0
37	0.3	3.0
39	0.1	3.0



input		output 1	
Urms	230.0 V	Urms	45.5 V
Irms	0.197 A	Irms	0.867 A
Prms	44.8 W	Prms	39.5 W
S	45.3 VA		
Q	-6.6 VAR		
PF	0.9893		
I(H1)	0.197 A	Uavg	45.5 V
Cos φ (H1)	0.9918	Iavg	0.867 A
η rms	88.0%	Pavg	39.5 W
η avg	88.0%		
THD	7.0%		

Laboratory
Test report

R-Tech
R-Tech
Rue de Mons 1 – B-4000 Liège – Belgium
Tel.: +32 4 224 53 40 – Fax.: +32 4 224 25 00
Member of Schréder Group

FORM L-54 Edition 01 – Revision 00 - Date: 14/06/2018

EMC test

General information

Subject : AXIA 3.1 LG Innotek 40 W Driver Class I

Asked by : THIJS Marcel

Created on : 06/11/2018

Test number : D180777

Reference norm : EN 55015 - EN 61547 Standards

Sample(s) : E180540

Folder : P-F18027

Test conditions

Luminaire : AXIA 3.1

Operator : External Lab

Description :
16 led's
Driver LG Innotek LLP 40 W PISE-A040Y
Dimmable - Dali

Electrical class : Class I EU

Driver : LG 40W 300-1000mA Prog Modular EU / 00-36-648

Current setting (mA) : 870

Auxiliaries : SPD VS Lighting Solutions

Testing facility : External - EMC - Laborelec

External test report reference : LBE04132777 - 1.0

Conclusion

Success

AXIA 3.1 Class I with LG driver complies with EN 55015 & EN 61547 Standards.

Validated by :
LERHO Xavier

Duplicate to : THIJS Marcel, VERBEECK Philippe, JORIS Philippe, GALLOPPA Sandro, DETAILLE Ludovic, MULS Sophie, BOS Peter

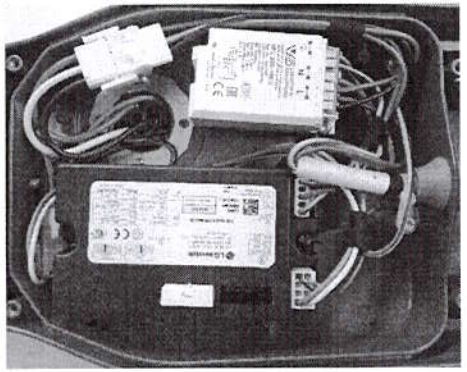
LAB : 06/11/2018

Summary of test

Test(s)

Name	Description	Result
Complete EMC test (10 Kv Surges)	Emission measurements (EN 55015): - Terminal disturbance - Radiated emissions - Conducted emissions Harmonics (IEC/EN 61000-3-2) Immunity measurements (IEC/EN 61547) - Electrostatic discharge (IEC/EN 61000-4-2) - Radiated, radio frequency electromagnetic field (IEC/EN 61000-4-3) - Fast transients (IEC/EN 61000-4-4) - Surges (IEC/EN 61000-4-5) - Injected currents (IEC/EN 61000-4-6) - Power frequency magnetic field immunity (IEC/EN 61000-4-8) - Voltage dips & interruptions (IEC/EN 61000-4-11)	Success

Complete EMC test (10 Kv Surges)



LABORELEC

002-Test
EN ISO/IEC 17025

CENTRAAL LABORATORIUM VOOR ELEKTRICITEIT (C.L.E.)
LABORATOIRE CENTRAL D'ELECTRICITE (L.C.E.)

Rodestraat, 125 – B-1630 Linkebeek

Electromagnetic Compatibility

TEST REPORT

Purpose of the test	Measurement of radio-disturbances and examination of compliance with EMC standards.
Trademark and type	R-Tech Axia 3.1 (LG) Cl I ***Dimmable***
Delivered to	**R-TECH** M. Maghe Laurent Rue de Mons, 3 B - 4000 LIEGE
Performed on	25/10/2018 – 26/10/2018
Delivered on	05/11/2018
CLE task No.	18/18073
CLE report No.	LBE04132777 - 1.0
Contents	24 pages
Applicant reference No.	Order PO002752 of 22/10/2018

Author	Verifier	Approver
Fon K Yves	**Herbert Denis**	**Deswert Jean Michel**
Technical Operator	*Technical Operator*	*Technology Manager*

This report concerns type tests on one or a series of specimens
The diffusion under any other form than the complete reproduction is not permitted except by written authorization from C.L.E.
If the version of this document is greater than 1.0 it automatically replaces all previous versions.

A. Specifications of the Equipment Under Test

The accuracy of the description and identification of the equipment under test, it's operating conditions, modifications and monitoring of its behaviour during and or after the test performed by Laborelec are under the responsibility of the customer.

Product name:	Led's Luminaire
Type:	Axia 3.1
Manufacturer:	R-Tech SA
Trademark:	Schréder
Number of samples:	1
CLE Number:	18/180540/1
Date of entrance:	24/10/2018

Specifications:

Drivers: LG Innotek
PISE-A040Y LLP40W 1,0 A 20 – 67 VAC

P_{in}:	47 W
U_{in}:	220 - 240 V
I_{in}:	0,98 A
λ:	0,98 C (Iout 1,0 A) 0,8 C (Iout 0,3 A)
η:	88 % min
P_{out}:	40 W max
U_{out}:	20 – 67 V
I_{out}:	0,3 – 1,0 A
t_c:	80°C
t_a:	- 40… + 55°C
Class:	I

Surge Protector Device: VS Lighting Solutions
SPC3/230/10K/i

U_{in}:	100 - 277 Vac
U_{oc}:	10 kV
U_p L-N:	≤ 1,5 kV
U_p L-GND:	≤ 1,8 kV
U_p N-GND:	≤ 1,8 kV
I_L:	16 A

Dimming protocol: Dali

All tests have been practiced on sample 18/180540/1.
Pictures of the appliance are given in appendix 1.

B. Program of the tests

Program

Tests, or verification by other means, of compliance with the EMC standards CISPR 15 / EN 55015 (radio-interference), IEC 61000-3-2 / EN 61000-3-2 (harmonics), IEC 61000-3-3 / EN 61000-3-3 (voltage fluctuations) and IEC 61547 / EN 61547 (immunity of electrical lighting equipment).

All EMC tests against the above mentioned standards are covered by the quality system EN ISO 17025.

Reference documents:

EMC standards:	CISPR 15	(2013) + A1 (2015)
	IEC 61000-3-2	(2014)
	IEC 61000-3-3	(2013) + A1 (2017)
	IEC 61547	(2009)
	EN 55015	(2013) + A1 (2015)
	EN 61000-3-2	(2014)
	EN 61000-3-3	(2013)
	EN 61547	(2009)

Supplier:

None, all tests and measurements have been performed at Laborelec.

C. Methods

C.1. Radio-interference measurements according to CISPR 15 / EN 55015

Disturbance voltages are measured at the terminals of the 50 µH/50 Ω artificial mains network from 9 kHz to 30 MHz (between each conductor L or N and earth) with a CISPR radio-receiver.

Method of measurement following pt. 8.1.4.1 of CISPR 15 / EN 55015:

- For light regulating controls which regulate the light output via a ballast or convertor, then the disturbance voltage at the mains and control terminals, if any, shall be measured at the maximum and minimum light output levels.

From 9 kHz to 30 MHz, the radiated electromagnetic disturbances are measured by means of 2 m loop antennas and a CISPR radio-receiver.

Conducted RF emission is measured at the RF output of a coupling / decoupling network (CDN-M2 or CDN-M3, EN/IEC 61000-4-6 compliant) from 30 MHz to 300 MHz with a CISPR radio-receiver.

Method of measurement following pt. 9.1.4. of CISPR 15 / EN 55015:

If the lighting equipment incorporates a light-regulating control or is controlled by an external device, the radiated electromagnetic disturbance shall be determined in the following way:

- For light regulating controls which regulate the light output via a ballast or convertor, measurements shall be performed at maximum and minimum light output levels.

Those methods and the instrumentation used are in accordance with CISPR 15 / EN 55015 and CISPR 16 / EN 55016.

C.2. Harmonics according to IEC / EN 61000-3-2

Where needed, the harmonics of the mains supply input current are measured by means of a resistive shunt and a wave analyser.

Method of measurement following pt. C.5.3. of IEC 61000-3-2 / EN 61000-3-2:

If a luminaire has a built-in dimming device, the harmonic currents shall be measured at the maximum load of the lamps as specified by the manufacturer. The setting of the dimming device is varied in five equidistant steps between the minimum and the maximum power in order to obtain comprehensive results.

C.3. Voltage fluctuations according to IEC / EN 61000-3-3

Voltage fluctuations are assessed by direct measurement at the terminals of the equipment under test using a flicker-meter, which complies with the specifications given in IEC / EN 61000-4-15.

C.4. Immunity according to IEC 61547 / EN 61547

Tests are carried out on the accessible parts of the appliance or on the mains supply, during normal operation of the appliance.
Test methods and the instrumentation used are in accordance with the basic standards that are referred to in the tables of this standard.

Conditions during testing following pt. 8. of IEC 61547-1 / EN 61547-1:

An EUT including a light-regulating control should be tested at a light output level of 50 % ± 10 % from the maximum light output. If a light output level of 50 % is not available for the EUT including a light regulation function, the test shall be done at the level which is closest to 50 %. If two steps equally distant to 50 % are available, the lower level (<50 % shall be used for the test)

D. Results

D.1. Radio-interference measurements between 0,009 and 30 MHz

The table below gives the results of terminal voltages between each input conductor (L or N) and earth in dB with reference to 0 dB corresponding to 1 µV.
Unless otherwise specified, the test voltage is 230 V - 50 Hz.
It is checked that radio-interference does not exceed the limits in a frequency range between 0,15 and 30 MHz.

D.1.1. Complete scan at full light output:

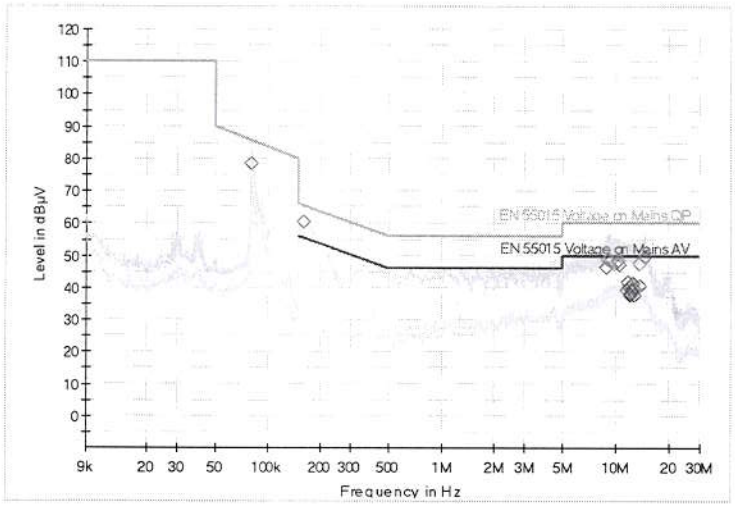
D.1.1.1. Measurements:

Results of the final analysis with quasi-peak and average detectors are given only at the most critical levels.

Quasi-Peak and Average Measurements

Frequency (MHz)	Quasi-Peak (dBµV)	Average (dBµV)	Limit (dBµV)	Exceed (Yes/No)	Meas. Time (s)	PE	Line
0.0799	78.54	---	85.73	No	1.00	GND	L1
0.1590	60.71	---	65.52	No	1.00	GND	N
8.8710	46.37	---	60.00	No	1.00	GND	N
8.9880	48.87	---	60.00	No	1.00	GND	N
9.3120	48.40	---	60.00	No	1.00	GND	N
9.8250	47.67	---	60.00	No	1.00	GND	N
10.2660	48.59	---	60.00	No	1.00	GND	N
10.5135	47.28	---	60.00	No	1.00	GND	N
11.4720	---	39.52	50.00	No	1.00	GND	L1
11.7420	---	42.14	50.00	No	1.00	GND	L1
11.9265	---	40.14	50.00	No	1.00	GND	L1
12.1110	---	38.24	50.00	No	1.00	GND	L1
12.2010	---	37.96	50.00	No	1.00	GND	N
12.3810	---	39.63	50.00	No	1.00	GND	N
12.4710	---	41.50	50.00	No	1.00	GND	L1
12.6555	---	38.00	50.00	No	1.00	GND	N
12.7455	---	39.96	50.00	No	1.00	GND	L1
13.6545	---	40.59	50.00	No	1.00	GND	L1
13.7355	47.59	---	60.00	No	1.00	GND	L1
14.5455	49.94	---	60.00	No	1.00	GND	L1

D.1.1.2. Graphical representation of the test results



Ambient temperature: 23°C

D.1.2. Complete scan at minimum light output.

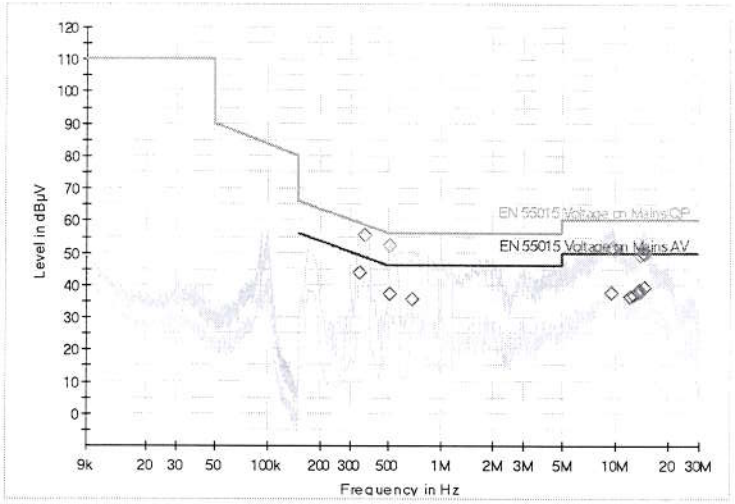
D.1.2.1. Measurements:

Results of the final analysis with quasi-peak and average detectors are given only at the most critical levels.

Quasi-Peak and Average Measurements

Frequency (MHz)	Quasi-Peak (dBµV)	Average (dBµV)	Limit (dBµV)	Exceed (Yes/No)	Meas. Time (s)	PE	Line
0.3390	---	44.00	49.23	No	1.00	GND	N
0.3615	55.55	---	58.69	No	1.00	GND	N
0.5055	52.37	---	56.00	No	1.00	GND	N
0.5100	---	37.67	46.00	No	1.00	GND	L1
0.6765	---	35.90	46.00	No	1.00	GND	N
9.5370	---	37.95	50.00	No	1.00	GND	L1
9.6180	51.85	---	60.00	No	1.00	GND	N
9.7800	51.04	---	60.00	No	1.00	GND	N
12.1650	---	36.46	50.00	No	1.00	GND	N
12.7095	---	37.08	50.00	No	1.00	GND	L1
13.3440	---	38.24	50.00	No	1.00	GND	L1
13.6140	---	38.54	50.00	No	1.00	GND	L1
13.7085	---	37.99	50.00	No	1.00	GND	L1
13.8165	49.58	---	60.00	No	1.00	GND	L1
14.4105	50.13	---	60.00	No	1.00	GND	L1
14.6130	---	39.55	50.00	No	1.00	GND	L1
14.6760	49.69	---	60.00	No	1.00	GND	L1
14.7660	50.12	---	60.00	No	1.00	GND	L1
14.9370	49.73	---	60.00	No	1.00	GND	L1

D.1.1.2. Graphical representation of the test results



Ambient temperature: 23°C

D.2. Radiated electromagnetic disturbance measurements from 9 kHz to 30 MHz

The table gives the radiated electromagnetic disturbance measurements of the appliance measured by 2 m loop antennas and a radio-receiver (with quasi-peak detector) according to CISPR 15 and CISPR 16.
It is checked that the radiated electromagnetic disturbance is well below the CISPR 15 / EN 55015 limits when a quasi-peak detector is used.
Unless otherwise specified the test voltage is 230 V - 50 Hz.

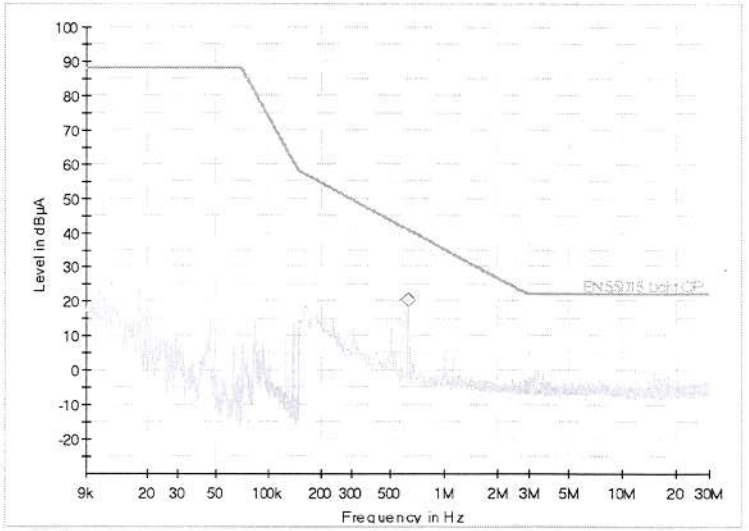
D.2.1. Measurements at maximum light output level

D.2.1.1. Measurements

Quasi-Peak Measurements

Frequency (MHz)	Quasi-Peak (dBµA)	Limit (dBµA)	Exceed (Yes/No)	Meas. Time (s)	Axis
0.6225	20.39	40.90	No	1.00	Y

D.2.1.2. Graphical representation of the test results



Ambient temperature: 23°C

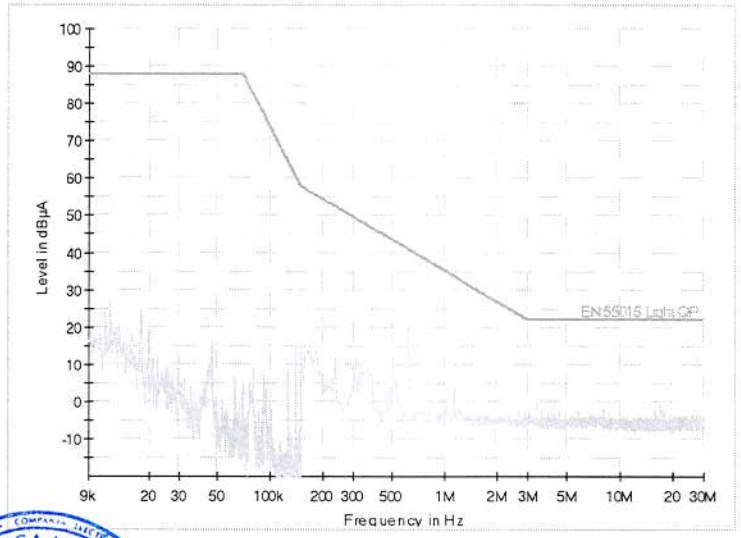
D.2.2. Measurements at minimum light output level

D.2.2.1. Measurements

Quasi-Peak Measurements

No final analysis with Quasi-Peak detector because the measured level is 30 dBµA below the Quasi-Peak limit

D.2.2.2. Graphical representation of the test results



Ambient Temperature: 23°C

D.3. Measurements of the Conducted RF emission

The table gives the conducted RF disturbance measurements of the appliance measured through a coupling / decoupling network (CDN-M2 or CDN-M3, EN/IEC 61000-4-6 compliant) from 30 MHz to 300 MHz with a CISPR radio-receiver (with quasi-peak detector) according to CISPR 15 and CISPR 16.
It is checked that the conducted RF disturbance is well below the EN 55015 limits when a quasi-peak detector is used.
Unless otherwise specified the test voltage is 230 V - 50 Hz.

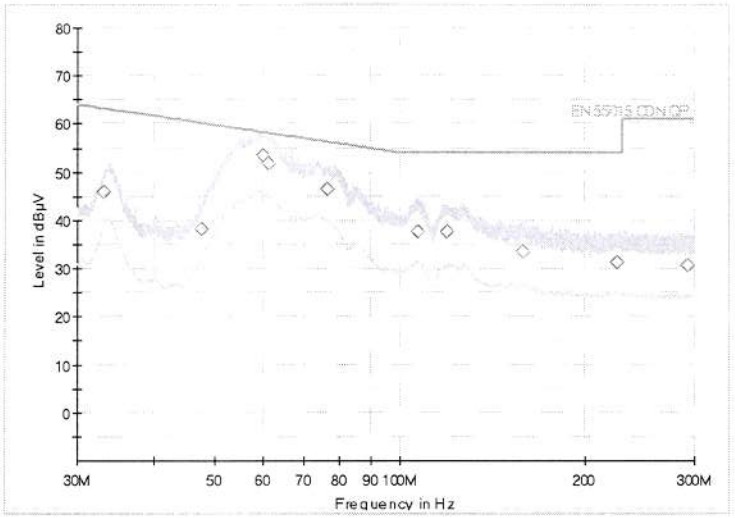
D.3.1. Measurements at maximum light output level

D.3.1.1. Measurements

Quasi-Peak Measurements

Frequency (MHz)	Quasi-Peak (dBµV)	Limit (dBµV)	Exceed (Yes/No)	Meas. Time (s)
33.1530	46.17	63.17	No	1.00
47.6115	38.35	60.16	No	1.00
59.9820	53.59	58.25	No	1.00
61.3635	51.97	58.06	No	1.00
76.4880	46.69	56.23	No	1.00
107.4885	37.70	54.00	No	1.00
119.4990	37.71	54.00	No	1.00
158.7255	33.48	54.00	No	1.00
225.1095	31.47	54.00	No	1.00
293.1360	30.78	61.00	No	1.00

D.3.1.2. Graphical representation of the test results



Preview Result 2-AVG
EN 55015 CDN QP
Preview Result 1-PK+
Final_Result QPK

Ambient temperature: 23°C

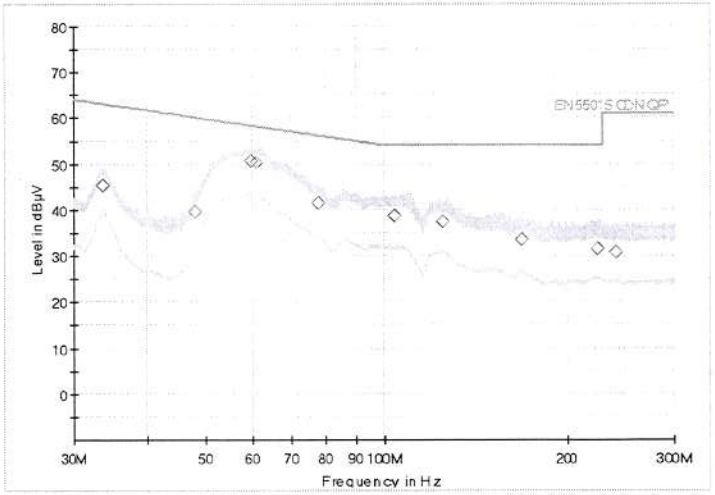
D.3.2. Measurements at minimum light output level

D.3.2.1. Measurements

Quasi-Peak Measurements

Frequency (MHz)	Quasi-Peak (dBµV)	Limit (dBµV)	Exceed (Yes/No)	Meas. Time (s)
33.5850	45.39	63.06	No	1.00
48.0960	39.69	60.08	No	1.00
59.7030	50.81	58.28	No	1.00
60.9630	50.53	58.11	No	1.00
77.3520	41.57	56.13	No	1.00
103.5195	38.89	54.00	No	1.00
124.1475	37.56	54.00	No	1.00
168.2295	33.49	54.00	No	1.00
225.4785	31.58	54.00	No	1.00
241.1700	30.94	61.00	No	1.00

D.3.2.2. Graphical representation of the test results



Preview Result 2-AVG
EN 55015 CDN QP
Preview Result 1-PK+
Final_Result QPK

Ambient temperature: 24°C

D.4. **Measurements of the harmonics of the input current in five equidistant steps between the minimum and the maximum power**

Harmonic order	Meas. 1 Min (A)	Meas. 2 (A)	Meas. 3 (A)	Meas. 4 (A)	Meas. 5 Max (A)	Class C a) Limits (A)
1	0.0296	0.0572	0.1000	0.1459	0.1975	-.----
2	(*)	(*)	(*)	(*)	(*)	0.0039
3	0.0058	0.0142	0.0079	(*)	0.0088	0.0592
4	(*)	(*)	(*)	(*)	(*)	-.----
5	(*)	(*)	(*)	(*)	0.0062	0.0197
6	(*)	(*)	(*)	(*)	(*)	-.----
7	(*)	(*)	0.0078	0.0057	(*)	0.0138
< 7	(*)	(*)	(*)	(*)	(*)	> 0.0099

(*) Harmonic currents less than 0,6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.
(IEC / EN 61000-3-2: § 6.2.3.4)

Ambient temperature: 24°C

Measurement uncertainties:

The measurement uncertainties can be obtained on request.

D.5. **Immunity according to IEC 61547 / EN 61547**

Unless otherwise specified the test voltage is 230 V - 50 Hz.
The normal behaviour of the appliance has been monitored by checking the luminous intensity and the current consumption.

As requested by the standard, the light output level has been set at 50 % ±10 %

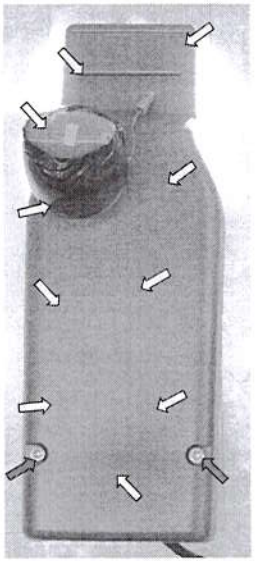
D.5.1. **Electrostatic discharge (IEC / EN 61000-4-2)**

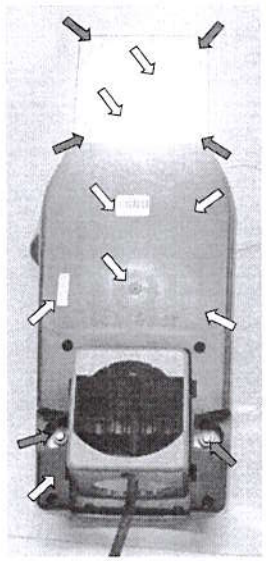
Twenty 4 kV contact discharges (ten positive and ten negative polarity) have been applied on the metal parts of the appliance and on the coupling planes.
Twenty 8 kV air discharges (ten positive and ten negative polarity) have been applied on the accessible insulated parts.

No noticeable degradation has been recorded.

Ambient temperature: 23°C
Relative humidity: 41 %

Yellow arrow: air discharges
Red arrow: contact discharges





D.5.2. Radiated, radio frequency electromagnetic field (EN 61000-4-3)

The EUT has been placed in the full anechoic room on a wooden table, 0,8 m high above the floor.
The cable of the power supply connected to the EUT is falling on the floor.
The front side (luminous side) of the EUT has been illuminated in vertical and in horizontal polarisation with an electromagnetic field.

Frequencies:	80 MHz to 1000 MHz
Electromagnetic field level:	3 V/m
Amplitude modulation:	80%AM 1kHz
Frequency step:	1%
Dwell time:	1 s

No noticeable degradation has been recorded.

D.5.3. Fast transients (IEC / EN 61000-4-4)

During four minutes (two minutes positive and two minutes negative polarity) fast transients 1 kV 5/50 ns, 5 kHz rep. freq., have been applied on the mains supply in common mode.

Ambient temperature:	23°C
Relative humidity:	42 %

No noticeable degradation has been recorded.

D.5.4. Surges (IEC / EN 61000-4-5)

Ten surge pulses 0,5 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and phase (L – N).

No noticeable degradation has been recorded.

Ten surge pulses 1 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and phase (L – N).

No noticeable degradation has been recorded.

Ten surge pulses 0,5 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (L – PE).

No noticeable degradation has been recorded.

Ten surge pulses 1 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (L – PE).

No noticeable degradation has been recorded.

Ten surge pulses 2 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (L – PE).

No noticeable degradation has been recorded.

Ten surge pulses 0,5 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (N – PE).

No noticeable degradation has been recorded.

Ten surge pulses 1 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (N – PE).

No noticeable degradation has been recorded.

Ten surge pulses 2 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (N – PE).

No noticeable degradation has been recorded.

At the request of the customer:

Ten surge pulses 2 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and phase (L – N).

No noticeable degradation has been recorded.

Ten surge pulses 4 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and phase (L – N).

No noticeable degradation has been recorded.

Ten surge pulses 8 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and phase (L – N).

No noticeable degradation has been recorded.

Ten surge pulses 10 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and phase (L – N).

No noticeable degradation has been recorded.

Ten surge pulses 4 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (L – PE).

No noticeable degradation has been recorded.

Ten surge pulses 8 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (L – PE).

No noticeable degradation has been recorded.

Ten surge pulses 10 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (L – PE).

No noticeable degradation has been recorded.

Ten surge pulses 4 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (N – PE).

No noticeable degradation has been recorded.

Ten surge pulses 8 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (N – PE).

No noticeable degradation has been recorded.

Ten surge pulses 10 kV 1,2/50 µs (five positive pulses at 90° and five negative pulses at 270°) have been applied between phase and protective earth (N – PE).

No noticeable degradation has been recorded.

Ambient temperature: 22°C
Relative humidity: 41 %

D.5.5. Injected currents (IEC / EN 61000-4-6)

R.F. current from 0,15 MHz to 80 MHz, 80% AM 1 kHz modulation, 3 V_{RMS} amplitude, has been applied, through a coupling/decoupling network CDN-M3, on the mains supply in common mode.

Frequency step: 1%
Dwell time: 1s

No noticeable degradation has been recorded.

D.5.6. Voltage dips (IEC / EN 61000-4-11)

The test voltage is 230V - 50Hz.

A voltage dip of 30 % U_T (161 V) during 200 ms has been applied on the mains supply.

During the interruption, a blinking of the light has been recorded.

D.5.7. Interruptions (IEC / EN 61000-4-11)

Interruptions of supply during 10 ms have been applied on the mains supply.

No noticeable degradation has been recorded.

E. Conclusions

For the tested appliance (see section A – Specifications of the EUT) the following results are obtained :

E.1. Emission measurements:

Measurement uncertainties

The measurement uncertainties can be obtained on request.

CISPR 15 / EN 55015 - see test results in parts D.1., D.2. & D.3. Complies

- Terminal disturbance voltages Complies
- Radiated emissions Complies
- Conducted RF emissions Complies

IEC / EN 61000-3-2 Complies

The appliance complies with EN 61000-3-2 on the basis of the measurements in D.4.

IEC / EN 61000-3-3 Complies

The appliance complies with the requirements of IEC / EN 61000-3-3 as it does not produce voltage fluctuations by its principle of operation.

E.2. Immunity tests results:

IEC 61547 / EN 61547 - see test results in parts D.5. Complies

Performance criteria following IEC 61547 / EN 61547

Performance criterion A:
During the test, no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.

Performance criterion B:
During the test, the luminous intensity may change to any value. After the test, the luminous intensity shall restore to its initial value within 1 min. Regulating controls need not function during the test, but after the test, the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.

Performance criterion C:
During and after the test, any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal, if necessary by temporary interruption of the power supply and/or operating the regulating control.

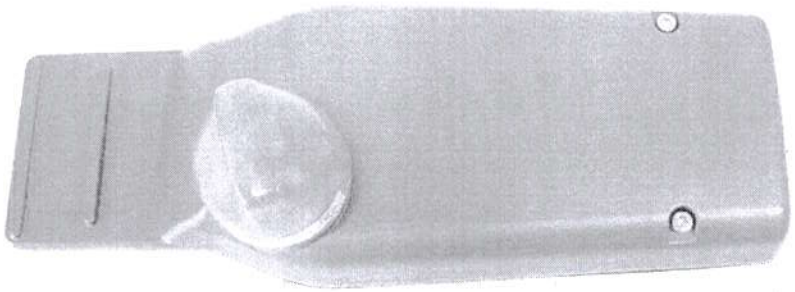
Additional requirement for lighting equipment incorporating a starting device:
After the test, the lighting equipment is switched off. After half an hour, it is switched on again. The lighting equipment shall start and operate as intended.

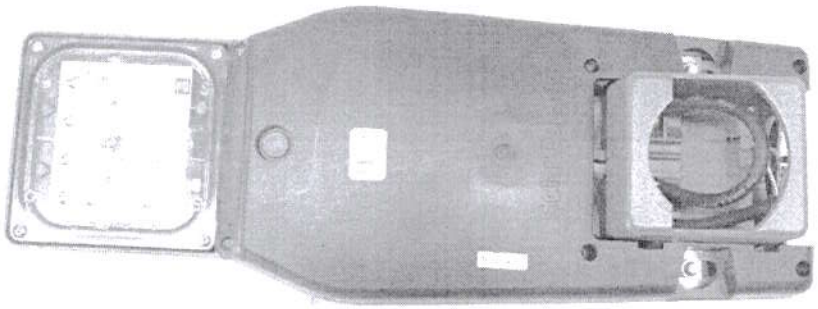
Tests	Standards	Requested performance criteria	Obtained criteria
Electrostatic discharges	**IEC / EN 61000-4-2**	A	A
Radiated, RF electromagnetic field	**IEC / EN 61000-4-3**	A	A
Fast transients	**IEC / EN 61000-4-4**	B	A
Surges	**IEC / EN 61000-4-5**	C	A*
Injected currents	**IEC / EN 61000-4-6**	A	A
Voltage dips	**IEC / EN 61000-4-11**	C	A
Voltage Interruptions	**IEC / EN 61000-4-11**	B	B

*: for the surges with the special requirements of the customers, an A criteria has been obtained.

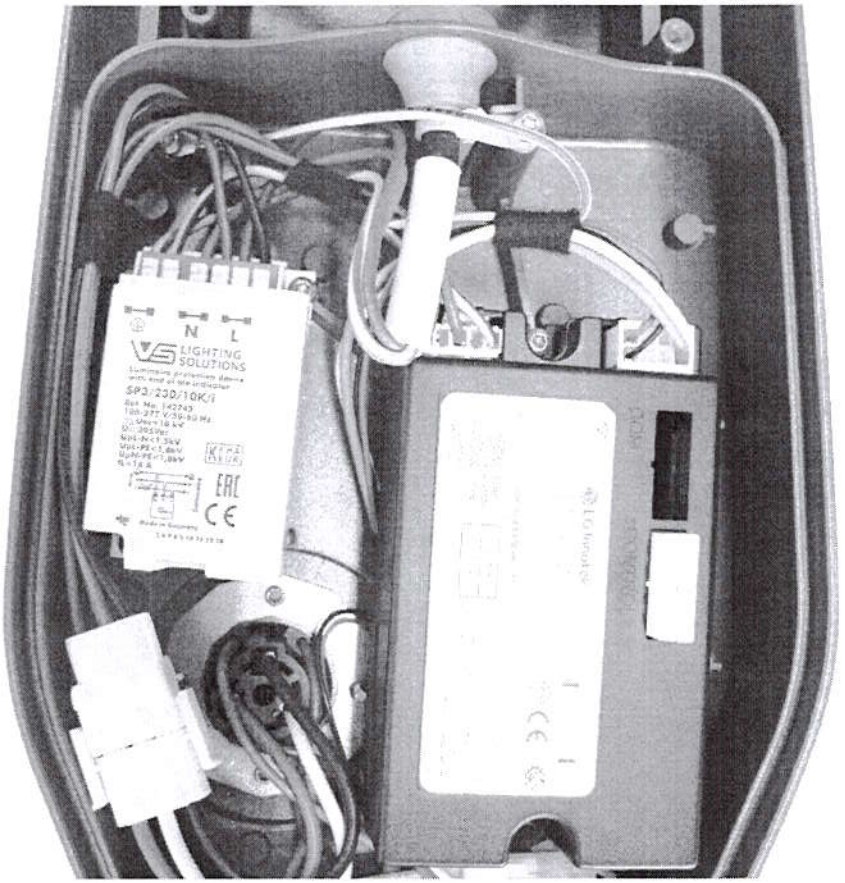
APPENDIX 1

Pictures of the EUT





Open view of the EUT



Laboratory
Test report

R-Tech
Rue de Mons 3 – B-4000 Liège – Belgium
Tel.: +32 4 224 71 40 – Fax: +32 4 224 25 90
Member of Schréder Group

FORM L-54 Edition 01 – Revision 00 - Date: 14/06/2018

Endurance test

General information

Subject : AXIA 3.1 - 16 Oslon Square Giant - LG 40W - 870mA - Polyamide 66 washer - Extra 0,1 mm

Asked by : CHEUVART Geoffrey

Created on : 20/03/2019

Validated on : 20/03/2019

Test number : D190244

Reference norm : IEC/EN 60598-1

Sample(s) : E190139

Folder : P-F18027

Test conditions

Luminaire : AXIA 3.1

Number of LED : 16

LED : Osram OSLON SQUARE GIANT

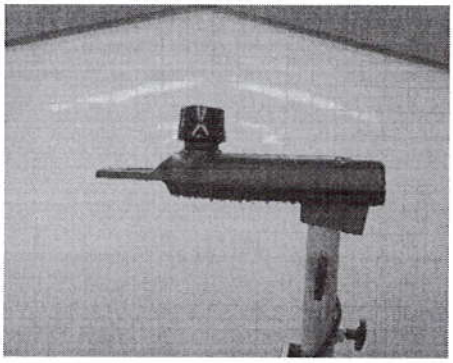
Driver current (mA) : 870

Protector material : PC

Test description :

Supply voltage: 1,10 x Un = 253 V Ac 50 Hz
Room Temperature: Ta + 10 °C = 45 °C
Test duration: 10 cycles 21 h ON + 3 h OFF
IP check after endurance and visual inspection

Operator : Philippe Léonard



IMG_0878.1

Conclusion

Success

Conclusion :

No sign of dangerous behavior. IP check after endurance passed.

Validated by :
GHYSENS Gilles

Duplicate to : CHEUVART Geoffrey
LAB : 20/03/2019

D190244

REPUBLICA MOLDOVA, CHIŞINĂU, SOCIETATEA PE ACTIUNI
1003600092733
«COMPANIA ELECTRICA»
S.A.

Test details

Test(s)

Name	Description	Result
Test @ 45°C	IP check after endurance and visual inspection	Success

Test @ 45°C

Result(s)

Additional info: PCB thickness: 1.65 and lens cavity number 1 (rev G')

✓ Ok, No water ingress in the optical part and in the auxiliary part

Laboratory
Test report

R-Tech
Rue de Mons 3 – B-4000 Liège – Belgium
Tel.: +32 4 224 71 40 – Fax: +32 4 224 25 90
Member of Schréder Group

FORM L-54 Edition 01 – Revision 00 - Date: 14/06/2018

Mechanical impact resistance test

General information

Subject : AXIA 3.1 - 16 Oslon Square Giant - 870mA - Spring washer

Asked by : THIJS Marcel

Created on : 20/05/2019

Validated on : 22/05/2019

Test number : D190409

Reference norm : IEC/EN 60598-1 & 62696 Standards

Sample(s) : E190316

Folder : P-F18027

Test conditions

Luminaire : AXIA 3.1

Quantity of sample under test : 5

Protector Material : PC

Protector Shape : Flat

Protector supplier : External - Gaggione

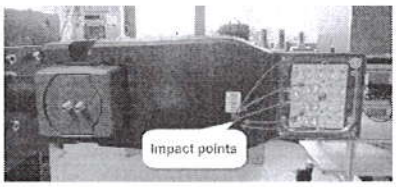
Remark :

The fixation is equipped with a spring washer.

Torque applied between the luminaire and its fixation : 17Nm

Additional Polyamide 66 WASHER on the lens.

Operator : WINA BOMBIL Patrick



IMG_3450b

Conclusion

Success

Conclusion :

IK10 granted.

Validated by :

GHYSENS Gilles

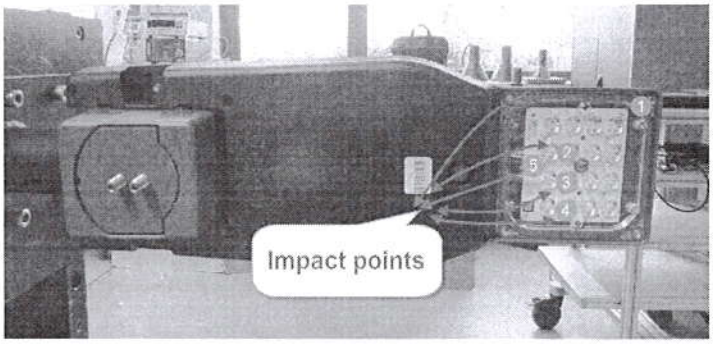
Duplicate to : THIJS Marcel, GALLOPPA Sandro, DETAILLE Ludovic, MULS Sophie, BOS Peter

LAB : 22/05/2019

Progressive IK

Test(s)

Name	Description	Result
IK 08	Impact energy : 5 joules Hammer weight : 1.7 Kg Height of fall : 30 Cm	Success
IK 09	Impact energy: 10 joules Hammer weight: 5 kg Height of fall: 20 cm	Success
IK 10	Impact Energy: 20 joules Hammer Weight: 5 Kg Height of fall: 40 cm	Success



IK 08

Result(s)

Tested
No tested

IK 08	Impact	1			2			3			4			5		
Sample	Shot	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
1		✓			✓			✓			✓			✓	✓	✓
2		✓			✓			✓			✓			✓	✓	✓
3		✓			✓			✓			✓			✓	✓	✓
4		✓			✓			✓			✓			✓	✓	✓
5		✓			✓			✓			✓			✓	✓	✓

IK 09

Result(s)

Tested
No tested

IK 09	Impact	1			2			3			4			5		
Sample	Shot	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
1		✓			✓			✓			✓			✓	✓	✓
2		✓			✓			✓			✓			✓	✓	✓
3		✓			✓			✓			✓			✓	✓	✓
4		✓			✓			✓			✓			✓	✓	✓
5		✓			✓			✓			✓			✓	✓	✓

IK 10

Result(s)

Tested
No tested

IK 10	Impact	1			2			3			4			5		
Sample	Shot	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
1		✓			✓			✓			✓			✓	✓	✓
2		✓			✓			✓			✓			✓	✓	✓
3		✓			✓			✓			✓			✓	✓	✓
4		✓			✓			✓			✓			✓	✓	✓
5		✓			✓			✓			✓			✓	✓	✓

Laboratory
Test report

R-Tech
Rue de Mons 3 – B-4000 Liège – Belgium
Tel.: +32 4 224 71 40 – Fax: +32 4 224 25 90
Member of Schréder Group

FORM L-54 Edition 01 – Revision 00 - Date: 14/06/2018

Tightness test

General information

Subject : AXIA 3.1 - 16 LEDs

Asked by : THIJS Marcel

Created on : 19/10/2018

Validated on : 24/10/2018

Test number : D180729

Reference norm : IEC/EN 60598-1 Standard

Sample(s) : E180534

Folder : P-F18027

Test conditions

Luminaire : AXIA 3.1

Number of LED : 16

LED : Osram OSLON SQUARE GIANT

Driver current (mA) : 870

Protector Material : PC

Additional info :

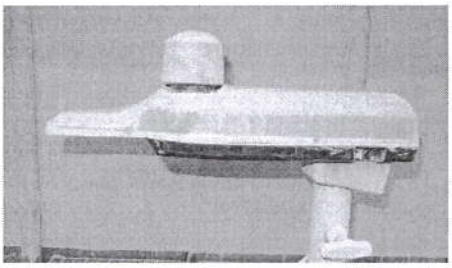
Gasket part number: 00-21-295

Material : Silicon elastomer

Color : Black

Hardness : 40 shore

Operator : Philippe Léonard



Conclusion

Success

Conclusion :

IP66 granted

Validated by :

GHYSENS Gilles

Duplicate to : THIJS Marcel, VERBEECK Philippe, JORIS Philippe, GALLOPPA Sandro, DETAILLE Ludovic, MULS Sophie, BOS Peter

LAB : 29/10/2018

D180729

REPUBLICA MOLDOVA, CHISINAU, SOCIETATEA DE ACTIUNI «COMPANIA ELECTRICA» S.A. 1003600092733

IP

Test(s)

Name	Description	Result
IP6x	- Luminaire switched ON until stable T° - Talcum in suspension (blowing ON) - After 1', luminaire OFF - Talcum for 3 hours	Success
IPx6	- Luminaire switched ON until stable T° - Luminaire switched OFF and immediately sprayed with water jet - Hose diam. 12,5 mm - Water pressure: 1 kg/cm2 - Spraying distance: 3 m - Duration of test: 3 minutes	Success

IP6x

Result(s)

Ok, nothing to indicate

IPx6

Result(s)

Ok, nothing to indicate

Laboratory
Test report

R-Tech
Rue de Mons 3 – B-4000 Liège – Belgium
Tel.: +32 4 224 71 40 – Fax: +32 4 224 25 90
Member of Schréder Group

FORM L-54 Edition 01 – Revision 00 - Date: 14/06/2018

Thermal Test LED

General information

Subject : AXIA 3.1 - 16 LEDs LG 40W
Asked by : THIJS Marcel
Created on : 15/11/2018
Validated on : 15/11/2018
Test number : D180817
Reference norm : IEC/EN 60598-1 Standard
Sample(s) : E180537
Folder : P-F18027

Test conditions

Luminaire : AXIA 3.1
Number of LED : 16
LED : Osram OSLON SQUARE GIANT
Driver : LG 40W 300-1000mA Prog Modular EU / 00-36-648
Driver current (mA) : 870
SPD : Vossloh Lighting Solutions SPC3 230/10 K

Measurements devices :
Fluke Norma 4000 - HF Powermeter - (E074) : Electrical measurements
Keithley 2701 (E098) – Ethernet Multimeter/Data Acquisition System : Thermal & VF led measurements

Power Supply :
APT 300XAC AC power supply (E103)
Supply voltages: 230 V 50 Hz

Junction Temperature measurement method : Junction temperature measurement by base temperature measurement and electrical measurement.T°j =T°b + Rjb x Pled

Operator : MESPOUILLE Loic

IMG_0085

Conclusion

ΔTs < 80°C no risk of solder crack

Ta: 45°C limited by driver; according IEC 60598-2-3 and IEC 60598-2-5 (outdoor use only)
Ta: 35°C limited by driver; indoor use and UL standard
Tq: 25°C limited by driver; according IEC 62722-2-1

Tq given for 100 khrs of lifetime

Validated by :

GHYSENS Gilles

Duplicate to : THIJS Marcel, VERBEECK Philippe, JORIS Philippe, GALLOPPA Sandro, DETAILLE Ludovic, MULS Sophie, BOS Peter

LAB : 15/11/2018

CR180817

Test details

Test(s)

Name	Description	Result
Test @ 870mA		Informative

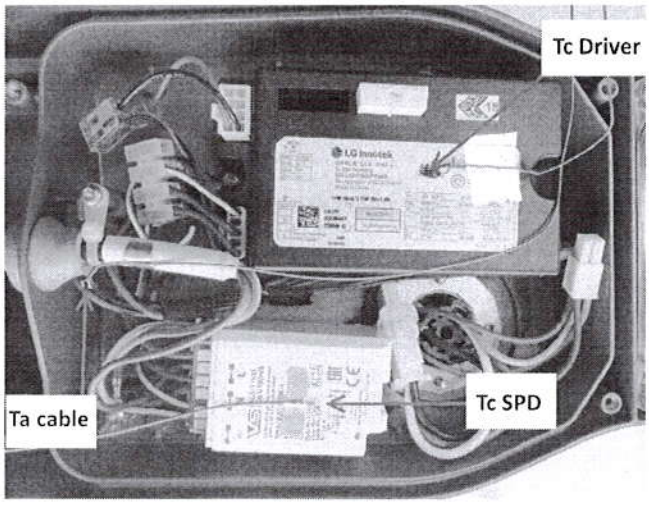
Test @ 870mA

Result(s)

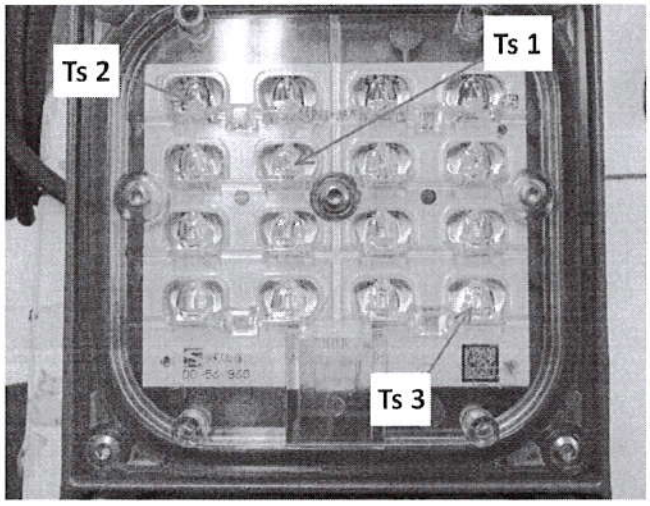
	Ts 1	Ts 2	Ts 3	Tc driver	Tc SPD	Ta Body
Limit T°				**80 °C**	**80 °C**	**90 °C**
Junction T°	77.9 °C	76.5 °C	74.2 °C			
Thermocouple T°	70.3 °C	69.0 °C	66.6 °C	65.9 °C	35.7 °C	33.3 °C
Room	23.6 °C	23.6 °C	23.6 °C	23.6 °C	23.6 °C	23.6 °C
E led	2.84V	2.84V	2.84V			
I led	0.867A	0.867A	0.867A			
P led	2.47W	2.47W	2.47W			
Rth junction-base	4.1 °C	4.1 °C	4.1 °C			
Heating				42.3 K	12.1 K	9.7 K
Δ Ts	46.8 K	45.4 K	43.1 K			

Primary EM		Secondary EM	
U	230.0V	U	45.5V
I	0.197A	I	0.867A
P	44.8 W	P	39.5 W
PF	0.989		
Efficiency	88%		

Thermal sensors disposition



IMG_pos_main



IMG_pos_LEDs

Laboratory
Test report

R-Tech
R-Tech
Rue de Mons 3 – B-4000 Liège – Belgium
Tel.: +32 4 224 73 40 – Fax: +32 4 224 25 90
Member of Schréder Group

FORM L-54 Edition 01 – Revision 00 - Date: 14/06/2018

Vibration test following IEC Standard

General information

Subject : AXIA 3.1 Side-Entry configuration for pole 60 mm

Asked by : JORIS Philippe

Created on : 12/11/2018

Test number : D180814

Reference norm : Modified IEC 68-2-6 Standard

Sample(s) : E180541

Folder : P-F18027

Test conditions

Luminaire : AXIA 3.1

Operator : External Lab

Fixation type : Side-entry

Pole diameter (mm) : 60

Screw type : M10

Tightening torque (Nm) : pole : 17

Test date : 30/10/2018

Testing facility : External - V2i

External test report reference :
Report_R-TECH_AXIA-3.1_IEC_ID2079_TSH_2018-10-30_v1

Conclusion

Success

AXIA 3.1 complies with Modified IEC 68-2-6 Standard.
No light flickering is observed at the end of the test.

Validated by :
LERHO Xavier

Duplicate to : THIJS Marcel, VERBEECK Philippe, JORIS Philippe, GALLOPPA Sandro, DETAILLE Ludovic, MULS Sophie, BOS Peter

LAB : 12/11/2018

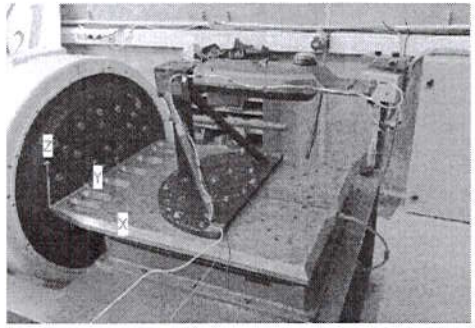
Test details

Test(s)

Name	Description	Result
Axis Z	Vibrations modified IEC 68-2-6	Success
Axis Y	Vibrations modified IEC 68-2-6	Success
Axis X	Vibrations modified IEC 68-2-6	Success

Axis Z

Annex(es)



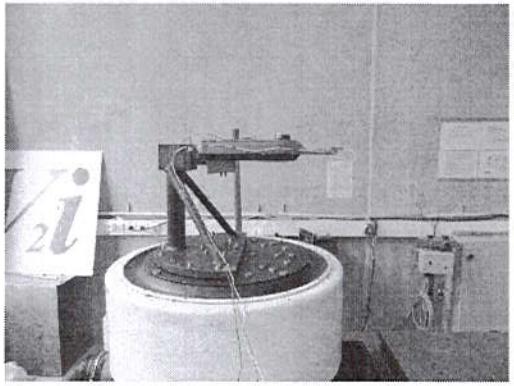
Axis 3

Report_R-TECH_AXIA-3.1_IEC_ID2079_TSH_2018-10-30_v1
Number of pages : 16

VIBRATION TEST REPORT

ITEM : AXIA 3.1

- Sample E180541
- Side-entry ∅ 60 mm configuration



TYPE OF TEST : MODIFIED IEC 68-2-6 STANDARD

CUSTOMER :

R-TECH
Rue de Mons, 3
B-4000 LIÈGE (BELGIUM)

OCTOBER 2018

AUTHOR :	L. VERHEES 08/11/2018	
CHECKED BY :	F. MARIN 09/11/2018	

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4031 Angleur – Belgique
Tél. +32-4-2871070 – Fax +32-4-2871071
Website : www.v2i.be

Table of contents

1 INTRODUCTION

1.1 Subject

The object of the report is to present the results of the vibration tests performed on the lighting device named:

AXIA 3.1	- Sample E180541 - Side-entry ∅ 60 mm configuration

following the **modified IEC 68-2-6 standard** (Table 1).

	IEC 68-2-6 standard	Modified IEC 68-2-6 standard
Test Item	light	light
Direction	3 directions	3 directions
Search for frequencies and quality factor Q	Excitation : sine sweep Frequency band : 5 - 25 Hz Sweep speed : 1 oct/min. Acceleration : 1g	Excitation : sine sweep Frequency band : 5 – **55** Hz Sweep speed : 1 oct/min. **Acceleration : 0.5g**
Test	Q < 2 (no natural frequency)	Q < 2 (no natural frequency)
	Excitation : sine sweep Frequency band : 5 - 25 Hz Sweep speed : 1 oct/min. Duration : 1h	Excitation : **RANDOM*** Frequency band : 5 - 55 Hz Acceleration : 0.84 g_{RMS} Duration : 1h
	Q < 10	**Q > 2**
	Excitation : sine Frequency : f_0 (Q_{max}) Acceleration : 0.5g Duration : 1h	Excitation : sine Frequency : f_0 (Q_{max}) Acceleration : 0.5g Duration : **30 minutes**
	Q > 10	
	No test	

Table 1 - IEC 68-2-6 standard and modified specification

*The **RANDOM equivalent test** consists in an accelerated aging process of one hour which presents, on a reference one-degree-of-freedom system, an equivalent fatigue damage spectrum than 20 years of mean wind and 90 hours of storms.

2 GENERAL INFORMATION

Offer reference	-----	**DB ID**	2079
Order form reference	-----		

Test date	30/10/2018

Customer project manager		X. LERHO
V2i engineer in charge		F. MARIN
Test Staff	**V2i**	L. VERHEES
	R-Tech	-----
	Schréder	-----

3 VIBRATION TESTING FACILITIES

Electrodynamic Shaker	
Shaker	G&W V2664 26kN – 2 in. stroke
Amplifier	DSA4-20K

Control and Acquisition	
Front end :	LMS Instruments SCADAS III mainframe System SC220V Serial number: 62171631 Calibration chart : Appendix 1
Computer :	V2i-Shaker-6

Software
LMS Test.Lab 16A, for control, conditioning and acquisition.

Accelerometers						
manufacturer	*model*	*name*	*direction*	*function*	*serial number*	*calibration due date*
PCB	353B16	CTRL	X, Y or Z	Control	133364	16/03/2019
PCB	356A02	CG	X,Y,Z	Measure	114445	19/03/2019
PCB	356A02	TIP	X,Y,Z	Measure	83268	20/03/2019
Calibration chart: Appendix 2						

4 NOMENCLATURE

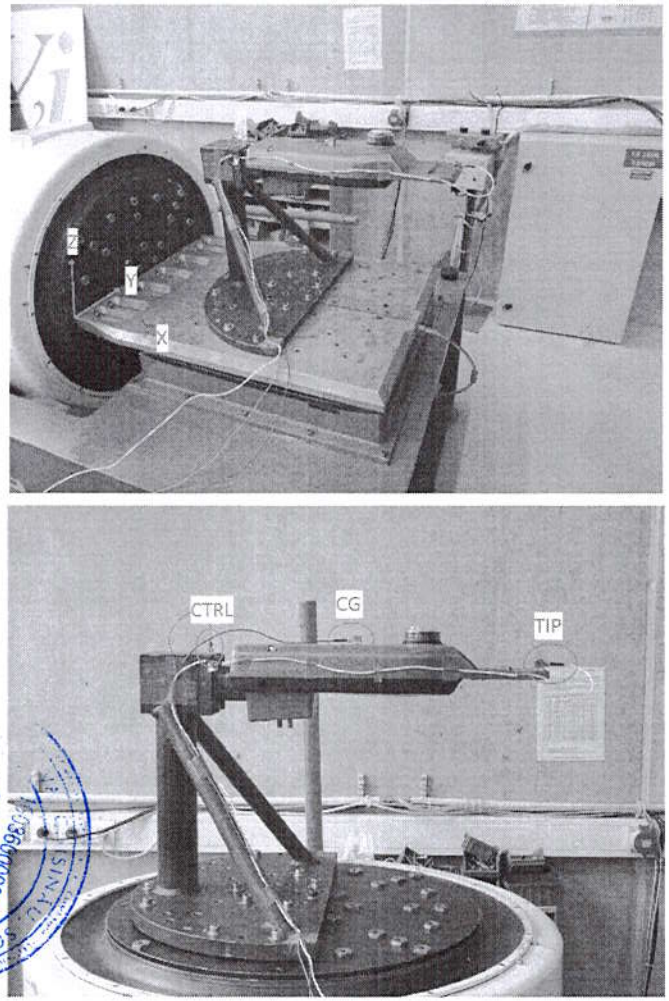


Figure 1 - Overview of the excitation axes and position of the accelerometers
(OX : Longitudinal axis ; OY : Transversal axis, OZ : Vertical axis)

5 HISTORY AND COMMENTS ON THE PERFORMED VIBRATION TESTS

Initial remarks	- The tightening torque between the steel pole shaft and the fixing part is set to **17 Nm**. - The tightening torque between the fixing part and the body is set to **15 Nm**.

OZ				
Sine sweep	**Frequency** 67.8 Hz	**Amplification** 38.6	**FRF** TIP-Z/CTRL+Z	**Dwell criterion** Amplitude
Sine dwell	**Time**	**History**		
	30'	**END of test**		
Sine sweep	**Frequency** 67.8 Hz	**Amplification** 43.3	Successfully completed	

OY				
Sine sweep	**Frequency** 95 Hz	**Amplification** 31.3	**FRF** TIP-Y/CTRL+Y	**Dwell criterion** Amplitude
Random	**Time**	**History**		
	60'	**END of test**		
Sine sweep	**Frequency** 95.2 Hz	**Amplification** 36	Successfully completed	

OX				
Sine sweep	**Frequency** 70.3 Hz	**Amplification** 9.5	**FRF** TIP-Z/CTRL+X	**Dwell criterion** Amplitude
Sine dwell	**Time**	**History**		
	30'	**END of test**		
Sine sweep	**Frequency** 70.1 Hz	**Amplification** 9.6	Successfully completed	

Final remark	- No untightening of the grub screws between the pole and the fixing part nor of the screws between the fixing part and the body.

6 FIGURES

6.1 Excitation along the OZ axis

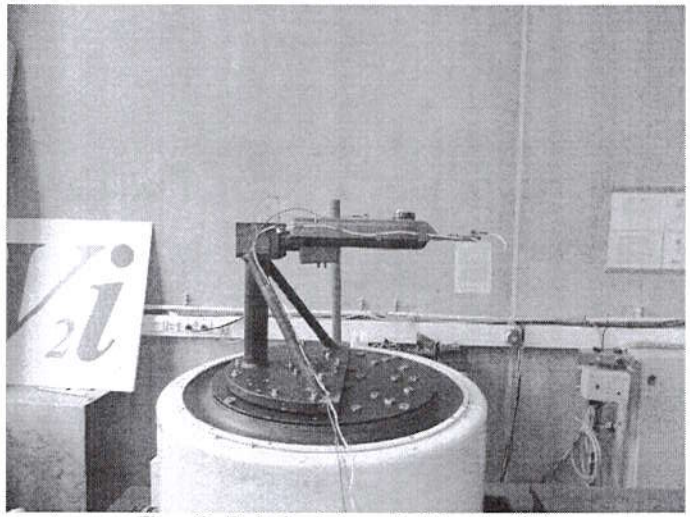


Figure 2 - Excitation in the vertical direction (OZ)

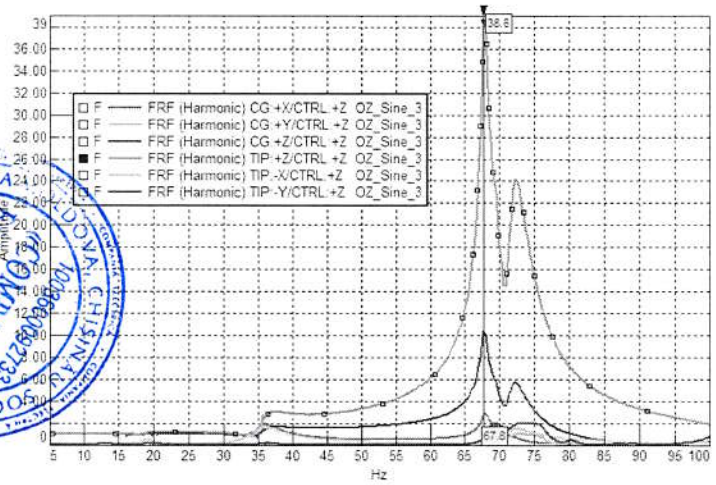


Figure 3 - FRF of the luminaire before the endurance test (OZ)

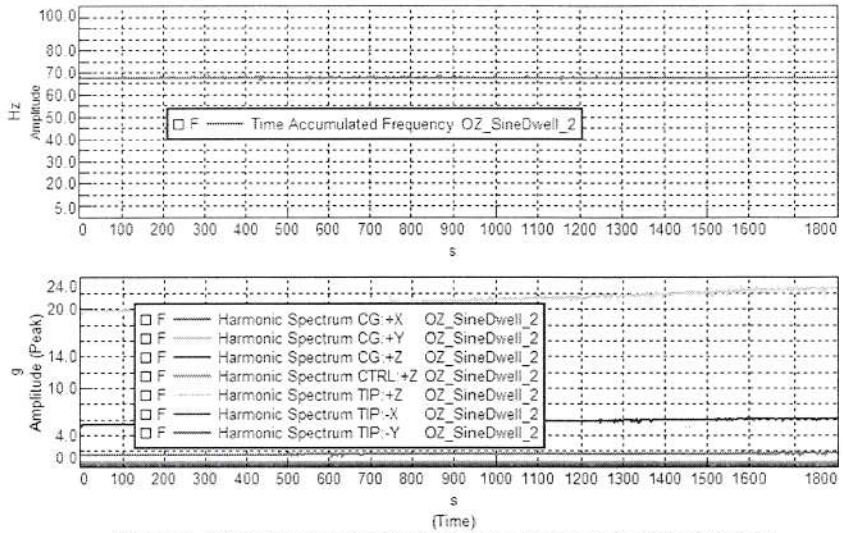


Figure 4 – Natural frequency and acceleration evolution during OZ endurance

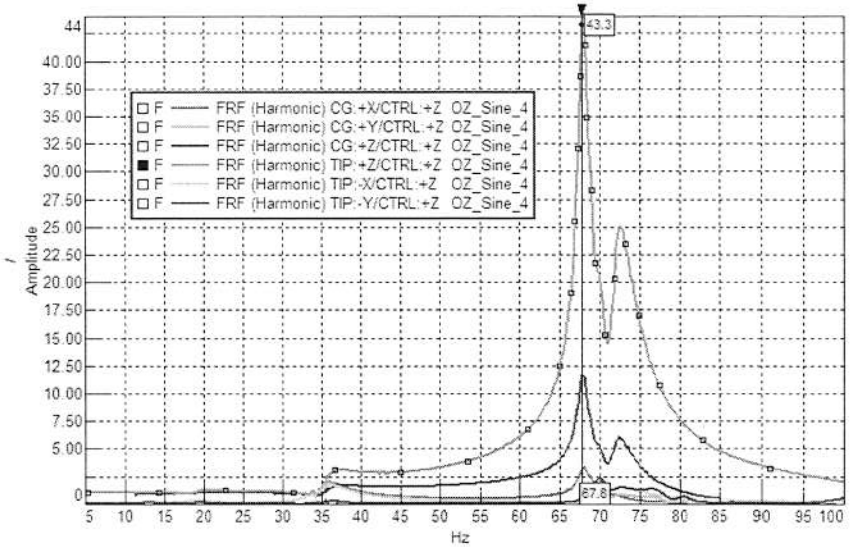


Figure 5 - FRF of the luminaire after the endurance test (OZ)

6.2 *Excitation along the OY axis*

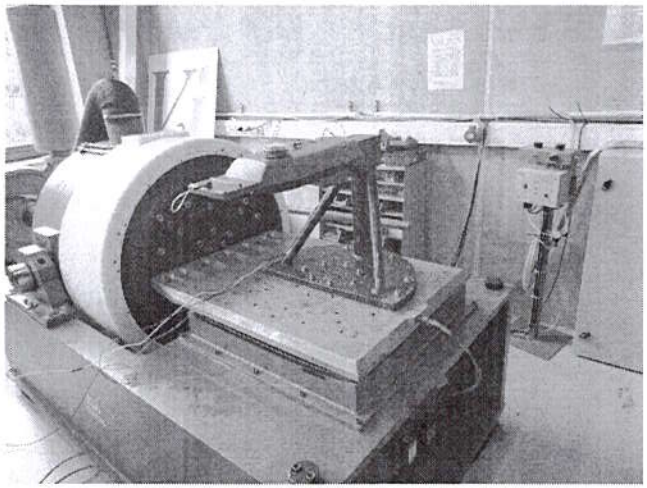


Figure 6 - Excitation in the transversal direction (OY)

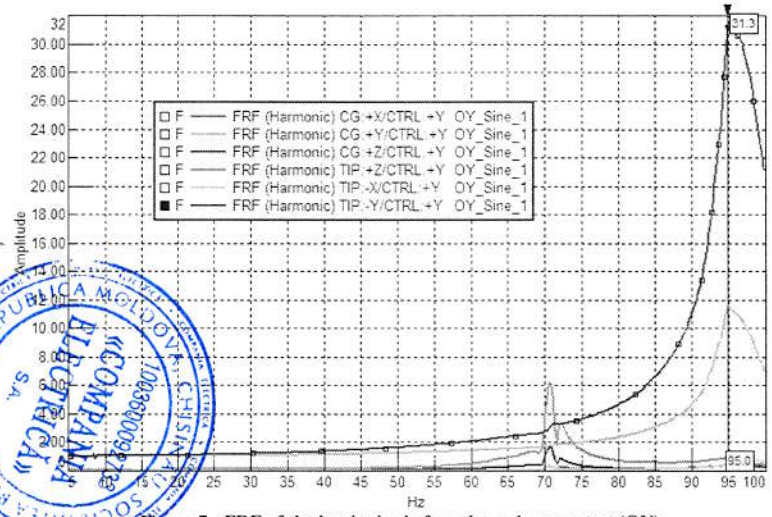


Figure 7 - FRF of the luminaire before the endurance test (OY)

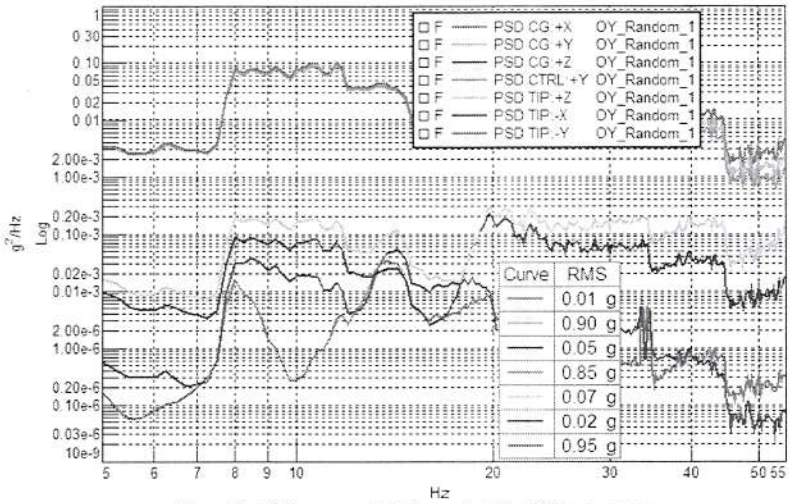


Figure 8 - PSD measured at the end of the OY endurance

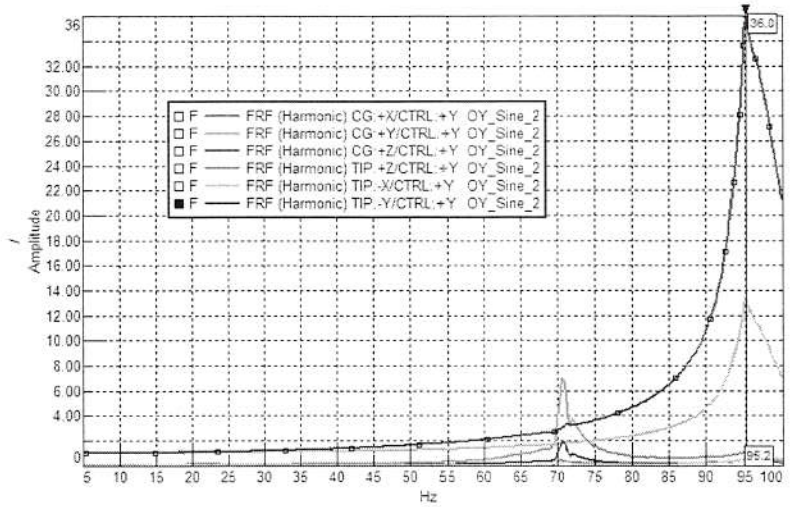


Figure 9 - FRF of the luminaire after the endurance test (OY)

6.3 *Excitation in the OX axis*

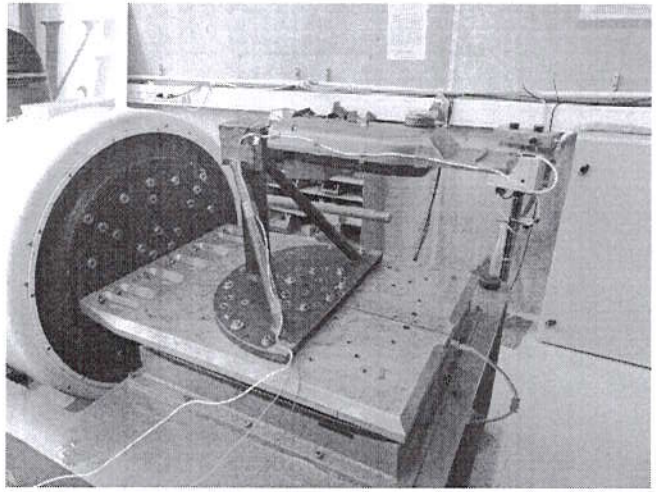


Figure 10 - Excitation in the longitudinal direction (OX)

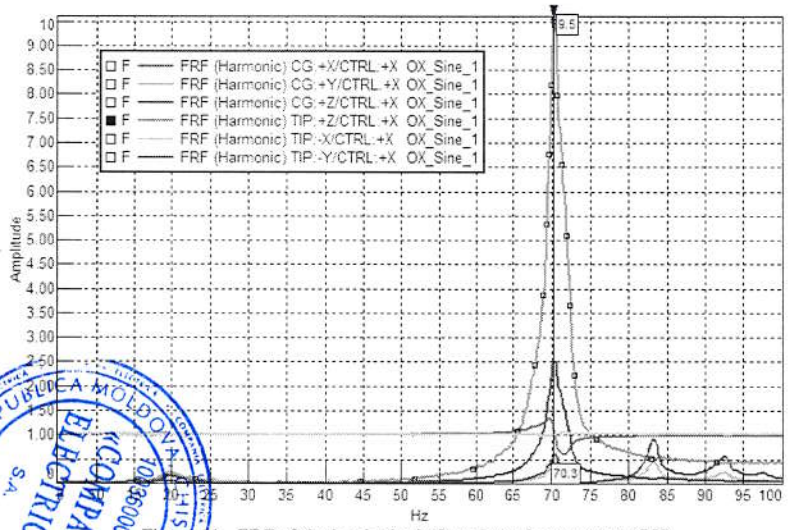


Figure 11 - FRF of the luminaire before the endurance test (OX)

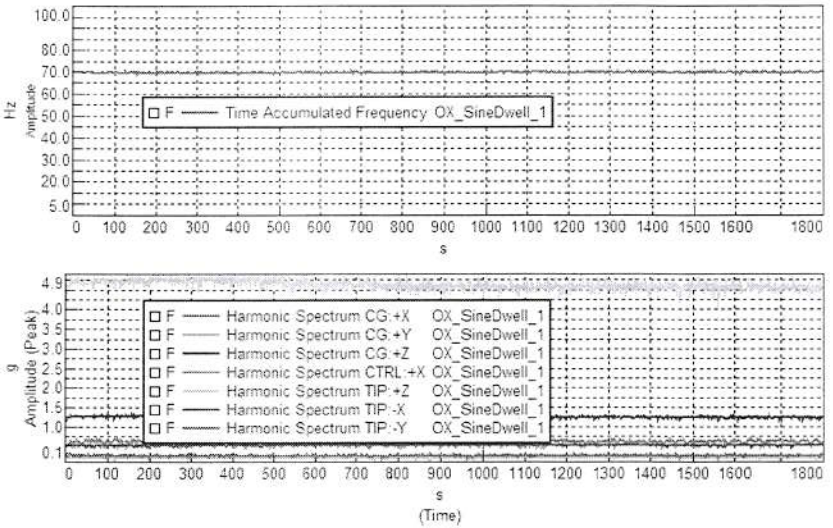


Figure 12 - Natural frequency and acceleration evolution during OX endurance

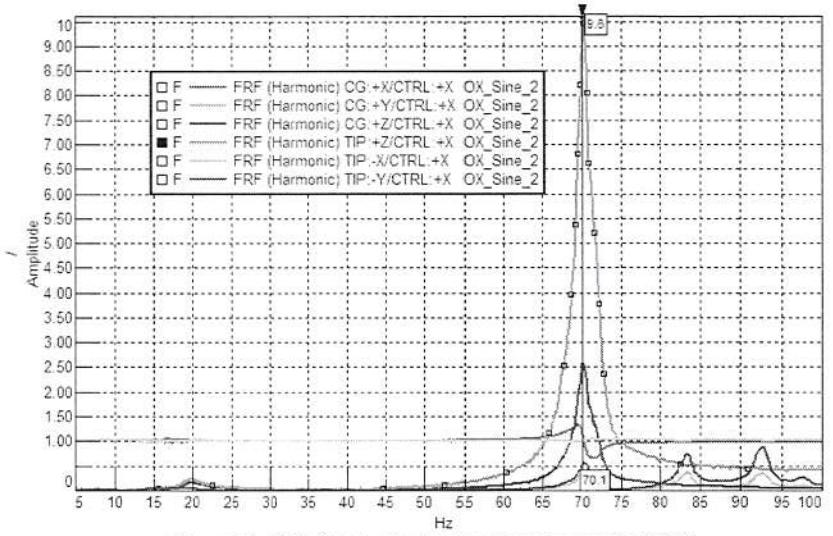


Figure 13 - FRF of the luminaire after the endurance test (OX)

7 CONCLUSIONS

The conclusions of the vibration tests performed on the luminaire

AXIA 3.1	- Sample E180541 - Side-entry ∅ 60 mm configuration

can be summarized as follows:

Fixing Part Tightening Evaluation					17 Nm
Performed	Yes	X	No		
Satisfied	Yes	X	No		
Remark					

Vibration Withstand Evaluation*					Modified IEC 68-2-6
Performed	Yes	X	No		
Satisfied	Yes	X	No		
Remarks	- No untightening is observed at the end of the test.				

Evaluation is performed according to the GDE-GUI-007 document

8 APPENDICES

8.1 Appendix 1

SIEMENS

Certificate number: **2018-62171631**

Calibration report

- 'As Left data' -

Product type: LMS SCADAS

Calibration Suite: **Calibration Software Production & Services**
Calibration Suite Version: **2.13.0024**

Customer:
Company name : V2I
Division / department : V2I
Location (city / country) : Liege / Belgium
Contact person : Jonathan Rochet

System:
System type(s) : SCL220V
Serial number(s) : 62171631

Calibration conditions:
TAC reference number : 8369383
Location (Factory, Office or On-site) : on-site
Date : May 3rd, 2018
Ambient temperature : 18.7 °C

Calibration performed by:
Name : Mr. F.C. Jeremiasse
Calibration label : YES

(Signature)

Summary:
- Calibration results within specification.

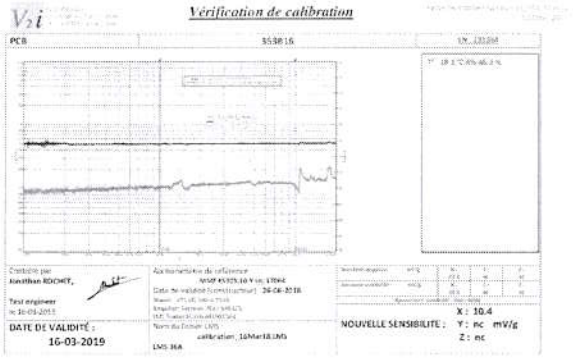
Siemens Industry Software
Wodanenk 53
4824 AT Breda
The Netherlands
Phone: +31 76 573 6363

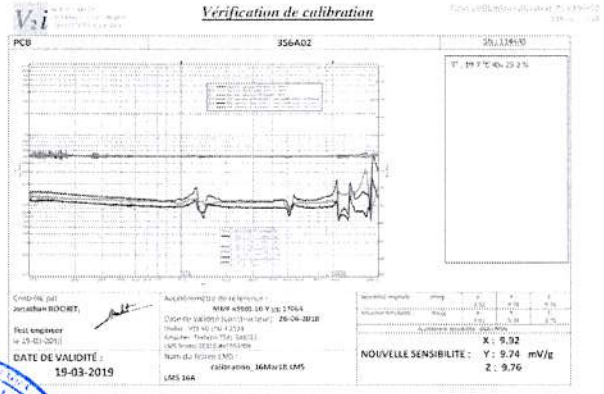
Siemens Industry Software
222-0033 Kanagawa
Shin-Yokohama, Kohoku-ku
Japan
Phone: + +81 454 784 800

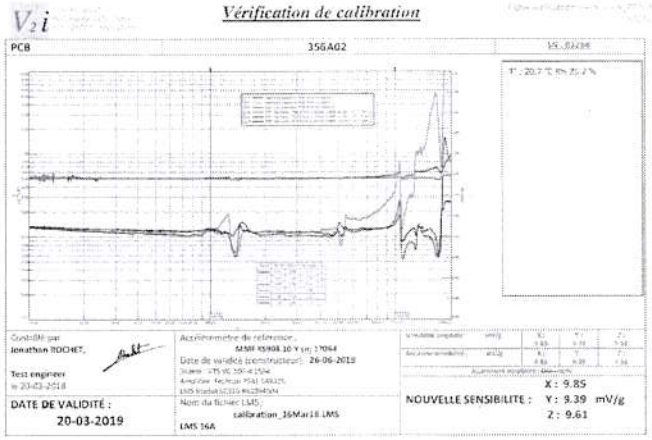
Siemens Industry Software
150 Avenue de la Republique
92320 Chatillon
France
Phone: +33 1 3067 9100

Siemens PLM Software
5755 New King Street
Troy, MI 48098
USA
Phone: +1 248 952 6664

8.2 *Appendix 2*







Laboratory
Test report

R-Tech
Rue de Mons 3 – B-4000 Liège – Belgium
Tel.: +32 4 224 71 40 – Fax: +32 4 224 25 90
Member of Schreder Group

FORM L-54 Edition 01 – Revision 00 - Date: 14/06/2018

Aerodynamic Wind Test

General information

Subject : AXIA 3.1

Asked by : JORIS Philippe

Created on : 10/04/2019

Test number : D190286

Sample(s) : E180542

Folder : P-F18027

Test conditions

Luminaire : AXIA 3.1

Fixation : Post-top

Tightening Torque (Nm) : 17

Pole Diameter : 60

Protector shape : Flat

Testing Facility : External - Wind Tunnel - ULg

See external report ref. : SOUF-RTECH-QT- 18019

Operator : External Lab

Conclusion

Informative

Conclusion :

This report gives the values of wind test for AXIA 3.1 for configurations 0°, 5°, 10°, 15° & Side.

Validated by :
LERHO Xavier

Duplicate to : THIJS Marcel, JORIS Philippe, GALLOPPA Sandro, DETAILLE Ludovic, MULS Sophie, BOS Peter

LAB : 10/04/2019

Test details

Test(s)

Name	Description	Result
Aerodynamic Coefficient Determination - Front 0°	Front 0°	Informative
Aerodynamic Coefficient Determination - Front 5°	Front 5°	Informative
Aerodynamic Coefficient Determination - Front 10°	Front 10°	Informative
Aerodynamic Coefficient Determination - Front 15°	Front 15°	Informative
Aerodynamic Coefficient Determination - Side	Side	Informative
Endurance test: Wind test qualification	Front 10° - 188 km/h Front 15° - 188 km/h	Success

Aerodynamic Coefficient Determination - Front 0°

Result(s)

	Value (m²)		
Wind Direction	Cd.S (drag)	Cs.S (Side)	Cl.S (Lift)
Front 0°	0.025	0.001	-0.019

Aerodynamic Coefficient Determination - Front 5°

Result(s)

	Value (m²)		
Wind Direction	Cd.S (drag)	Cs.S (Side)	Cl.S (Lift)
Front 5°	0.019	0.003	-0.003

Aerodynamic Coefficient Determination - Front 10°

Result(s)

	Value (m²)		
Wind Direction	Cd.S (drag)	Cs.S (Side)	Cl.S (Lift)
Front 10°	0.026	0.006	0.010

Aerodynamic Coefficient Determination - Front 15°

Result(s)

	Value (m²)		
Wind Direction	Cd.S (drag)	Cs.S (Side)	Cl.S (Lift)
Front 15°	0.032	0.001	0.026

Aerodynamic Coefficient Determination - Side

Result(s)

	Value (m²)		
Wind Direction	Cd.S (drag)	Cs.S (Side)	Cl.S (Lift)
Side	0.033	-0.012	-0.010

R-Tech

Test report / Rapport d'essais AXIA 3.1

Electronic report

Thomas Andrianne [1]
Wind Tunnel Manager

[1] E-mail : t.andrianne@uliege.be

Institut de Mécanique et Génie Civil (Bât. B52/9)
Quartier Polytech, 1, Allée de la Découverte, 9 – B-4000 LIEGE
Tél. +32-4-366 9336 – Fax +32-4-3669396

Table des matières

1. Order description / Description de la demande

1.1 Test customer / Demandeur des tests

The origin of the order is:
Le demandeur des tests est :

R-Tech s. a. (Schreder Group G.I.E.)
Rue de Mons, 3
B – 4000 Liège
Maghe Laurent
Certification Manager

The order reference is:
Les références associées à cette commande sont :

SOUF-RTECH-QT-18018

1.2 Tested specimen / Spécimen testé

The general characteristics of the tested specimen and the axes definition are given in Figure 1. Figure 2 to 6 show the luminaire positioned in the wind tunnel's working section.

Les dimensions générales du spécimen testé ainsi que la convention d'axes sont données à la figure 1. Les figures 2 à 6 montrent le luminaire dans la veine d'essais de la soufflerie.

	AXIA 3.1	AXIA 3.2	AXIA 3.3
A (mm)	513	585	550
B (mm)	191	191	277
C (mm)	130	130	130
Weight (Kg)	TBD	TBD	TBD
CxS (m^2)	TBD	TBD	TBD

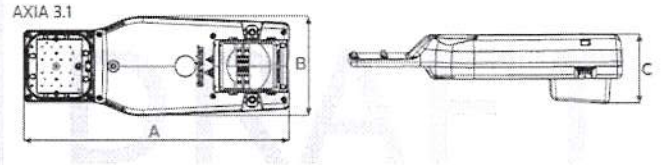


Figure 1: *AXIA 3.1 general drawing / Plan d'ensemble du luminaire AXIA 3.1*

Figure 2: *AXIA 3.1 mounted in the wind tunnel in the front 0° configuration*
AXIA 3.1 dans la veine d'essais dans la configuration face 0°

Figure 3: *AXIA 3.1 mounted in the wind tunnel in the front 5° configuration*
AXIA 3.1 dans la veine d'essais dans la configuration face 5°

Figure 4: *AXIA 3.1 mounted in the wind tunnel in the front 10° configuration*
AXIA 3.1 dans la veine d'essais dans la configuration face 10°

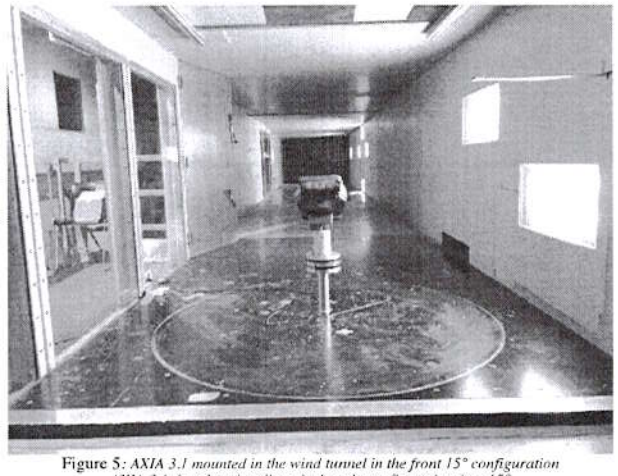


Figure 5: *AXIA 3.1 mounted in the wind tunnel in the front 15° configuration*
AXIA 3.1 dans la veine d'essais dans la configuration face 15°

Figure 6: *AXIA 3.1 mounted in the wind tunnel in the side configuration*
AXIA 3.1 dans la veine d'essais dans la configuration latérale

2. *Test procedure / Procédure d'essais*

2.1 Wind tunnel description / Description de la soufflerie

The tests are performed in the wind tunnel facility of the Sart-Tilman (figure 2.1), University of Liège. Belgium. The classical configuration is in closed loop, but if needed, an open-loop configuration is also available. The qualification of luminaires is performed in the 'aeronautical' section with the characteristics listed in table 2.1.

Les essais sont effectués dans la soufflerie pluridisciplinaire de l'Université de Liège (figure 2.1) – soufflerie en boucle fermée (possibilité d'essais en boucle ouverte) de 35 x 18 m – dans la veine dite « veine aéronautique ». Ses caractéristiques sont décrites dans le tableau 2.1.

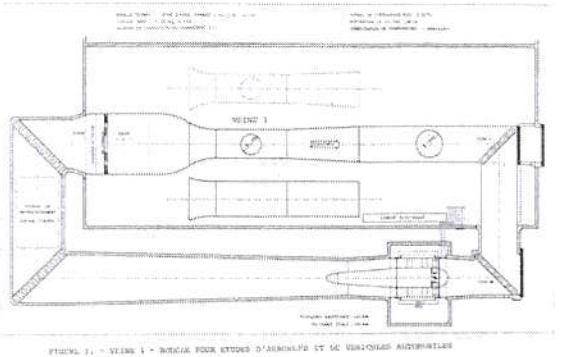


***Figure 2.1:** Wind tunnel general drawing / Plan d'ensemble de la soufflerie*

TABLE 2.1 : WIND TUNNEL CHARACTERISTICS / SOUFFLERIE DU SART-TILMAN.

	Veine aérodynamique	Veine d'ingénierie du vent
Type d'essais	Aéronefs, automobiles, luminaires, …	Etudes de structures et de bâtiments de génie civil
Dimensions (l x h)	2 m x 1.5 m	2.5 m x 1.8 m
Section	3 m²	4.5 m²
Vitesse en boucle fermée	60 m/s	40 m/s
Vitesse en boucle ouverte	40 m/s	30 m/s
Plateforme d'essais	1.5 m, rotation ±90°	2 m, rotation ±180°
Stabilité thermique	± 1°C	± 1°C
Remarque	- Aspiration de la couche limite - Système de mesure de vitesse par différence de pression statique à l'entrée et la sortie du convergent	- Modélisation de la couche limite - Système de mesure de vitesse par différence de pression statique à l'entrée et la sortie du convergent

2.2 *Test description / Description des essais*

2.2.1 *Test procedure / Procédure de test*

Luminaires are tested following the general procedure 005 from the 'Fédération Professionnelle des Producteurs et Distributeur d'Electricité de Belgique' relative to public lighting equipment. The luminaires have to withstand a wind speed of 188km/h, which has to be achieved in less than 2 minutes. The wind speed is then stabilized during 10 minutes. Under these constraints, the tested specimen has to withstand the wind pressure without undergoing damage, permanent deformations, or displacements at its support.

Les luminaires sont testés conformément au cahier des charges 005 de la Fédération Professionnelle des Producteurs et Distributeur d'Electricité de Belgique concernant les équipements d'éclairage public. Les appareils d'éclairage, placés dans les conditions classiques d'utilisation, doivent résister à une pression du vent correspondant à une vitesse de 188km/h. La vitesse de vent de 188km/h doit être atteinte endéans les deux minutes et maintenue pendant dix autres minutes. Sous ces contraintes, l'appareil ne peut présenter ni bris, ni déformation permanente et aucun déplacement de l'appareil par rapport à son support ne peut survenir.

2.2.2 *Conventions / Conventions*

The global drag coefficient is given by the following expression:

$$C_D S = \frac{D}{1/2\rho V^2}$$

where C_xS is the global drag coefficient, in m²
C_x is the non-dimensional drag coefficient
S is the reference area of the luminaire, in m²
D is the drag, in N
ϱ is the air density, in Kg/m³
V is the wind speed, in m/s

The lift coefficient is given by the following expression:

$$C_L S = \frac{L}{1/2\rho V^2}$$

where C_zS is the global lift coefficient, in m²
C_z is the non-dimensional lift coefficient
L is the lift, in N

The air density is computed by taking into account the measured pressure and temperature, using the gas state equation:

$$\rho = \frac{P}{RT}$$

where P is the atmospheric pressure (Pa)
T is the air temperature (K)
R is the Specific Gas Constant = 286.9 Joules/Kg K

Le coefficient de traînée est donné par l'expression suivante :

$$C_D S = \frac{D}{1/2\rho V^2}$$

où C_xS est le coefficient global de traînée (aussi connu sous le nom Cx.S), en m²
C_x est le coefficient de traînée adimensionnel
S est la surface frontale du luminaire, en m²

D est la traînée, en N
ϱ est la masse volumique, en Kg/m³
V est la vitesse du vent, en m/s

Le coefficient portance est donné par l'expression suivante :

$$C_L S = \frac{L}{1/2\rho V^2}$$

où C_zS est le coefficient global de portance, en m²
C_z est le coefficient de portance adimensionnel
L est la portance, en N

La valeur de la masse volumique ϱ de l'air est calculée en fonction de la mesure de pression et de température suivant l'equation d'état des gaz:

$$\rho = \frac{P}{RT}$$

où P est la pression atmospherique en Pa
T est la température en Kelvin
R une constante = 287 Joules/Kg K

2.2.3 Tests applied on the specimen / Liste des essais

The table 2.2 summarizes the test applied on the specimen described in §1.2.
Le tableau 2.2 reprend la liste des tests appliqués sur le spécimen décrit au §1.2.

TABLE 2.2: APPLIED TESTS / LISTE DES ESSAIS

Aerodynamic coefficient measurement / Mesure des coefficients aérodynamiques

Configuration	Drag / Traînée
Front 0° / Face 0°	9.5 m/s, 19.9 m/s
Front 5° / Face 5°	9.4 m/s, 19.9 m/s
Front 10° / Face 10°	9.4 m/s, 19.9 m/s
Front 15° / Face 15°	9.3 m/s, 19.8 m/s
Side / Latérale	9.5 m/s, 19.9 m/s

Wind qualification test / Essais de tenue au vent

Front 10° / Face 10°	✔
Front 15° / Face 15°	✔

3. Test results / Résultats des tests

3.1 Aerodynamic coefficient measurements / Mesure des coefficients aérodynamiques

3.1.1 Front 0° / Face 0°

Luminaire configuration : **front0**

Environment			**Luminaire Surface areas**	
v1 =	9.5	m/s	Front=	0.025
v2 =	19.9	m/s		
T° =	15.7	°C		
P =	98222	Pa		
rho =	1.185	Kg/m³		

Blocking factor correction

Wind tunnel =	3	m²
Specimen =	0.02	m²
Area ratio =	0.8	%
BFC =	0.99	Blocking Factor Correction

*N.B. : The blocking factor correction is **estimated** by the procedure described in ' Wind effect on Structrures: Fundamentals and Applications to Design ', E. Simiu, R.H. Scanlan, p 298 - 300*

Drag measurements

Speed (m/s)	Drag (N)	Cd.S (m²)	Cd.S *BFC (m²)	Cd
9.5	1.2	0.0216	0.0213	0.8584
19.9	6.0	0.0256	0.0252	1.0160

Sideforce measurements

Speed (m/s)	Sideforce (N)	Cs.S (m²)	Cs.S *BFC (m²)	Cs
9.5	0.0	0.0006	0.0006	0.0223
19.9	0.1	0.0004	0.0004	0.0169

Lift measurements

Speed (m/s)	Lift (N)	Cl.S (m²)	Cl.S *BFC (m²)	Cl
9.5	-1.0	-0.0193	-0.0191	-0.7681
19.9	-3.1	-0.0131	-0.0130	-0.5217

3.1.2 Front 5° / Face 5°

Luminaire configuration : **front5**

Environment			**Luminaire Surface areas**	
v1 =	9.4	m/s	Front=	0.025
v2 =	19.9	m/s		
T° =	15.6	°C		
P =	98222	Pa		
rho =	1.186	Kg/m³		

Blocking factor correction

Wind tunnel =	3	m²
Specimen =	0.02	m²
Area ratio =	0.8	%
BFC =	0.99	Blocking Factor Correction

*N.B. : The blocking factor correction is **estimated** by the procedure described in ' Wind effect on Structrures: Fundamentals and Applications to Design ', E. Simiu, R.H. Scanlan, p 298 - 300*

Drag measurements

Speed (m/s)	Drag (N)	Cd.S (m²)	Cd.S *BFC (m²)	Cd
9.3	1.0	0.0191	0.0188	0.7580
19.9	3.6	0.0153	0.0151	0.6067

Sideforce measurements

Speed (m/s)	Sideforce (N)	Cs.S (m²)	Cs.S *BFC (m²)	Cs
9.3	0.2	0.0035	0.0035	0.1390
19.9	0.3	0.0011	0.0011	0.0443

Lift measurements

Speed (m/s)	Lift (N)	Cl.S (m²)	Cl.S *BFC (m²)	Cl
9.3	-0.2	-0.0032	-0.0031	-0.1258
19.9	-0.6	-0.0025	-0.0025	-0.1008

3.1.3 Front 10° / Face 10°

Luminaire configuration : **front10**

Environment			**Luminaire Surface areas**	
v1 =	9.4	m/s	Front=	0.025
v2 =	19.9	m/s		
T° =	15.5	°C		
P =	98222	Pa		
rho =	1.186	Kg/m³		

Blocking factor correction

Wind tunnel =	3	m²
Specimen =	0.02	m²
Area ratio =	0.8	%
BFC =	0.99	Blocking Factor Correction

*N.B. : The blocking factor correction is **estimated** by the procedure described in ' Wind effect on Structrures: Fundamentals and Applications to Design ', E. Simiu, R.H. Scanlan, p 298 - 300*

Drag measurements

Speed (m/s)	Drag (N)	Cd.S (m²)	Cd.S *BFC (m²)	Cd
9.4	1.3	0.0242	0.0239	0.9633
19.9	6.1	0.0261	0.0258	1.0374

Sideforce measurements

Speed (m/s)	Sideforce (N)	Cs.S (m²)	Cs.S *BFC (m²)	Cs
9.4	0.3	0.0061	0.0061	0.2442
19.9	0.4	0.0017	0.0016	0.0661

Lift measurements

Speed (m/s)	Lift (N)	Cl.S (m²)	Cl.S *BFC (m²)	Cl
9.4	0.4	0.0076	0.0075	0.3038
19.9	2.4	0.0104	0.0103	0.4146

3.1.4 Front 15° / Face 15°

Luminaire configuration : **front15**

Environment			**Luminaire Surface areas**	
v1 =	9.3	m/s	Front=	0.025
v2 =	19.8	m/s		
T° =	12.8	°C		
P =	99841	Pa		
rho =	1.217	Kg/m³		

Blocking factor correction		
Wind tunnel =	3	m²
Specimen =	0.03	m²
Area ratio =	0.8	%
BFC =	0.99	Blocking Factor Correction

*N.B. : The blocking factor correction is **estimated** by the procedure described in ' Wind effect on Structrures: Fundamentals and Applications to Design ', E. Simiu, R.H. Scanlan, p 298 - 300*

Drag measurements

Speed (m/s)	Drag (N)	Cd.S (m²)	Cd.S *BFC (m²)	Cd
9.3	1.7	0.0323	0.0318	1.2734
19.8	7.3	0.0307	0.0303	1.2114

Sideforce measurements

Speed (m/s)	Sideforce (N)	Cs.S (m²)	Cs.S *BFC (m²)	Cs
9.3	0.0	0.0003	0.0003	0.0110
19.8	0.3	0.0012	0.0012	0.0475

Lift measurements

Speed (m/s)	Lift (N)	Cl.S (m²)	Cl.S *BFC (m²)	Cl
9.3	1.4	0.0266	0.0262	1.0483
19.8	5.9	0.0246	0.0243	0.9722

3.1.5 Side / Latérale

Luminaire configuration : **side**

Environment			**Luminaire Surface areas**	
v1 =	9.5	m/s	Front=	0.067
v2 =	19.9	m/s		
T° =	15.5	°C		
P =	98222	Pa		
rho =	1.186	Kg/m³		

Blocking factor correction		
Wind tunnel =	3	m²
Specimen =	0.07	m²
Area ratio =	2.2	%
BFC =	0.97	Blocking Factor Correction

*N.B. : The blocking factor correction is **estimated** by the procedure described in ' Wind effect on Structrures: Fundamentals and Applications to Design ', E. Simiu, R.H. Scanlan, p 298 - 300*

Drag measurements

Speed (m/s)	Drag (N)	Cd.S (m²)	Cd.S *BFC (m²)	Cd
9.5	1.8	0.0343	0.0331	0.4963
19.9	5.9	0.0252	0.0243	0.3648

Sideforce measurements

Speed (m/s)	Sideforce (N)	Cs.S (m²)	Cs.S *BFC (m²)	Cs
9.5	-0.3	-0.0065	-0.0063	-0.0938
19.9	-2.8	-0.0120	-0.0116	-0.1736

Lift measurements

Speed (m/s)	Lift (N)	Cl.S (m²)	Cl.S *BFC (m²)	Cl
9.5	-0.6	-0.0104	-0.0100	-0.1499
19.9	-2.0	-0.0087	-0.0084	-0.1261

3.2 Qualification test / Test de tenue au vent

3.2.1 Choice of test direction / Choix de la direction des essais

The test directions are the front 10° and 15° configurations (see figures 4 and 5).

Les configurations frontales 10° et 15° sont choisies pour effectuer le test de tenue au vent (voir figures 4 et 5).

3.2.2 Qualification test / Test de qualification

The tested specimen passed the wind qualification test at 52.2m/s (188km/h) during 10 minutes: neither failure nor permanent deformations were detected. There were no displacements with respect to the specimen's support.

L'appareil n'a présenté aucun bris ni aucune déformation permanente lors du test à 52.2m/s (188km/h) durant 10 minutes. Aucun déplacement par rapport à son support n'est survenu.