

**To:**

Urszula Bochenek

Industrial Quality Engineer

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**From:**

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**Object:** PVT 2021, ENEC & ENEC+ PERIODICAL TESTING. **One luminaire for all axle.**

**Product description:**

**Brand:** Philips

**Family name:** CORELINE\_MALAGA\_LED

**Family code:** BRP101

**Led Module or Lamps:**

✓ PCB – N/A

**Electric Components in Product:**

✓ Driver: N/A

✓ SPD: N/A

✓ Other: N/A

**Luminaire characteristics:**

✓ **Electrical Class:** N/A

✓ **IP Classification:** N/A

✓ **IK Classification:** N/A

✓ **Ta(°C):** N/A

✓ **Un(V):** N/A

✓ **fn (Hz):** N/A

✓ **I Led Module (mA):** N/A

✓ **Luminaire installation:** SIDE ENTRY ø60 => on the pole SE ø60

✓ **Luminaire weight (kg):** 2,2

**Tests according to:**

☒ QS-006592 Vibrations Test Procedure for the Luminaires v. 7

**Test Equipment:**

☒ Shaker UDC type UD SAB30F-S452-16-ST30

**Test Results:**

☒ **PASS** / ☐ **N/A**

☐ **FAIL**

**Tested by:**

☐ Lucyna Wolniakowska - Kulas

☐ Dalida Fuks

☐ Michał Szepietowski

☐ Andrzej Kromplewski

☐ Konrad Micinski

☒ Andrzej Haluszka

**Approved by:**

☒ Dariusz Pierzchanowski

**Test date:** 18-20.01.2022

**Issue date:** 24.01.2022

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### Reference tightening torques:

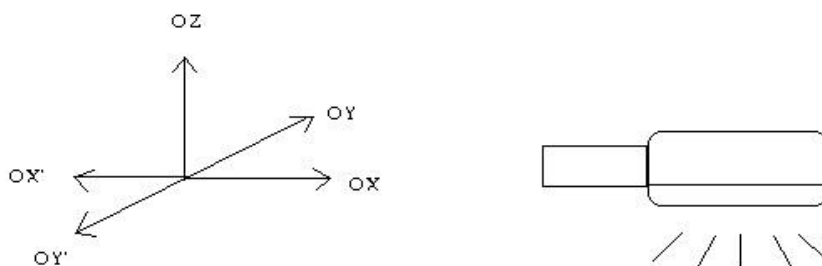
PART	SCREW DIAMETER (mm)	RATED TORQUE (Nm)
SPIGOT ARME SCREW (1)	8	15
SPIGOT ARME SCREW (2)	8	15

### Before test execution the product shall be checked according to the following table:

Point of observation	Values	Results
Switch ON test	Luminaire should be ON	PASS
Construction of the luminaire	No visible damage, cracks nor deformation	PASS
Tightening torque(s) between spigot and mast	Initial torque value(s)	PASS
Tightening torque(s) on critical functions (housing, cover, ...)	Initial torque value(s)	PASS
Aim position (where applicable)	Worst case aim direction	PASS

Table 1: Overview of required initial checks.

### Luminaires - Street & Road lighting:



### 1. DETERMINATION OF MECHANICAL RESONANCE FREQUENCY:

Parameter	Values
Vibration type	Sinusoidal
Vibration frequency range	5Hz – 30Hz;
Axis	<b>X, Y, Z</b>
Acceleration amplitude	0,5 g
Duration (sweeps)	1
Control	Single accelerometer
Position of accelerometer	1 in the gravity centre

Table 2: frequency scan test conditions

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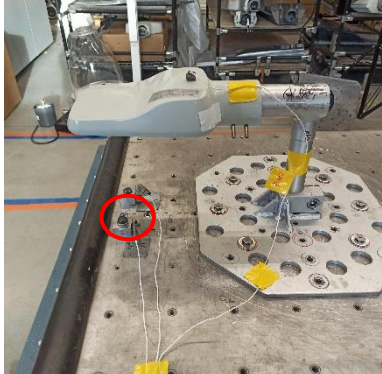

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## AXIS 0X

MOUNTING POSITION ACCELEROMETERS	
CONTROL	MEASURE
	

## 2. ENDURANCE VIBRATION TEST

Parameter	Refers	Values
Control - Single accelerometer	<input checked="" type="checkbox"/>	1
Position of accelerometer - in the gravity centre	<input checked="" type="checkbox"/>	1
Luminaire weight $M$ [kg]	<input checked="" type="checkbox"/>	2,2
A - factor <i>Formula 1</i>	<input checked="" type="checkbox"/>	$A = \frac{\max \text{luminaire acc value}}{\text{Acc table}} [g]$ 1,0732
A factor $A < 2$	<input checked="" type="checkbox"/>	0,5366
A factor $A > 2$	<input type="checkbox"/>	-
Cat.I <i>Formula 2a</i> for luminaire up to 8m	<input checked="" type="checkbox"/>	$\text{Acc luminaire} = (6,86 - 0,413M + 0,008695M^2)[g]$ 5,99
Cat.II <i>Formula 2b</i> for luminaire 8-18m	<input type="checkbox"/>	$\text{Acc luminaire} = (8,15 - 0,363M + 0,006881M^2)[g]$ -
Cat.III <i>Formula 2c</i> for luminaire	<input type="checkbox"/>	$\text{Acc luminaire} = (5,18 - 0,305M + 0,006595M^2)[g]$ -
Frequency $f_{\text{res}}$ [Hz]	<input type="checkbox"/>	-
-5% $f_{\text{res}}$ [Hz]	<input type="checkbox"/>	-
Time of vibration for $A > 2$ (100k cycles) <i>Formula 3</i>	<input type="checkbox"/>	$T = \frac{100000}{60 f_{\text{res}}} [\text{min}]$ -
Time of vibration for $A < 2$ [min]	<input checked="" type="checkbox"/>	$T = 60 [\text{min}]$ 60
Vibration frequency range for $A < 2$ [Hz]	<input checked="" type="checkbox"/>	30
Input acceleration on table for Endurance <i>Formula 4</i>	<input checked="" type="checkbox"/>	$\text{Acc} = \frac{\text{Acc luminaire}}{A} [g]$ 5,581
Acc table	<input checked="" type="checkbox"/>	5, 581
Max luminaire acc value (response)	<input checked="" type="checkbox"/>	5,97
The half-power bandwidth $\Delta f$	<input type="checkbox"/>	-

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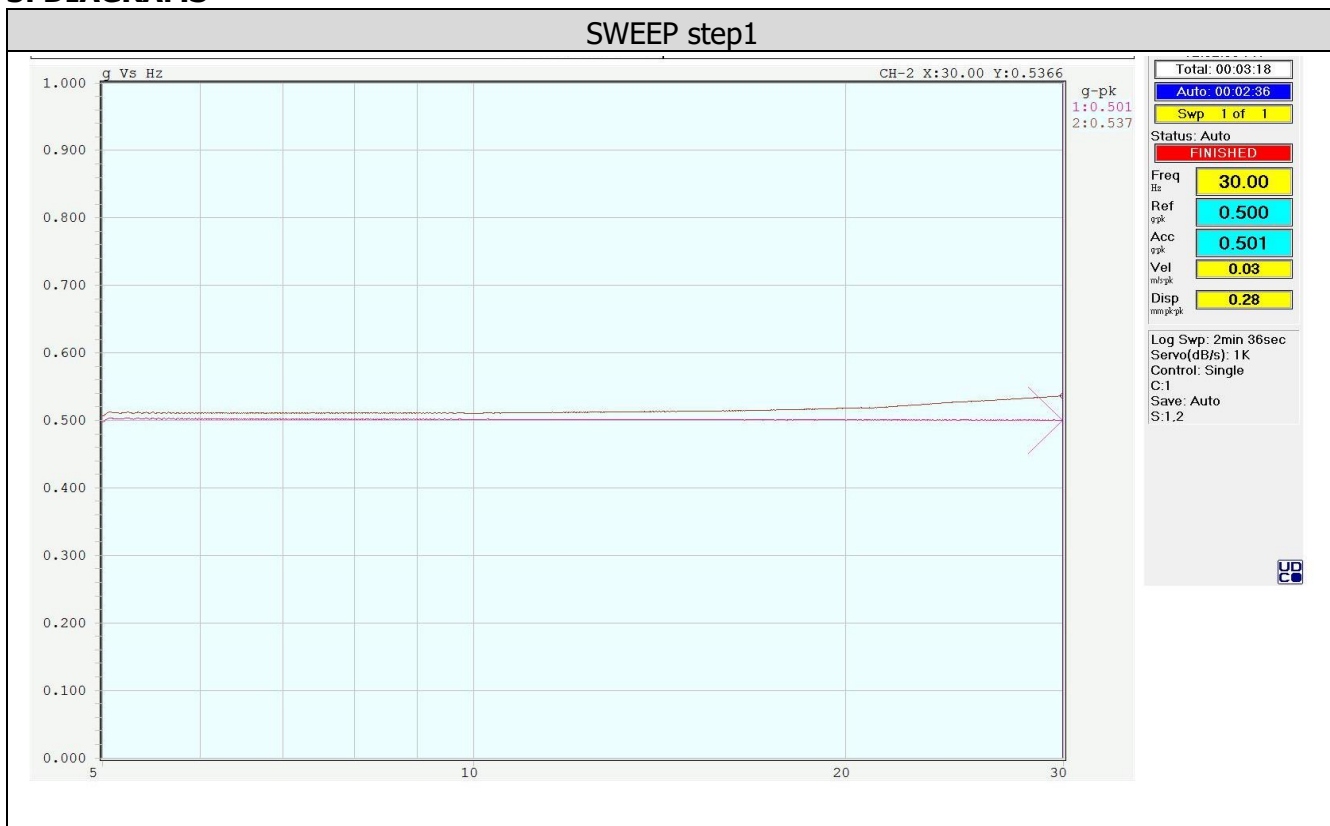
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TORQUE CHECK				
PART	SCREW DIAMETE R (mm)	MINIMUM TORQUE ALLOWED(Nm)	MEASURED TORQUE (Nm)	RESULT
<b>SPIGOT ARME SCREW (1)</b>	<b>8</b>	<b>10,5</b>	<b>15</b>	<b>PASS</b>
<b>SPIGOT ARME SCREW (2)</b>	<b>8</b>	<b>10,5</b>	<b>15</b>	<b>PASS</b>

Point of observation	Values	Results
Switch ON test	Luminaire should be ON	PASS
Construction of the luminaire and its components	No visible damage, cracks nor deformation, no thread damage both in luminaire nor in bolts	PASS
Tightening torque(s) between spigot and mast as well as on critical parts (housing, cover, ...)	Remaining torque value at minimum of 70% initial value and above values defined in IEC 60598-1	PASS
Level that constitutes major allowed change in frequency / displacement	+/- 10%	PASS

<b>CONCLUSION</b>	After the test, no damages or cracks.
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### 3. DIAGRAMS



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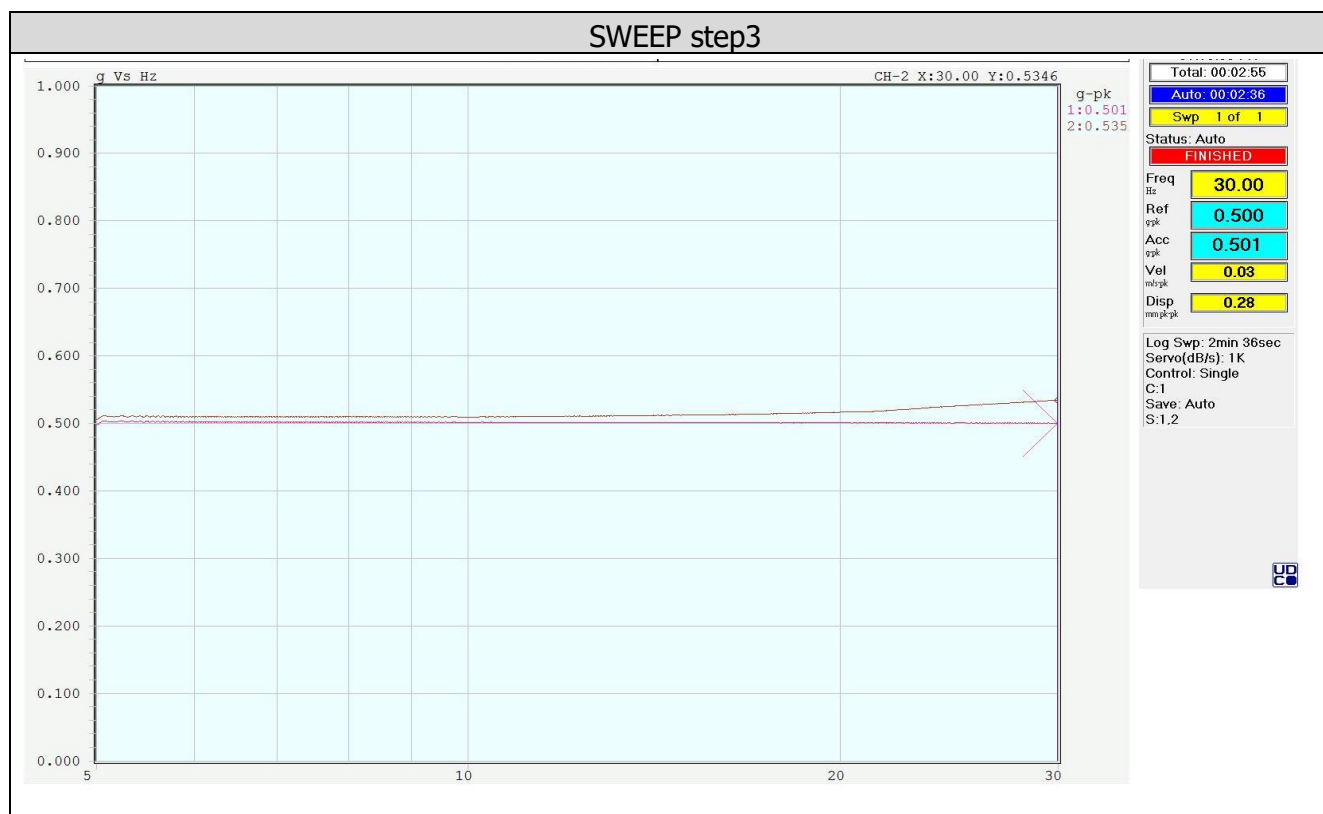
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## AXIS 0Y

MOUNTING POSITION ACCELEROMETERS	
CONTROL	MEASURE
	

## 2. ENDURANCE VIBRATION TEST

Parameter	Refers	Values
Control - Single accelerometer	<input checked="" type="checkbox"/>	1
Position of accelerometer - in the gravity centre	<input checked="" type="checkbox"/>	1
Luminaire weight $M$ [kg]	<input checked="" type="checkbox"/>	2,2
A - factor Formula 1	<input checked="" type="checkbox"/>	$A = \frac{\text{max luminaire acc value}}{\text{Acc table}} [g]$ 1,1156
A factor $A < 2$	<input checked="" type="checkbox"/>	0,5578
A factor $A > 2$	<input type="checkbox"/>	-

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Parameter	Refers	Values
Cat.I <i>Formula 2a</i> for luminaire up to 8m $Acc_{luminaire} = (6,86 - 0.413M + 0.008695M^2)[g]$	<input checked="" type="checkbox"/>	5,99
Cat.II <i>Formula 2b</i> for luminaire 8-18m $Acc_{luminaire} = (8.15 - 0.363M + 0.006881M^2)[g]$	<input type="checkbox"/>	-
Cat.III <i>Formula 2c</i> for luminaire $Acc_{luminaire} = (5.18 - 0.305M + 0.006595M^2)[g]$	<input type="checkbox"/>	-
Frequency $f_{res}$ [Hz]	<input type="checkbox"/>	-
-5% $f_{res}$ [Hz]	<input type="checkbox"/>	-
Time of vibration for A >2 (100k cycles) <i>Formula 3</i> $T = \frac{100000}{60 f_{res}} [min]$	<input type="checkbox"/>	-
Time of vibration for A <2 [min] $T = 60 [min]$	<input checked="" type="checkbox"/>	60
Vibration frequency range for A<2 [Hz]	<input checked="" type="checkbox"/>	30
Input acceleration on table for Endurance <i>Formula 4</i> $Acc = \frac{Acc_{luminaire}}{A} [g]$	<input checked="" type="checkbox"/>	5,369
Acc table	<input checked="" type="checkbox"/>	5,500
Max luminaire acc value (response)	<input checked="" type="checkbox"/>	5,98
The half-power bandwidth $\Delta f$	<input type="checkbox"/>	-

TORQUE CHECK				
PART	SCREW DIAMETER (mm)	MINIMUM TORQUE ALLOWED(Nm)	MEASURED TORQUE (Nm)	RESULT
<b>SPIGOT ARME SCREW (1)</b>	<b>8</b>	<b>10,5</b>	<b>16</b>	<b>PASS</b>
<b>SPIGOT ARME SCREW (2)</b>	<b>8</b>	<b>10,5</b>	<b>14</b>	<b>PASS</b>

Point of observation	Values	Results
Switch ON test	Luminaire should be ON	PASS
Construction of the luminaire and its components	No visible damage, cracks nor deformation, no thread damage both in luminaire nor in bolts	PASS
Tightening torque(s) between spigot and mast as well as on critical parts (housing, cover, ...)	Remaining torque value at minimum of 70% initial value and above values defined in IEC 60598-1	PASS
Level that constitutes major allowed change in frequency / displacement	+/- 10%	PASS

<b>CONCLUSION</b>	After the test, no damages or cracks.
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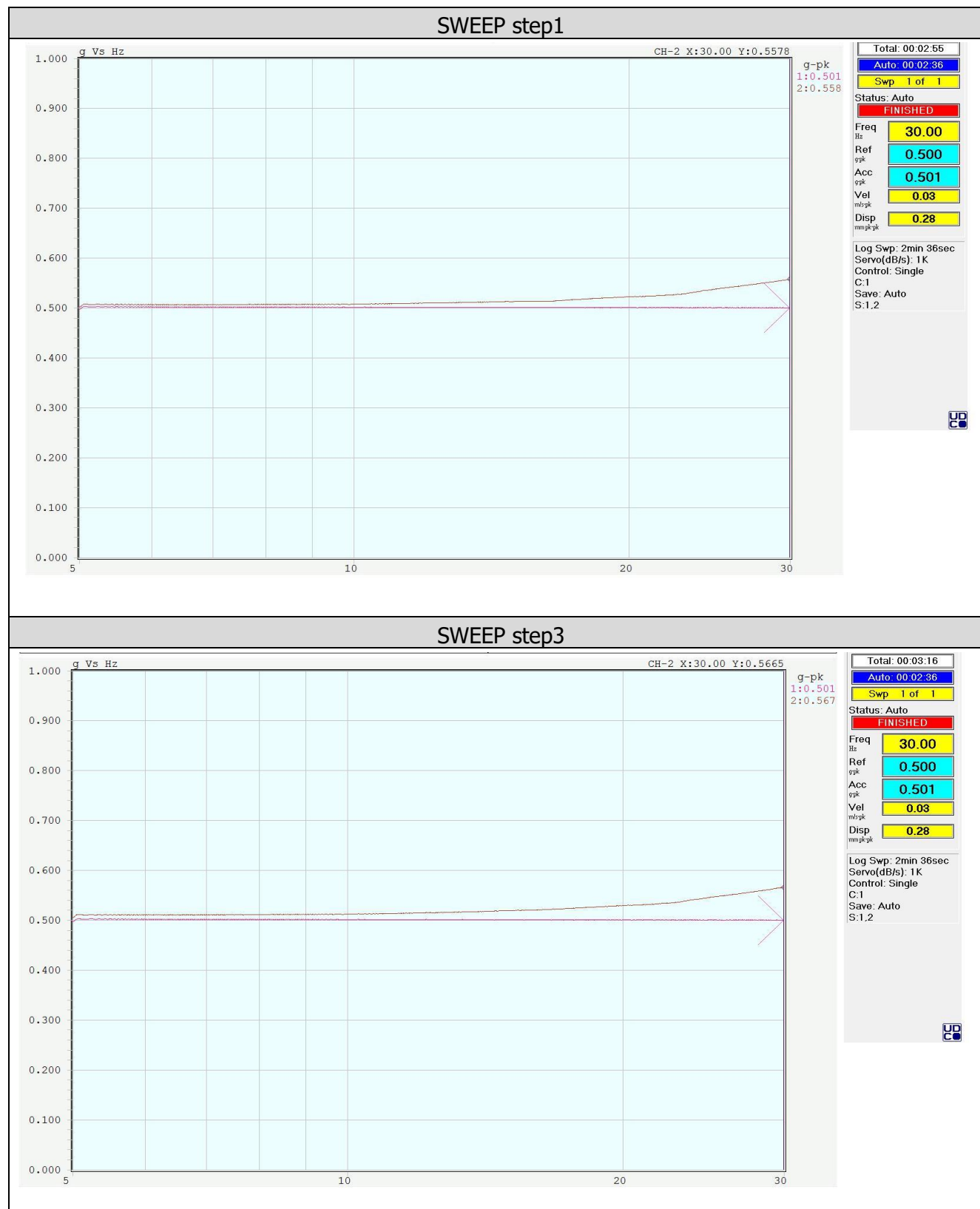
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### 3. DIAGRAMS



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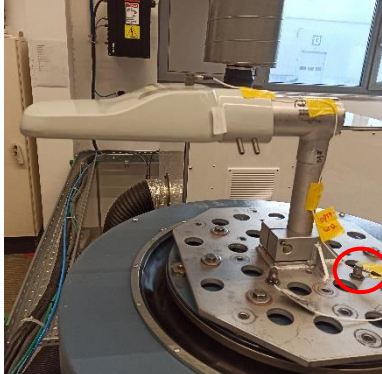
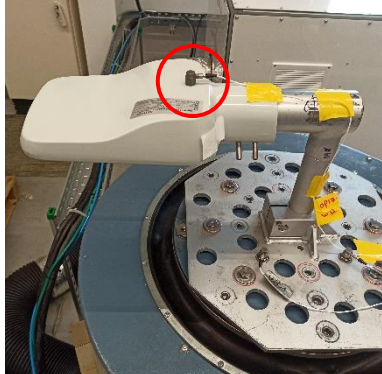
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## AXIS 0Z

MOUNTING POSITION ACCELEROMETERS	
CONTROL	MEASURE
	

## 2. ENDURANCE VIBRATION TEST

Parameter	Refers	Values
Control - Single accelerometer	<input checked="" type="checkbox"/>	1
Position of accelerometer - in the gravity centre	<input checked="" type="checkbox"/>	1
Luminaire weight $M$ [kg]	<input checked="" type="checkbox"/>	2,2
A - factor <i>Formula 1</i> $A = \frac{\max \text{luminaire acc value}}{\text{Acc table}} [g]$	<input checked="" type="checkbox"/>	1,1186
A factor $A < 2$	<input checked="" type="checkbox"/>	0,5593
A factor $A > 2$	<input type="checkbox"/>	-
Cat.I <i>Formula 2a</i> for luminaire up to 8m $\text{Acc luminaire} = (6,86 - 0,413M + 0,008695M^2)[g]$	<input checked="" type="checkbox"/>	5,99
Cat.II <i>Formula 2b</i> for luminaire 8-18m $\text{Acc luminaire} = (8,15 - 0,363M + 0,006881M^2)[g]$	<input type="checkbox"/>	-
Cat.III <i>Formula 2c</i> for luminaire $\text{Acc luminaire} = (5,18 - 0,305M + 0,006595M^2)[g]$	<input type="checkbox"/>	-
Frequency $f_{\text{res}}$ [Hz]	<input type="checkbox"/>	-
-5% $f_{\text{res}}$ [Hz]	<input type="checkbox"/>	-
Time of vibration for $A > 2$ (100k cycles) <i>Formula 3</i> $T = \frac{100000}{60 f_{\text{res}}} [\text{min}]$	<input type="checkbox"/>	-
Time of vibration for $A < 2$ [min] $T = 60 [\text{min}]$	<input checked="" type="checkbox"/>	60
Vibration frequency range for $A < 2$ [Hz]	<input checked="" type="checkbox"/>	30
Input acceleration on table for Endurance <i>Formula 4</i> $\text{Acc} = \frac{\text{Acc luminaire}}{A} [g]$	<input checked="" type="checkbox"/>	5,355
Acc table	<input checked="" type="checkbox"/>	5,355
Max luminaire acc value (response)	<input checked="" type="checkbox"/>	6,01
The half-power bandwidth $\Delta f$	<input type="checkbox"/>	-

TORQUE CHECK				
PART	SCREW DIAMETER R (mm)	MINIMUM TORQUE ALLOWED(Nm)	MEASURED TORQUE (Nm)	RESULT
<b>SPIGOT ARME SCREW (1)</b>	<b>8</b>	<b>10,5</b>	<b>14</b>	<b>PASS</b>
<b>SPIGOT ARME SCREW (2)</b>	<b>8</b>	<b>10,5</b>	<b>15</b>	<b>PASS</b>

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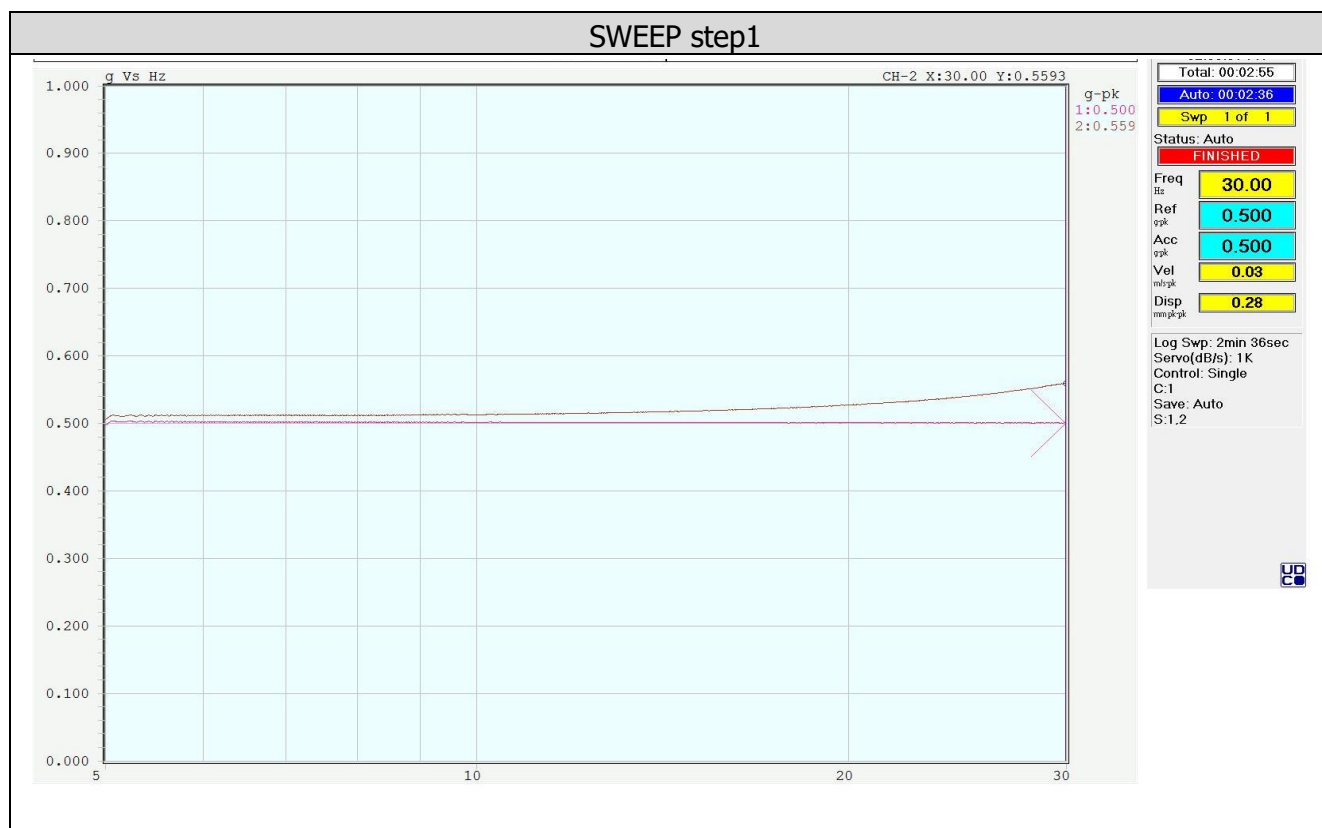
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Point of observation	Values	Results
Switch ON test	Luminaire should be ON	FAIL
Construction of the luminaire and its components	No visible damage, cracks nor deformation, no thread damage both in luminaire nor in bolts	PASS
Tightening torque(s) between spigot and mast as well as on critical parts (housing, cover, ...)	Remaining torque value at minimum of 70% initial value and above values defined in IEC 60598-1	PASS
Level that constitutes major allowed change in frequency / displacement	+/- 10%	PASS

<b>CONCLUSION</b>	After the test, no damages or cracks.
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### 3. DIAGRAMS

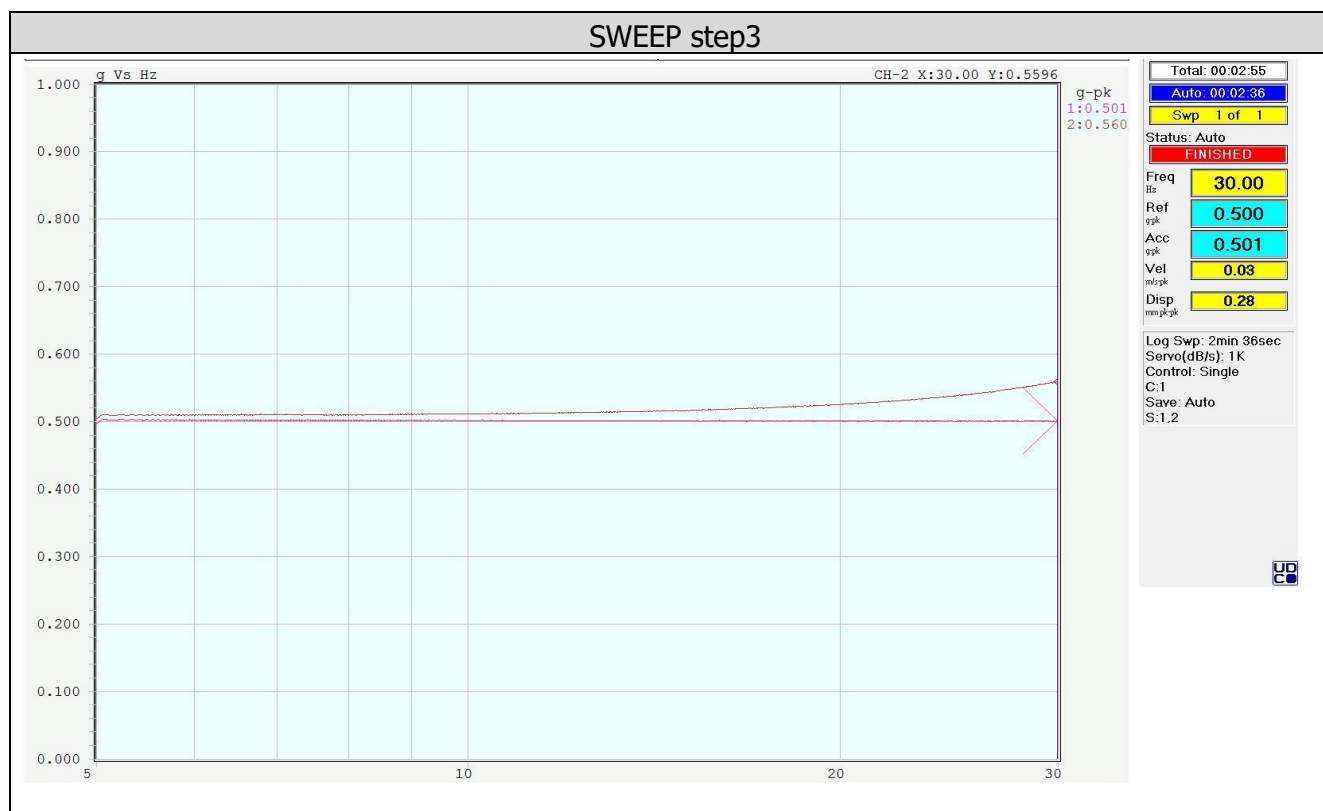


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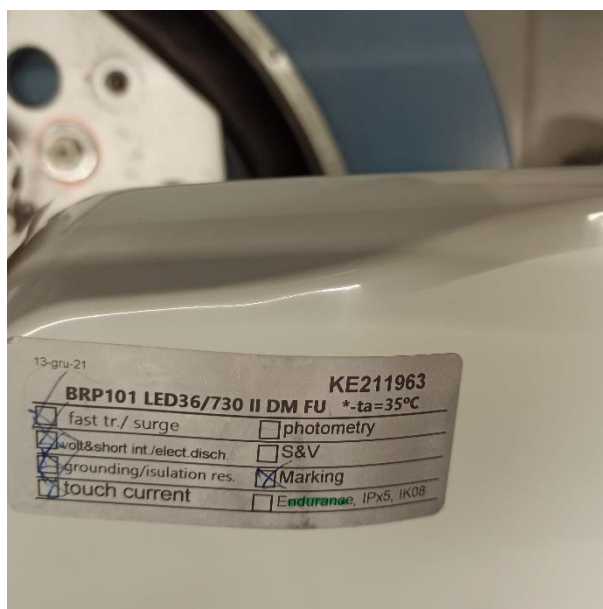
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