Test Report issued under the responsibility of:

TÜVRheinland®

TEST REPORT
IEC 62471
Photobiological safety of lamps and lamp systems

Report Reference No. ..... :	**DE21Q1K6 001**
Date of issue ..... :	07.09.2021
Total number of pages ..... :	17
Name of Testing Laboratory preparing the Report ..... :	**TÜV Rheinland LGA Products GmbH**
Applicant's name ..... :	POWERMOON GmbH
Address ..... :	Ginsterstr. 5, 47495 Rheinberg, Deutschland
Test specification:	
Standard ..... :	IEC 62471:2006
Test procedure ..... :	Type testing
Non-standard test method..... :	N/A
Test Report Form No. ..... :	IEC62471B
TRF Originator ..... :	VDE Testing and Certification Institute
Master TRF ..... :	Dated 2018-08-16

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

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The test results presented in this report relate only to the object tested.
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Test item description .....:	Illumination for construction sites, road construction, emergency services, sport and events		
Trade Mark .....:	POWERMOON® HexaSpace		
Manufacturer.....:	POWERMOON GmbH		
Model/Type reference .....:	HexaSpace		
Ratings .....:	900W / 230V~ AC / 50-60Hz / 4A		
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒ **CB Testing Laboratory:**	TÜV Rheinland LGA Products GmbH		
Testing location/ address ..... :	Tillystrasse 2, 90431 Nuremberg, Germany		
Tested by (name, function, signature) ..... :	Dipl. Ing. K. Stenzhorn team coordinator		
Approved by (name, function, signature) .. :	Dipl. Ing. (FH) G. Richter lab manager		
☐ **Testing procedure: CTF Stage 1:**			
Testing location/ address ..... :			
Tested by (name, function, signature) ..... :			
Approved by (name, function, signature) .. :			
☐ **Testing procedure: CTF Stage 2:**			
Testing location/ address ..... :			
Tested by (name + signature) ..... :			
Witnessed by (name, function, signature) . :			
Approved by (name, function, signature) .. :			
☐ **Testing procedure: CTF Stage 3:**			
☐ **Testing procedure: CTF Stage 4:**			
Testing location/ address ..... :			
Tested by (name, function, signature) ..... :			
Witnessed by (name, function, signature) . :			
Approved by (name, function, signature) .. :			
Supervised by (name, function, signature) :			

List of Attachments (including a total number of pages in each attachment):

- **Attachment 1: CENELEC Common Deviations, 4 pages**
- **Attachment 2: Photodocumentation, 6 pages**

Summary of testing: The units are Risk Group 1 according to IEC 62471:2006 and EN 62471:2008.

Tests performed (name of test and test clause):	**Testing location:**
Clauses 4, 5 and 6	TÜV Rheinland LGA Products GmbH Tillystrasse 2, 90431 Nuremberg, Germany

Summary of compliance with National Differences (List of countries addressed):

- CENELEC

☒ **The units comply with EN 62471:2008 (CENELEC Common deviations)**

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Test item particulars ..... :	Illumination for construction sites, road construction, emergency services, sport and events
Tested lamp ..... :	☒ continuous wave lamps ☐ pulsed lamps
Tested lamp system ..... :	
Lamp classification group ..... :	☐ exempt ☒ risk 1 ☐ risk 2 ☐ risk 3
Lamp cap ..... :	N/A
Bulb ..... :	N/A
Rated of the lamp ..... :	N/A
Furthermore marking on the lamp ..... :	N/A
Seasoning of lamps according IEC standard ..... :	N/A
Used measurement instrument ..... :	Spectral radiometer
Temperature by measurement ..... :	23,2°C
Information for safety use ..... :	N/A
Possible test case verdicts:	
– **test case does not apply to the test object ..... :**	N/A
– **test object does meet the requirement ..... :**	P (Pass)
– **test object does not meet the requirement ..... :**	F (Fail)
Testing:	Sample no.: A00390129-003
Date of receipt of test item ..... :	09.07.2021
Date (s) of performance of tests ..... :	03.09.2021

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a ☒ comma / ☐ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies) ..... :	POWERMOON GmbH, Ginsterstr. 5, 47495 Rheinberg, Deutschland

General product information and other remarks:

Overview:

- The POWERMOON® HEXASPACE® is the most innovative lightweight LED Work Light on the market -Weighing only 8,8kg with 110 000 Lumen!
- The POWERMOON® HEXASPACE® delivers a 360-degree illumination for a faster, safer and more efficient work environment.
- It has 6 manually movable light panels to set the perfect lighting angle exactly for your needs.
- The POWERMOON® HEXASPACE® is IP68 - meaning it is completely watertight and can be used in any weather condition (heavy rain/snow)
- The POWERMOON® HEXASPACE® is compact, efficient and easy to set up. It also comes with two hand grips on the sides for your comfort.
- Perfect illumination for construction sites, road construction, emergency services, sport and events.
- No ventilator – Zero noise! High performance fanless self-cooling system – no disturbing sound while using the light!

Technical details:

- Wattage : 900W
- Voltage : 220-240V / 50-60Hz
- Current : 4A at 230V
- Type of protection : IP 68
- Light amount : 110.000 Lumen
- Light color : 5700K, daylight quality
- Weight : 8,8kg (12,6kg incl. cable & Bag)
- Dimensions : D=690x780mm H=70mm
- Transport packaging : D=710x800mm H=90mm
- Min Generator W : 1000W

Order number: 1092623 50, project number: P00341053

LEDs are type VT-TCOB-880-24V by Shenzhen Everluster Lighting Co., Ltd.

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
4	**EXPOSURE LIMITS**		P
4.1	General		P
	The exposure limits in this standard is not less than 0,01 ms and not more than any 8-hour period and should be used as guides in the control of exposure		
	Detailed spectral data of a light source are generally required only if the luminance of the source exceeds 10^4 cd·m^{-2}	see clause 4.3	P
4.3	Hazard exposure limits		P
4.3.1	Actinic UV hazard exposure limit for the skin and eye		P
	The exposure limit for effective radiant exposure is 30 J·m^{-2} within any 8-hour period		P
	To protect against injury of the eye or skin from ultraviolet radiation exposure produced by a broad-band source, the effective integrated spectral irradiance , E_S, of the light source shall not exceed the levels defined by:		P
	$E_s \cdot t = \sum_{200}^{400} \sum_{t} E_\lambda(\lambda,t) \cdot S_{UV}(\lambda) \cdot \Delta t \cdot \Delta\lambda \le 30$ J·m^{-2}		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye or skin shall be computed by:		P
	$t_{max} = \frac{30}{E_s}$ s		P
4.3.2	Near-UV hazard exposure limit for eye		P
	For the spectral region 315 nm to 400 nm (UV-A) the total radiant exposure to the eye shall not exceed 10000 J·m^{-2} for exposure times less than 1000 s. For exposure times greater than 1000 s (approximately 16 minutes) the UV-A irradiance for the unprotected eye, E_{UVA}, shall not exceed 10 W·m^{-2}.		P
	The permissible time for exposure to ultraviolet radiation incident upon the unprotected eye for time less than 1000 s, shall be computed by:		P
	$t_{max} \le \frac{10\,000}{E_{UVA}}$ s		P
4.3.3	Retinal blue light hazard exposure limit		P
	To protect against retinal photochemical injury from chronic blue-light exposure, the integrated spectral radiance of the light source weighted against the blue-light hazard function, B(λ), i.e., the blue-light weighted radiance , L_B, shall not exceed the levels defined by:		P
	$L_B \cdot t = \sum_{300}^{700} \sum_{t} L_\lambda(\lambda,t) \cdot B(\lambda) \cdot \Delta t \cdot \Delta\lambda \le 10^6$ J · m^{-2} · sr^{-1}	for t ≤ 10^4 s $t_{max} = \frac{10^6}{L_B}$	P

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	$L_B = \sum_{300}^{700} L_\lambda \cdot B(\lambda) \cdot \Delta\lambda \le 100$ $W \cdot m^{-2} \cdot sr^{-1}$	for t > 10^4 s	N/A
4.3.4	Retinal blue light hazard exposure limit - small source		N/A
	Thus the spectral irradiance at the eye E_λ, weighted against the blue-light hazard function B(λ) shall not exceed the levels defined by:	see table 4.2	N/A
	$E_B \cdot t = \sum_{300}^{700} \sum_{t} E_\lambda(\lambda,t) \cdot B(\lambda) \cdot \Delta t \cdot \Delta\lambda \le 100$ $J \cdot m^{-2}$	for t ≤ 100 s	N/A
	$E_B = \sum_{300}^{700} E_\lambda \cdot B(\lambda) \cdot \Delta\lambda \le 1$ $W \cdot m^{-2}$	for t > 100 s	N/A
4.3.5	Retinal thermal hazard exposure limit		P
	To protect against retinal thermal injury, the integrated spectral radiance of the light source, L_λ, weighted by the burn hazard weighting function R(λ) (from Figure 4.2 and Table 4.2), i.e., the burn hazard weighted radiance, shall not exceed the levels defined by:		P
	$L_R = \sum_{380}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \le \frac{50\,000}{\alpha \cdot t^{0,25}}$ $W \cdot m^{-2} \cdot sr^{-1}$	(10 µs ≤ t ≤ 10 s)	P
4.3.6	Retinal thermal hazard exposure limit – weak visual stimulus		N/A
	For an infrared heat lamp or any near-infrared source where a weak visual stimulus is inadequate to activate the aversion response, the near infrared (780 nm to 1400 nm) radiance, L_{IR}, as viewed by the eye for exposure times greater than 10 s shall be limited to:		N/A
	$L_{IR} = \sum_{780}^{1400} L_\lambda \cdot R(\lambda) \cdot \Delta\lambda \le \frac{6\,000}{\alpha}$ $W \cdot m^{-2} \cdot sr^{-1}$	t > 10 s	N/A
4.3.7	Infrared radiation hazard exposure limits for the eye		N/A
	The avoid thermal injury of the cornea and possible delayed effects upon the lens of the eye (cataractogenesis), ocular exposure to infrared radiation, E_{IR}, over the wavelength range 780 nm to 3000 nm, for times less than 1000 s, shall not exceed:		N/A
	$E_{IR} = \sum_{780}^{3\,000} E_\lambda \cdot \Delta\lambda \le 18\,000 \cdot t^{-0,75}$ $W \cdot m^{-2}$	t ≤ 1000 s	N/A
	For times greater than 1000 s the limit becomes:		N/A
	$E_{IR} = \sum_{780}^{3\,000} E_\lambda \cdot \Delta\lambda \le 100$ $W \cdot m^{-2}$	t > 1000 s	N/A
4.3.8	Thermal hazard exposure limit for the skin		P
	Visible and infrared radiant exposure (380 nm to 3000 nm) of the skin shall be limited to:		P

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	$E_H \cdot t = \sum_{380}^{3\,000} \sum_{t} E_\lambda(\lambda,t) \cdot \Delta t \cdot \Delta\lambda \le 20\,000 \cdot t^{0,25}$ J · m^{-2}	6,1 x 10² J m² (within 1 s)	P
5	**MEASUREMENT OF LAMPS AND LAMP SYSTEMS**		P
5.1	Measurement conditions		P
	Measurement conditions shall be reported as part of the evaluation against the exposure limits and the assignment of risk classification.		P
5.1.1	Lamp ageing (seasoning)		N/A
	Seasoning of lamps shall be done as stated in the appropriate IEC lamp standard.		N/A
5.1.2	Test environment		P
	For specific test conditions, see the appropriate IEC lamp standard or in absence of such standards, the appropriate national standards or manufacturer's recommendations.		P
5.1.3	Extraneous radiation		P
	Careful checks should be made to ensure that extraneous sources of radiation and reflections do not add significantly to the measurement results.		P
5.1.4	Lamp operation		P
	Operation of the test lamp shall be provided in accordance with:		P
	– the appropriate IEC lamp standard, or		N/A
	– the manufacturer' s recommendation		P
5.1.5	Lamp system operation		P
	The power source for operation of the test lamp shall be provided in accordance with:		P
	– the appropriate IEC standard, or		N/A
	– the manufacturer' s recommendation		P
5.2	Measurement procedure		P
5.2.1	Irradiance measurements		P
	Minimum aperture diameter 7mm.		P
	Maximum aperture diameter 50 mm.		P
	The measurement shall be made in that position of the beam giving the maximum reading.		P
	The measurement instrument is adequate calibrated.		P
5.2.2	Radiance measurements		P
5.2.2.1	Standard method		P
	The measurements made with an optical system.		P
	The instrument shall be calibrated to read in absolute radiant power per unit receiving area and per unit solid angle to acceptance averaged over the		P

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	field of view of the instrument.		
5.2.2.2	Alternative method		N/A
	Alternatively to an imaging radiance set-up, an irradiance measurement set-up with a circular field stop placed at the source can be used to perform radiance measurements.		N/A
5.2.3	Measurement of source size		P
	The determination of α, the angle subtended by a source, requires the determination of the 50% emission points of the source.		P
5.2.4	Pulse width measurement for pulsed sources		N/A
	The determination of Δt, the nominal pulse duration of a source, requires the determination of the time during which the emission is > 50% of its peak value.		N/A
5.3	Analysis methods		P
5.3.1	Weighting curve interpolations		P
	To standardize interpolated values, use linear interpolation on the log of given values to obtain intermediate points at the wavelength intervals desired.	see table 4.1	P
5.3.2	Calculations		P
	The calculation of source hazard values shall be performed by weighting the spectral scan by the appropriate function and calculating the total weighted energy.		P
5.3.3	Measurement uncertainty		P
	The quality of all measurement results must be quantified by an analysis of the uncertainty.	see Annex C in the norm	P
6	**LAMP CLASSIFICATION**		P
	For the purposes of this standard it was decided that the values shall be reported as follows:	see table 6.1	P
	– for lamps intended for general lighting service, the hazard values shall be reported as either irradiance or radiance values at a distance which produces an illuminance of 500 lux, but not at a distance less than 200 mm		N/A
	– for all other light sources, including pulsed lamp sources, the hazard values shall be reported at a distance of 200 mm		P
6.1	Continuous wave lamps		P
6.1.1	Except Group		P
	In the except group are lamps, which does not pose any photobiological hazard. The requirement is met by any lamp that does not pose:		P
	– an actinic ultraviolet hazard (E_S) within 8-hours exposure (30000 s), nor		P

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	– a near-UV hazard (E_{UVA}) within 1000 s, (about 16 min), nor		P
	– a retinal blue-light hazard (L_B) within 10000 s (about 2,8 h), nor		N/A
	– a retinal thermal hazard (L_R) within 10 s, nor		P
	– an infrared radiation hazard for the eye (E_{IR}) within 1000 s		N/A
6.1.2	Risk Group 1 (Low-Risk)		P
	In this group are lamps, which exceeds the limits for the except group but that does not pose:		N/A
	– an actinic ultraviolet hazard (E_S) within 10000 s, nor		N/A
	– a near ultraviolet hazard (E_{UVA}) within 300 s, nor		N/A
	– a retinal blue-light hazard (L_B) within 100 s, nor		P
	– a retinal thermal hazard (L_R) within 10 s, nor		N/A
	– an infrared radiation hazard for the eye (E_{IR}) within 100 s		N/A
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (L_{IR}), within 100 s are in Risk Group 1.		N/A
6.1.3	Risk Group 2 (Moderate-Risk)		N/A
	This requirement is met by any lamp that exceeds the limits for Risk Group 1, but that does not pose:		N/A
	– an actinic ultraviolet hazard (E_S) within 1000 s exposure, nor		N/A
	– a near ultraviolet hazard (E_{UVA}) within 100 s, nor		N/A
	– a retinal blue-light hazard (L_B) within 0,25 s (aversion response), nor		N/A
	– a retinal thermal hazard (L_R) within 0,25 s (aversion response), nor		N/A
	– an infrared radiation hazard for the eye (E_{IR}) within 10 s		N/A
	Lamps that emit infrared radiation without a strong visual stimulus and do not pose a near-infrared retinal hazard (L_{IR}), within 10 s are in Risk Group 2.		N/A
6.1.4	Risk Group 3 (High-Risk)		N/A
	Lamps which exceed the limits for Risk Group 2 are in Group 3.		N/A
6.2	Pulsed lamps		N/A
	Pulse lamp criteria shall apply to a single pulse and to any group of pulses within 0,25 s.		N/A
	A pulsed lamp shall be evaluated at the highest nominal energy loading as specified by the manufacturer.		N/A

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict
	The risk group determination of the lamp being tested shall be made as follows:		N/A
	– a lamp that exceeds the exposure limit shall be classified as belonging to Risk Group 3 (High-Risk)		N/A
	– for single pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance does is below the EL shall be classified as belonging to the Exempt Group		N/A
	– for repetitively pulsed lamps, a lamp whose weighted radiant exposure or weighted radiance dose is below the EL, shall be evaluated using the continuous wave risk criteria discussed in clause 6.1, using time averaged values of the pulsed emission		N/A

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 4.1	Spectral weighting function for assessing ultraviolet hazards for skin and eye		P
Wavelength[1] λ, nm	**UV hazard function $S_{uv}(\lambda)$**	**Wavelength λ, nm**	**UV hazard function $S_{uv}(\lambda)$**
200	0,030	313*	0,006
205	0,051	315	0,003
210	0,075	316	0,0024
215	0,095	317	0,0020
220	0,120	318	0,0016
225	0,150	319	0,0012
230	0,190	320	0,0010
235	0,240	322	0,00067
240	0,300	323	0,00054
245	0,360	325	0,00050
250	0,430	328	0,00044
254*	0,500	330	0,00041
255	0,520	333*	0,00037
260	0,650	335	0,00034
265	0,810	340	0,00028
270	1,000	345	0,00024
275	0,960	350	0,00020
280*	0,880	355	0,00016
285	0,770	360	0,00013
290	0,640	365*	0,00011
295	0,540	370	0,000093
297*	0,460	375	0,000077
300	0,300	380	0,000064
303*	0,120	385	0,000053
305	0,060	390	0,000044
308	0,026	395	0,000036
310	0,015	400	0,000030

[1] Wavelengths chosen are representative: other values should be obtained by logarithmic interpolation at intermediate wavelengths.
* Emission lines of a mercury discharge spectrum.

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 4.2	Spectral weighting functions for assessing retinal hazards from broadband optical sources	P

Wavelength nm	**Blue-light hazard function B (λ)**	**Burn hazard function R (λ)**
300	0,01	
305	0,01	
310	0,01	
315	0,01	
320	0,01	
325	0,01	
330	0,01	
335	0,01	
340	0,01	
345	0,01	
350	0,01	
355	0,01	
360	0,01	
365	0,01	
370	0,01	
375	0,01	
380	0,01	0,1
385	0,013	0,13
390	0,025	0,25
395	0,05	0,5
400	0,10	1,0
405	0,20	2,0
410	0,40	4,0
415	0,80	8,0
420	0,90	9,0
425	0,95	9,5
430	0,98	9,8
435	1,00	10,0
440	1,00	10,0
445	0,97	9,7
450	0,94	9,4
455	0,90	9,0
460	0,80	8,0
465	0,70	7,0
470	0,62	6,2
475	0,55	5,5
480	0,45	4,5
485	0,40	4,0
490	0,22	2,2
495	0,16	1,6
500-600	$10^{[(450-\lambda)/50]}$	1,0
600-700	0,001	1,0
700-1050		$10^{[(700-\lambda)/500]}$
1050-1150		0,2
1150-1200		$0{,}2 \cdot 10^{0{,}02(1150-\lambda)}$
1200-1400		0,02

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 5.4	Summary of the ELs for the surface of the skin or cornea (irradiance based values)				P
Hazard Name	**Relevant equation**	**Wavelength range nm**	**Exposure duration sec**	**Limiting aperture rad (deg)**	**EL in terms of constant irradiance $W \cdot m^{-2}$**
Actinic UV skin & eye	$E_S = \sum E_\lambda \cdot S(\lambda) \cdot \Delta\lambda$	200 – 400	< 30000	1,4 (80)	30/t
Eye UV-A	$E_{UVA} = \sum E_\lambda \cdot \Delta\lambda$	315 – 400	≤1000 >1000	1,4 (80)	10000/t 10
Blue-light small source	$E_B = \sum E_\lambda \cdot B(\lambda) \cdot \Delta\lambda$	300 – 700	≤100 >100	< 0,011	100/t 1,0
Eye IR	$E_{IR} = \sum E_\lambda \cdot \Delta\lambda$	780 –3000	≤1000 >1000	1,4 (80)	$18000/t^{0,75}$ 100
Skin thermal	$E_H = \sum E_\lambda \cdot \Delta\lambda$	380 – 3000	< 10	2π sr	$20000/t^{0,75}$

Table 5.5	Summary of the ELs for the retina (radiance based values)				P
Hazard Name	**Relevant equation**	**Wavelength range nm**	**Exposure duration sec**	**Field of view radians**	**EL in terms of constant radiance $W \cdot m^{-2} \cdot sr^{-1}$)**
Blue light	$L_B = \sum L_\lambda \cdot B(\lambda) \cdot \Delta\lambda$	300 – 700	0,25 – 10 10-100 100-10000 ≥ 10000	$0,011 \cdot \sqrt{(t/10)}$ 0,011 $0,0011 \cdot \sqrt{t}$ 0,1	$10^6/t$ $10^6/t$ $10^6/t$ 100
Retinal thermal	$L_R = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	380 – 1400	< 0,25 0,25 – 10	0,0017 $0,011 \cdot \sqrt{(t/10)}$	$50000/(\alpha \cdot t^{0,25})$ $50000/(\alpha \cdot t^{0,25})$
Retinal thermal (weak visual stimulus)	$L_{IR} = \sum L_\lambda \cdot R(\lambda) \cdot \Delta\lambda$	780 – 1400	> 10	0,011	6000/α

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps									P
Risk	Action spectrum	Symbol	Units	Emission Measurement						
				Exempt		Low risk		Mod risk		
				Limit	Result	Limit	Result	Limit	Result	
Actinic UV	$S_{UV}(\lambda)$	E_s	$W \cdot m^{-2}$	0,001	$6,65 \times 10^{-6}$	0,003	N/A	0,03	N/A	
Near UV		E_{UVA}	$W \cdot m^{-2}$	10	$2,08 \times 10^{-2}$	33	N/A	100	N/A	
Blue light	B(λ)	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	103,8	10000	144,4	4000000	N/A	
Blue light, small source	B(λ)	E_B	$W \cdot m^{-2}$	1,0*	N/A	1,0	N/A	400	N/A	
Retinal thermal	R(λ)	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/α = 280000	$1,70 \times 10^3$	28000/α = 280000	$1,70 \times 10^3$	71000/α = 710000	N/A	
Retinal thermal, weak visual stimulus**	R(λ)	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	6000/α	N/A	6000/α	N/A	6000/α	N/A	
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	N/A	570	N/A	3200	N/A	

* Small source defined as one with α < 0,011 radian. Averaging field of view at 10000 s is 0,1 radian.
** Involves evaluation of non-GLS source

List of test equipment used:

TÜVRheinland®
Genau. Richtig.

Equipment - Liste

Prüfdatum von 03.09.2021
Prüfdatum bis 03.09.2021

Prüfberichtsnummer DE21Q1K6 001
Projektnummer P00341053AB

Kunde POWERMOON GmbH
Produktname Luminaire Hexaspace Schutzklasse 2
Bemerkung

Page 1 of 1

GTEM-ID	Beschreibung	Typbezeichnung	Hersteller	Letzt. Datum TT.MM.JJJJ	Fälligkeit TT.MM.JJJJ
9027017	Optischer Messplatz		Bentham Instruments Limited	NA*	
2726084	Lineal	460600, 50 cm	Schwenk	18.08.2021	ICO
2726755	Messschieber 150 mm	16 ES , 0 - 150 mm	Mahr GmbH	25.06.2021	25.06.2023
2728100	Waage (Plattform)	EOB150K50, 150/0,05	KERN & SOHN GmbH	26.04.2021	26.04.2022
2732543	Datenlogger Feuchte/Temperatur	EASYLog 24RFT	Greisinger electronic GmbH	18.05.2021	18.05.2022

IEC62471B ATTACHMENT

Clause	Requirement + Test	Result - Remark	Verdict
ATTACHMENT TO TEST REPORT IEC 62471 **EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES** Photobiological safety of lamps and lamps systems			
Differences according to..... EN 62471:2008			
Annex Form No..... EU_GD_IEC62471B **Annex Form Originator .....** OVE **Master Annex Form.....** 2019-01-24			

	CENELEC COMMON MODIFICATIONS (EN)		**P**
4	**EXPOSURE LIMITS**		**P**
	Contents of the whole Clause 4 of IEC 62471:2006 moved into a new informative Annex ZB		—
	Clause 4 replaced by the following:		**P**
	Limits of the Artificial Optical Radiation Directive (2006/25/EC) have been applied instead of those fixed in IEC 62471:2006	See appended Table 6.1	**P**
4.1	General		**P**
	First paragraph deleted		—

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Table 6.1	Emission limits for risk groups of continuous wave lamps (based on EU Directive 2006/25/EC)								P
Risk	Action spectrum	Symbol	Units	Emission Measurement					
				Exempt		Low risk		Mod risk	
				Limit	Result	Limit	Result	Limit	Result
Actinic UV	$S_{UV}(\lambda)$	E_S	$W \cdot m^{-2}$	0,001	$6,65 \times 10^{-6}$	-	-	-	-
Near UV		E_{UVA}	$W \cdot m^{-2}$	0,33	$2,08 \times 10^{-2}$	-	-	-	-
Blue light	B(λ)	L_B	$W \cdot m^{-2} \cdot sr^{-1}$	100	103,8	10000	144,4	4000000	N/A
Blue light, small source	B(λ)	E_B	$W \cdot m^{-2}$	0,01*	N/A	1,0	N/A	400	N/A
Retinal thermal	R(λ)	L_R	$W \cdot m^{-2} \cdot sr^{-1}$	28000/α = 280000	$1,70 \times 10^3$	28000/α = 280000	$1,70 \times 10^3$	71000/α = 710000	N/A
Retinal thermal, weak visual stimulus**	R(λ)	L_{IR}	$W \cdot m^{-2} \cdot sr^{-1}$	545000 0,0017≤ α ≤ 0,011	N/A				
				6000/α 0,011≤ α ≤ 0,1	N/A				
IR radiation, eye		E_{IR}	$W \cdot m^{-2}$	100	N/A	570	N/A	3200	N/A

* Small source defined as one with α < 0,011 radian. Averaging field of view at 10000 s is 0,1 radian.
** Involves evaluation of non-GLS source

NOTE The action functions: see Table 4.1 and Table 4.2
The applicable aperture diameters: see 4.2.1
The limitations for the angular subtenses: see 4.2.2
The related measurement condition 5.2.3 and the range of acceptance angles: see Table 5.5.

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

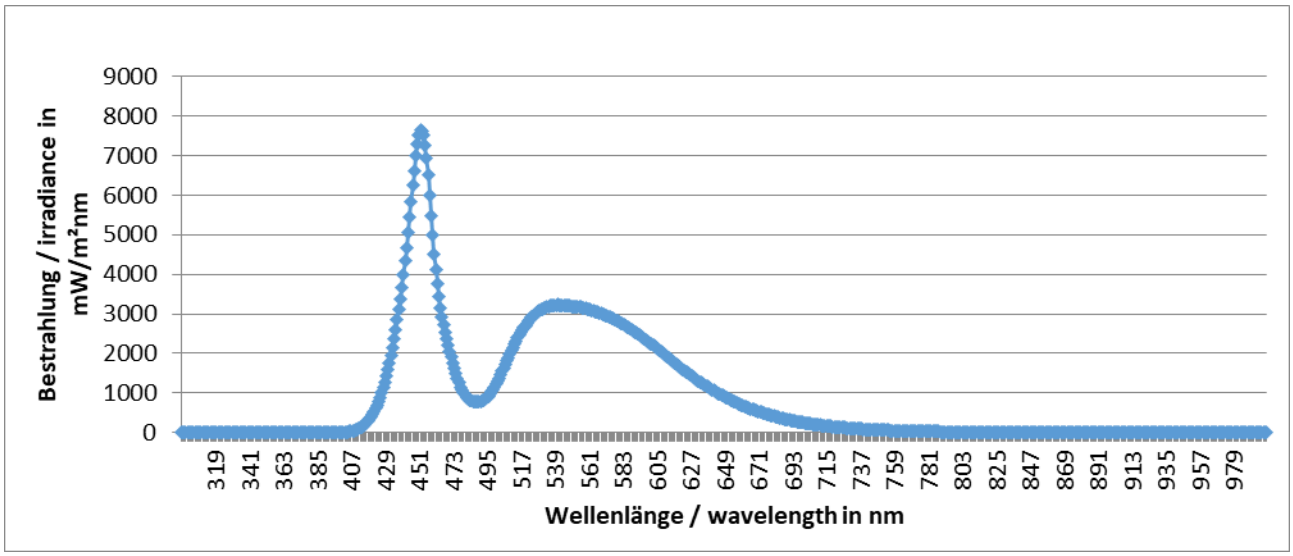


Fig. 1: Spectrum of LEDs

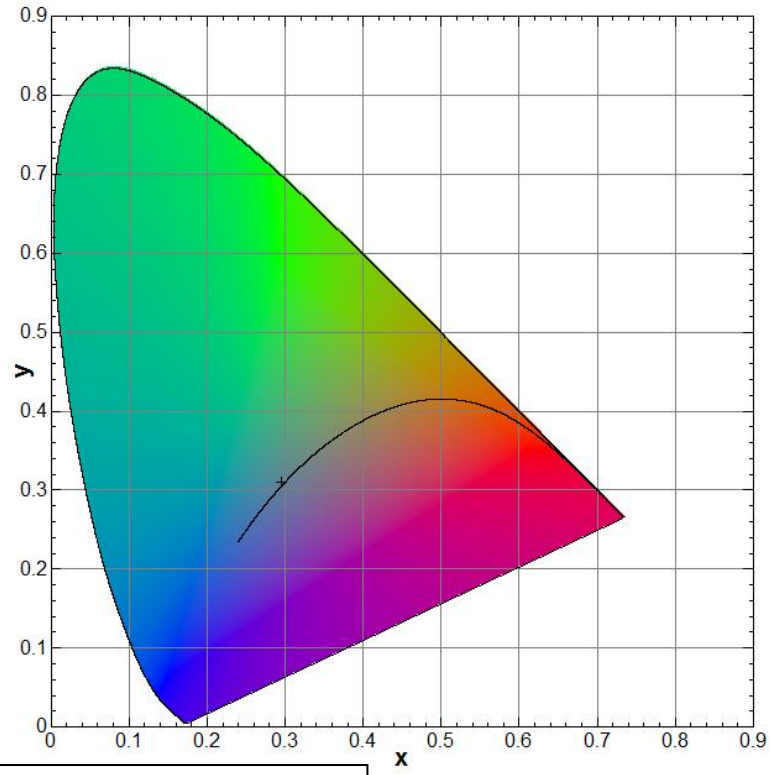


Fig. 2: Colour locus of LEDs

x: 0,2952, y: 0,3097, Ra: 74,1, Colour temperature: 7,89 x 10^3 K

IEC 62471			
Clause	Requirement + Test	Result – Remark	Verdict

Spectrometer Results according to IEC 62471 and EN 62471

From the hazards selected, lamp classification is:
RISK GROUP 1

Labelling should be:
No Labelling Required

Actinic UV
Integral : 0.00665 mW m-2
Exposure : 4512929.7 seconds
Classification : Exempt
Label : Not Required

Near UV
Integral : 0.02083 W m-2
Exposure : 480173.6 seconds
Classification : Exempt
Label : Not Required

Blue Light
Integral : 144.39346 W m-2 sr-1
Exposure : 6925.5 seconds
Classification : Group 1
Label : Not Required

Retinal Thermal
Integral : 1701.0263 W m-2 sr-1
Exposure : 280000000 seconds
Classification : Exempt
Label : Not Required

Spectrometer Results UV hazard

Measurement distance: 200 mm
Spectral Range 200 – 780 nm
Illuminance 1.88E+05 lux

Hazard	Actinic UV ($mW.m^{-2}$)	Measured value ($mW.klm^{-1}$)	Limit ($mW.klm^{-1}$)	Result
IEC 61167 (200-400nm)	*6.65E-03*	*3.53E-05*	2	*Pass*
IEC 60598-1 (200-315nm)	*5.63E-03*	*2.99E-05*	2	*Pass*

Spectrometer Results according to IEC TR 62778

Spectral Range 300 – 780 nm
Luminance 1.42E+05 cd m-2

Hazard	Measured value	RG1 Limit	Classification	E_{thr} (lx)
Blue Light Radiance 11mrad FOV (W m-2 sr-1)	*144.394*	*1E+04*	*RG1*	***n/a***

ANLAGE 2 zum Prüfbericht-Nr.: DE21Q1K6 001
APPENDIX 2 to Test Report No.:

FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

Bild / Picture 1:

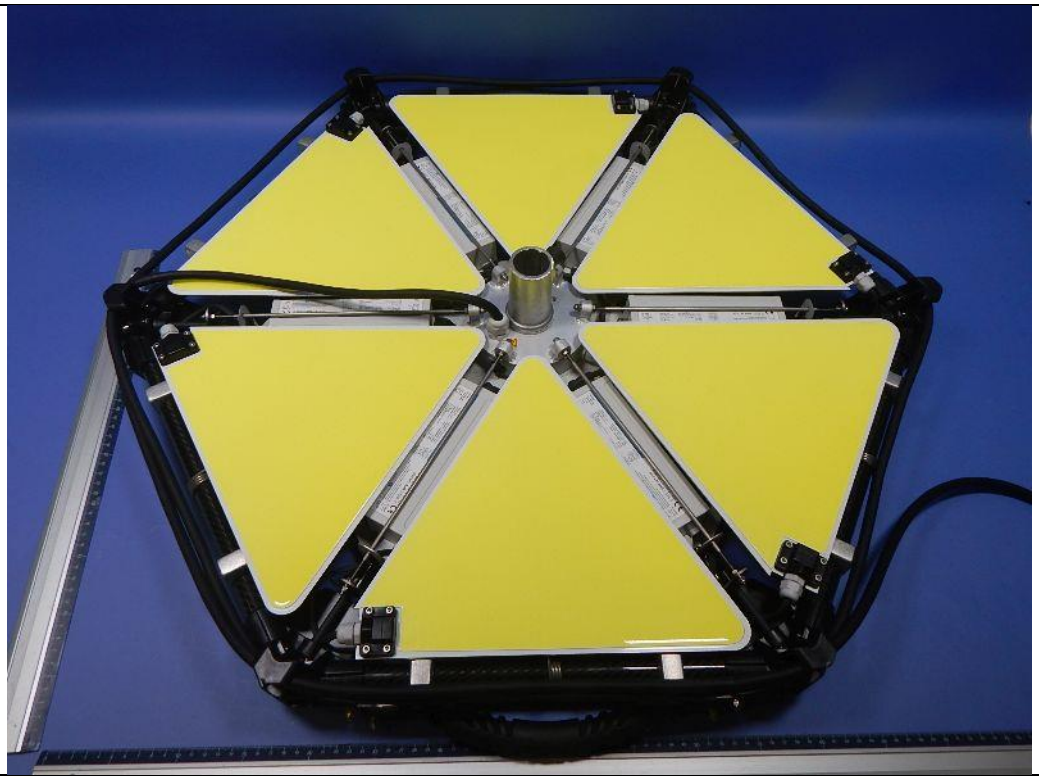
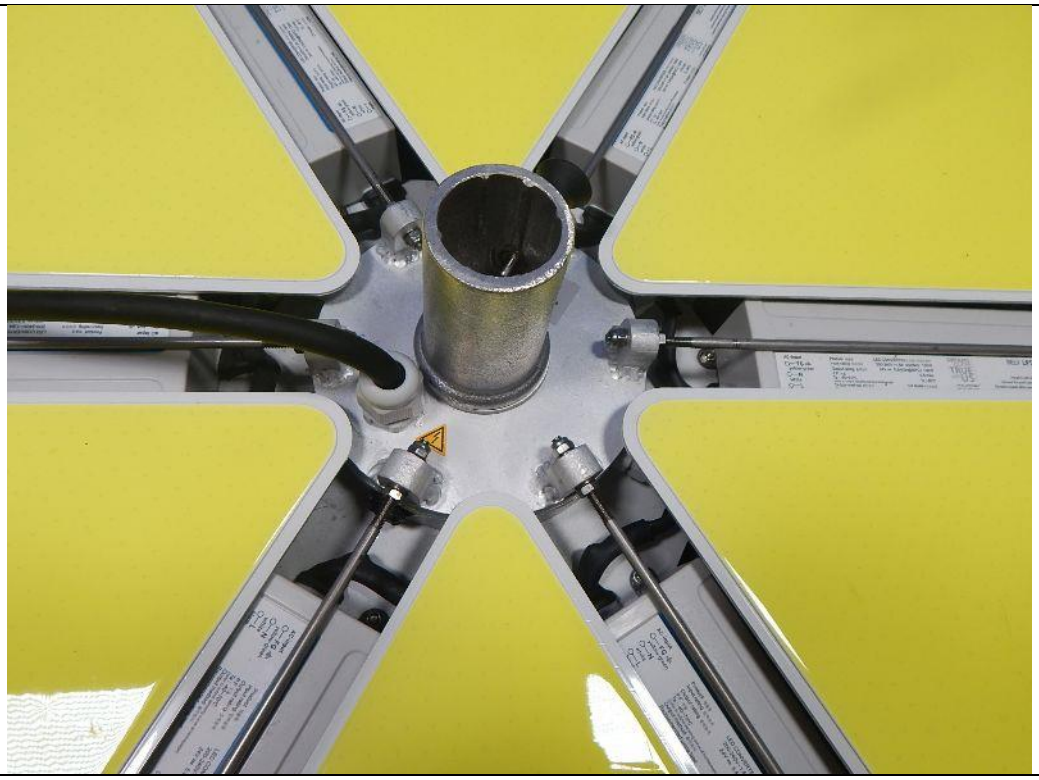


Bild / Picture 2:

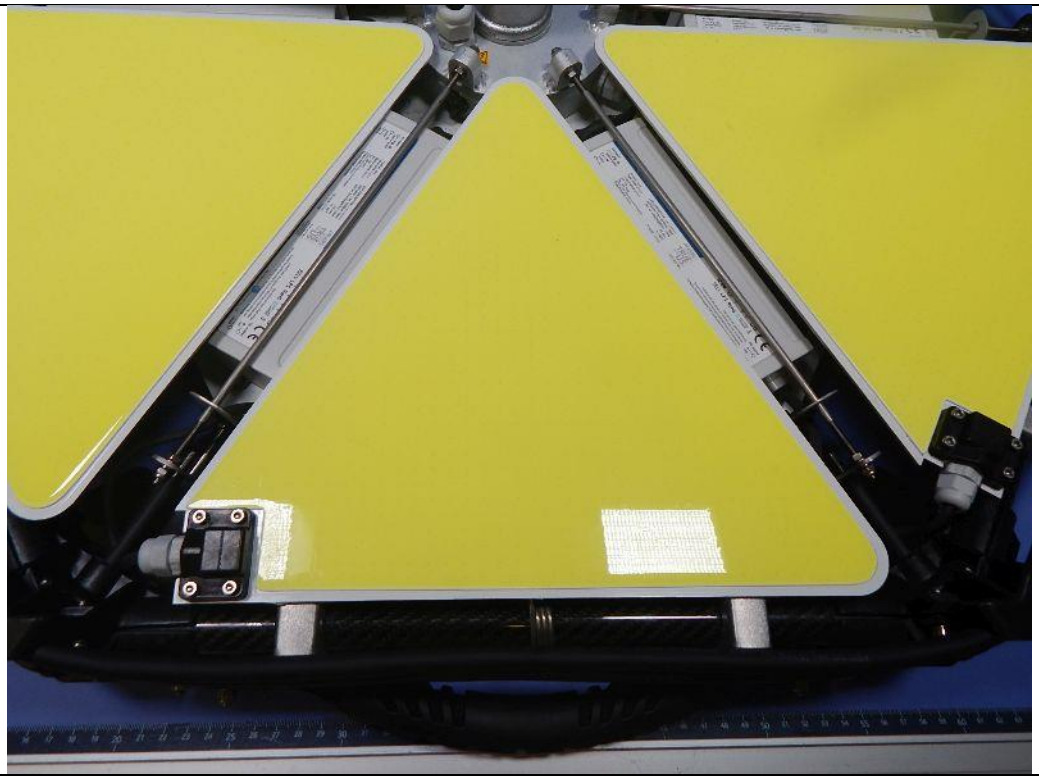


ANLAGE 2 zum Prüfbericht-Nr.: DE21Q1K6 001
APPENDIX 2 to Test Report No.:

FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

Bild / Picture 3:

Bild / Picture 4:



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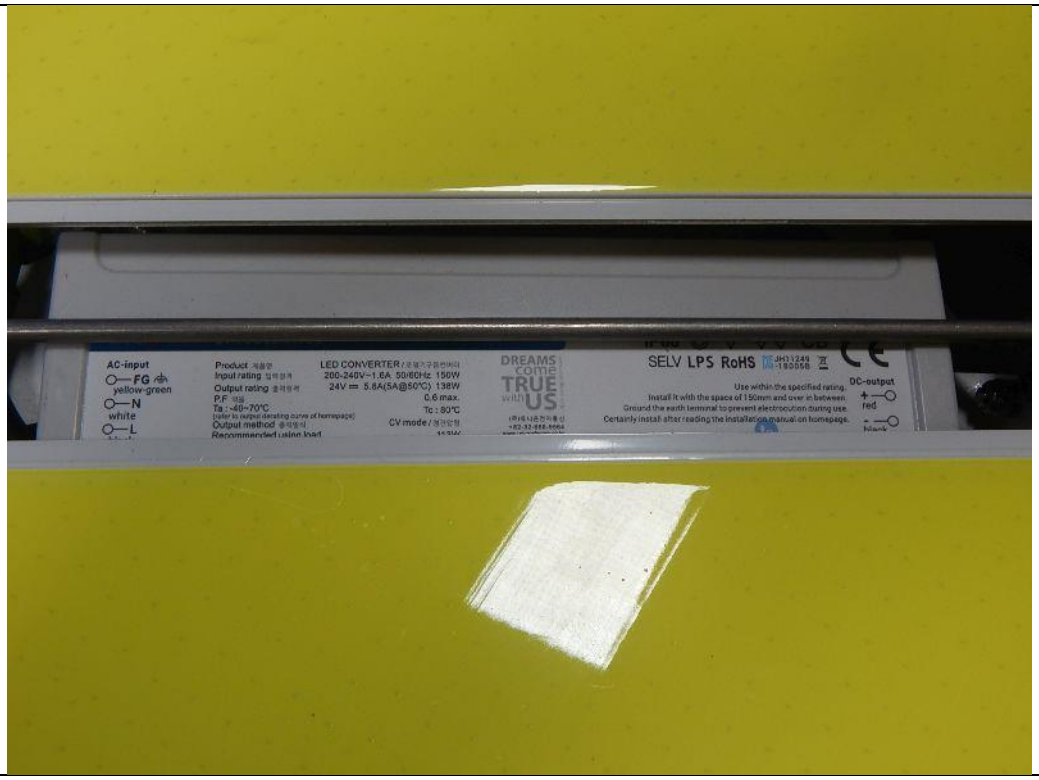
APPENDIX 2 to Test Report No.:

FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

Bild / Picture 5:



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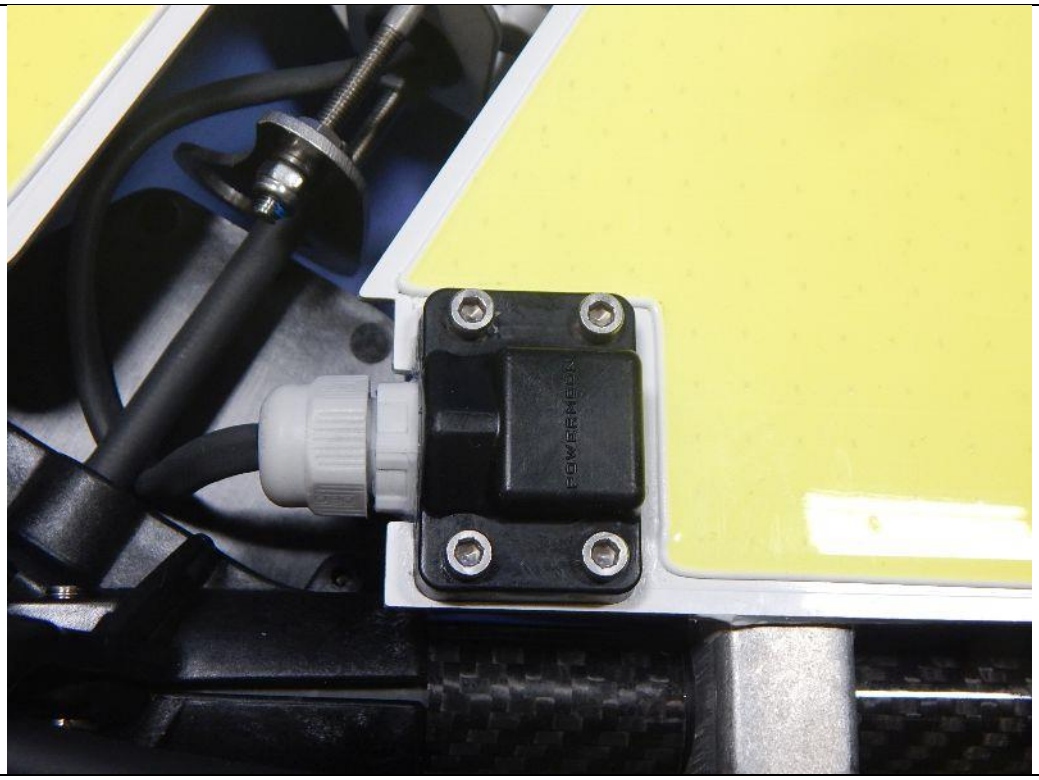

FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

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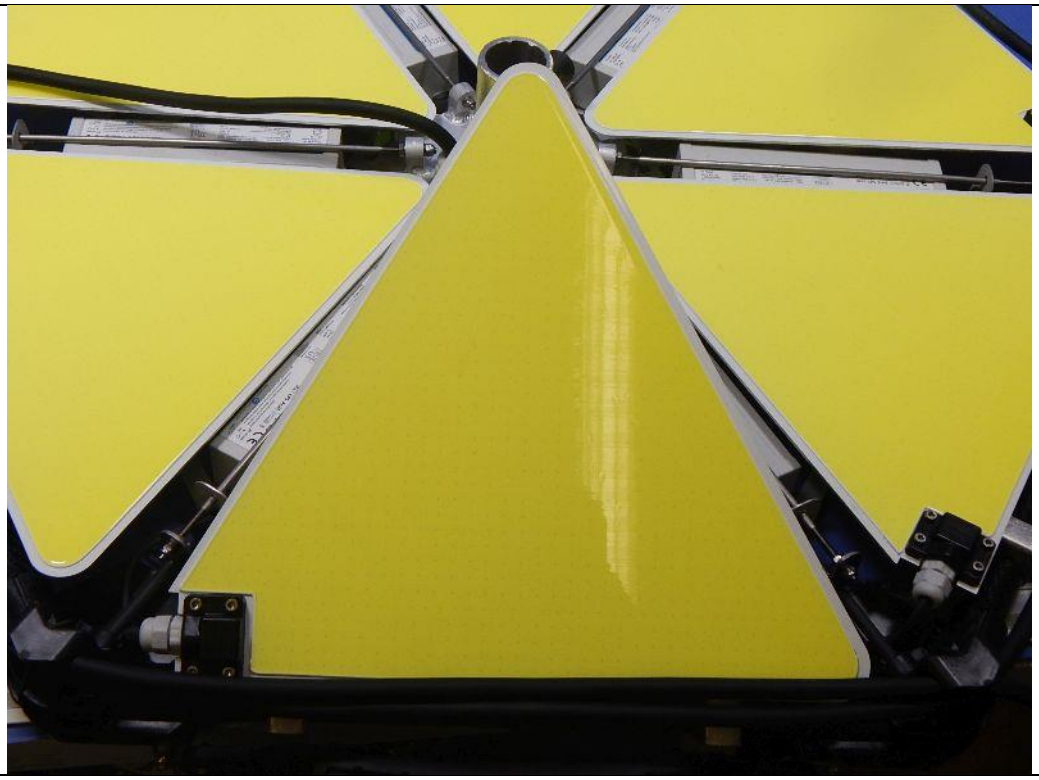

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FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

Bild / Picture 9:

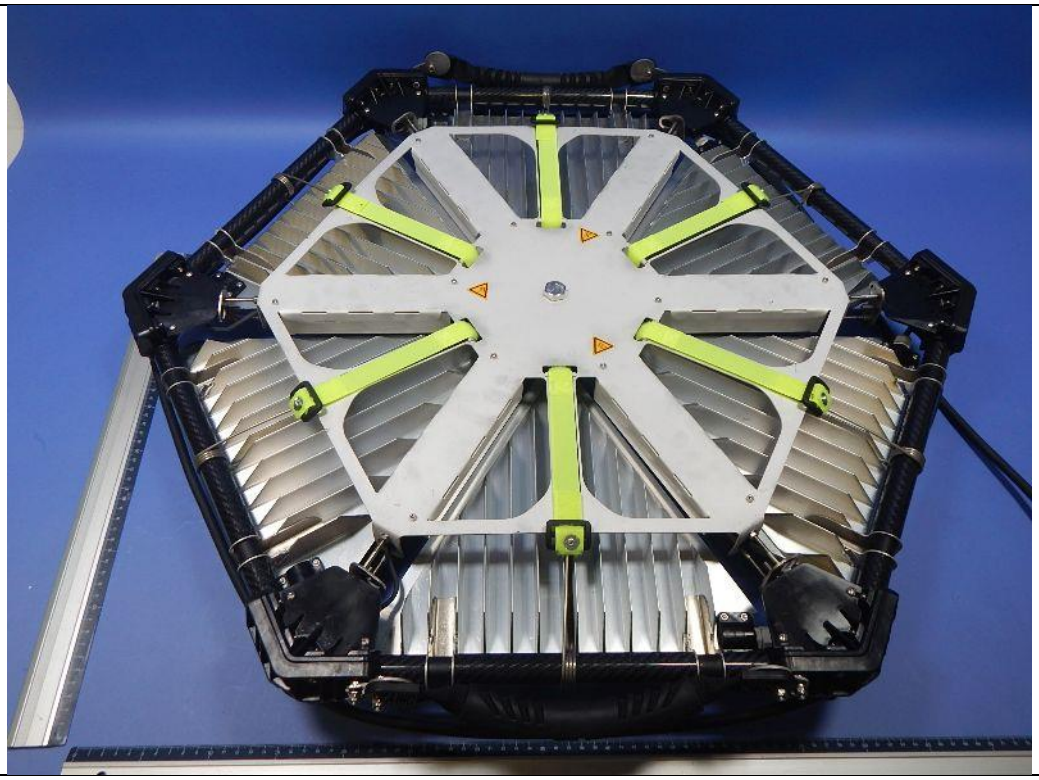


Bild / Picture 10:

ANLAGE 2 zum Prüfbericht-Nr.: DE21Q1K6 001
APPENDIX 2 to Test Report No.:

FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

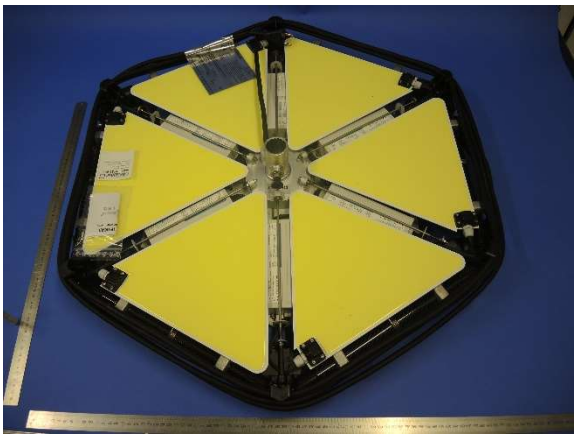
Bild / Picture 11:

Prüfbericht - Produkte
Test Report - Products

TÜVRheinland®

Prüfbericht-Nr.: *Test report no.*:	**DE21C2M8 001**	**Auftrags-Nr.:** *Order no.*:	1092623 70	
Kunden-Referenz-Nr.: *Client reference no.*:	1667981	**Auftragsdatum:** *Order date:*	2021-07-08	
Auftraggeber: *Client*:	POWERMOON GmbH, Ginsterstr. 5, 47495 Rheinberg, Deutschland			
Prüfgegenstand: *Test item*:	Luminaire Powermoon Transformer			
Bezeichnung / Typ-Nr.: *Identification / Type no.*:	Hexaspace Schutzklasse 2			
Auftrags-Inhalt: *Order content*:	Sinus Vibration			
Prüfgrundlage: *Test specification*:	EN 60068-2-6: 2008 (Teilprüfung) Umgebungseinflüsse – Teil 2-6: Prüfverfahren – Prüfung Fc: Schwingen (sinusförmig)			

Wareneingangsdatum: *Date of sample receipt*:	2021-07-09
Prüfmuster-Nr.: *Test sample no:*	A003090129-004
Prüfzeitraum: *Testing period*:	2021-08-20 – 2021-08-20
Ort der Prüfung: *Place of testing*:	Nürnberg
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland LGA Products GmbH
Prüfergebnis*: *Test result**:	Siehe Sonstiges / See Other



geprüft von: *tested by:*		**genehmigt von:** *authorized by*:	
Datum: *Date:* 2021-08-24		**Ausstellungsdatum:** *Issue date:* 2021-08-24	
Stellung / Position:	Sachverständige(r)/Expert	**Stellung** / Position:	Laborleiter/lab manager

Sonstiges / *Other*: Siehe Messergebnisse - Bemerkungen

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Prüfbericht-Nr.: DE21C2M8 001
Test report no.:

Anmerkungen
Remarks

1	Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden. *The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system.* *Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.*
2	Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben. *As contractually agreed, this document has been signed digitally only. TUV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TUV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged.*
3	Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt. *Test clauses with remark of * are subcontracted to qualified subcontractors and descripted under the respective test clause in the report.* *Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.*
4	Die Messunsicherheit der in diesem Prüfbericht aufgeführten Messverfahren wird nicht in die Einhaltung der jeweiligen Grenzwerte / Betriebsbedingungen mit einbezogen. *The measurement uncertainly of the measurement procedures listed in this test report does not include the compliance of the respective limit values / operating conditions.*
5	Sofern mit dem Kunden keine abweichende Regelung getroffen wurde, wird eine Konformitätsbewertung grundsätzlich auf Basis der angewendeten Normen durchgeführt. Auf Kundenwunsch wird die Aussage zur Konformität des in diesem Prüfbericht geprüften Produktes nach den Kriterien / Anforderungen der angewendeten Normen durchgeführt. Davon abweichende Bewertungsbedingungen werden in den jeweiligen Kapiteln gesondert dokumentiert. *Unless otherwise agreed with the customer, a conformity assessment is always carried out based on the applied standards.* *At the customer´s request, the statement on the conformity of the product tested in this test report is carried out according to the criteria / requirements of the applied standards.* *Evaluation conditions deviating from these are documented separately in the respective chapters.*

Produktbeschreibung
Product description

Liste der verwendeten Prüfmittel
List of used test equipment

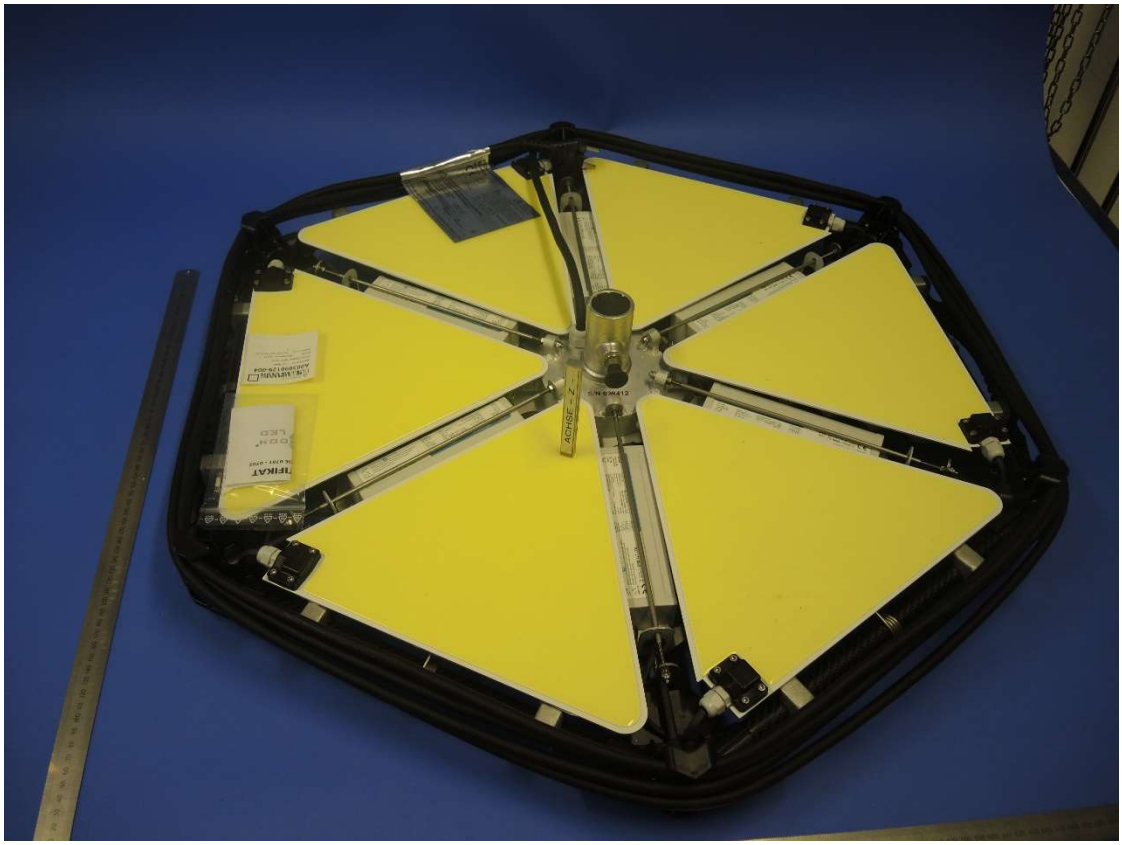
Prüfmittel *Test equipment*	**Prüfmittel-Nr. / ID- NR.** *Equipment No. / ID-No.*	**Nächste Kalibrierung** *Next calibration*
Shaker RMS SWT 224-400	2730164	N/A
Regelanlage B&K Dactron LDS-200	2726291	10/2021
Signalkonditionierer Unholtz-Dickie CVA-8	2726446	04/2023
Beschleunigungsaufnehmer B&K 4383	2730208	06/2022

Prüfmusterbeschreibung
Description of test samples

Produktdetails *Product details*	N/A
Maße / Gewicht *Dimensions / Weight*	N/A
Bedienelemente *Operating elements*	N/A
Ausstattung / Zubehör *Equipment / Accessories*	N/A
Verwendete Materialien *Used materials*	N/A
Sonstiges *Other*	Test sample(s), as well sample information, description, product details and intended usage was provided by customer.
Prüfmusterbereitstellung: *Test sample obtaining:*	☒ Sending by customer ☐ Sampling by TÜV Rheinland Group ☐ others:

Produktbeschreibung
Product description

1Stk. Luminaire Powermoon Transformer: Hexaspace Schutzklasse 2



Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen /** *Measuring results - Remarks*	**Ergebnis** *Result*
1	**Prüfangaben zur Sinus-Vibrationsprüfung gemäß EN 60068-2-6:2008**		
1	Frequenzbereich: 10 – 55 Hz Durchlaufgeschwindigkeit: 1 Okt./min Auslenkungsamplitude:0,35mm Anzahl der Prüfachsen: 1 (Z) Prüfdauer pro Achse: 30 Minuten Betriebsart: in Betrieb	Es sind keinerlei sichtbare mechanische Schäden wie Materialbruch, Risse, lose Teile oder Deformationen feststellbar. Die Funktion ist vor während und nach der Prüfung gegeben.	Pass ☐ Fail ☐ N/A ☒ N/T ☐

ANLAGE zum Prüfbericht-Nr.: DE21C2M8 001
APPENDIX to Test Report No.:

FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

Bild / Picture 1: Prüfaufbau

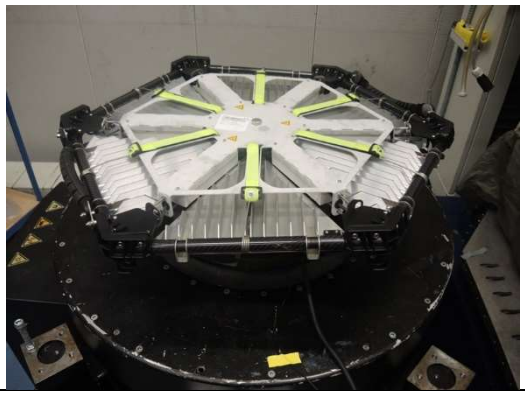
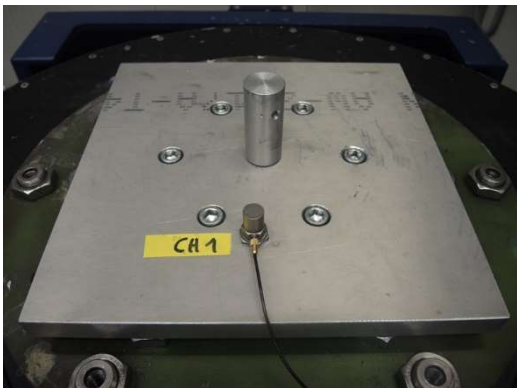


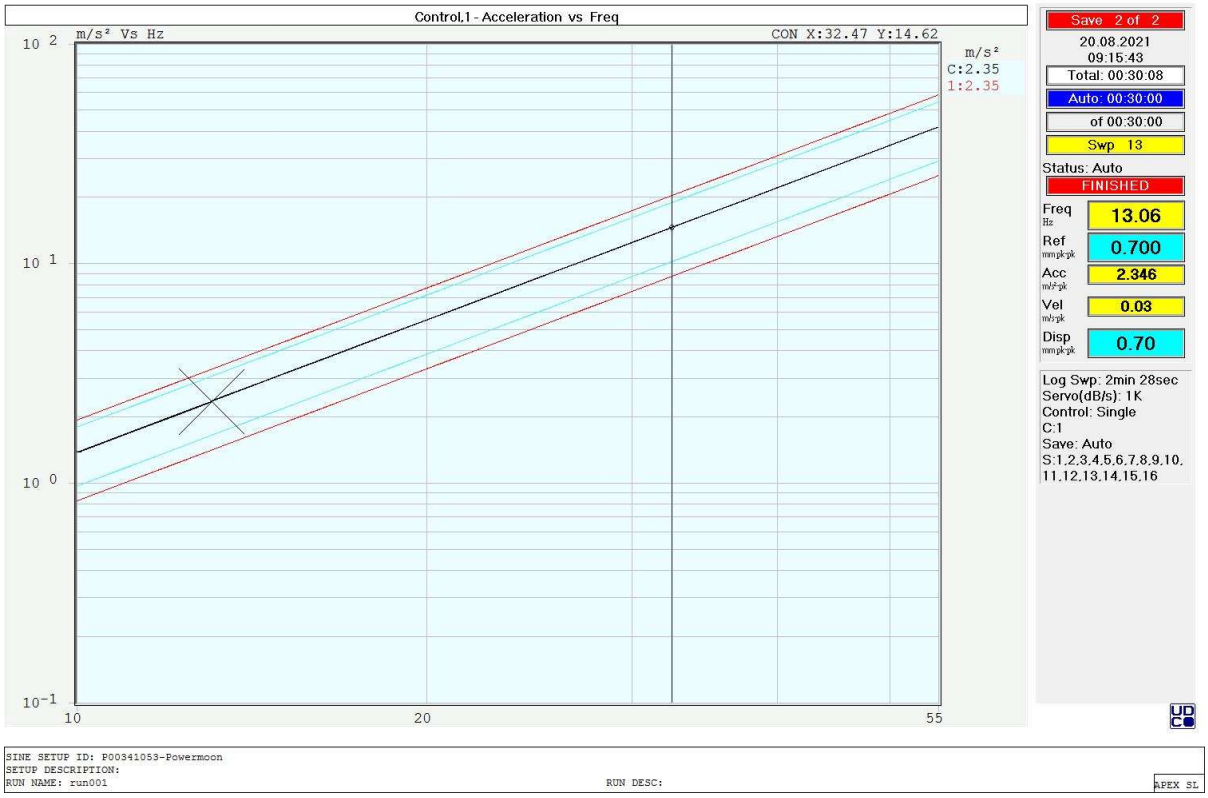
Bild / Picture 2: Regekanal Ch1



ANLAGE zum Prüfbericht-Nr.: DE21C2M8 001
APPENDIX to Test Report No.:

FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

Bild / Picture 3: Sinus Vibration



-- Ende des Prüfberichts -

Prüfbericht-Nr.: *Test report no.*:	**DE218EHJ 001**	**Auftrags-Nr.:** *Order no.*:	1092623	Seite 1 von 6 *Page 1 of 6*
Kunden-Referenz-Nr.: *Client reference no.*:	1667981	**Auftragsdatum:** *Order date:*	2021-07-08	
Auftraggeber: *Client*:	POWERMOON GmbH Ginsterstr. 5 D-47495 Rheinberg			
Prüfgegenstand: *Test item*:	Luminaire			
Bezeichnung / Typ-Nr.: *Identification / Type no.*:	HexaSpace			
Auftrags-Inhalt: *Order content*:	Degree of protection (IP code) IP68			
Prüfgrundlage: *Test specification*:	IEC 60598-1:2014+AMD1:2017 cl. 9, cl. 10, cl. 12			

Wareneingangsdatum: *Date of sample receipt*:	2021-07-09
Prüfmuster-Nr.: *Test sample no:*	A003090129-002
Prüfzeitraum: *Testing period*:	2021-08-27 - 2021-09-08
Ort der Prüfung: *Place of testing*:	Am Grauen Stein 29, 51105 Cologne, Germany
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland LGA Products GmbH, Cologne
Prüfergebnis*: *Test result**:	Pass

geprüft von: *tested by:*	X	**genehmigt von:** *authorized by*:	X
Datum: *Date:* 2021-09-09		**Ausstellungsdatum:** *Issue date:* 2021-09-09	
Stellung / Position:	Sachverständige(r)/Expert	**Stellung** / Position:	Sachverständige(r)/Expert

Sonstiges / *Other*: Annex: DE218EHJ 001_attm1_PD Photodocumentation 10 pages

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery*: Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* *Legend:*	*P(ass) = passed a.m. test specification(s)*	*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Anmerkungen
Remarks

1	Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden. *The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system.* *Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.*
2	Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben. *As contractually agreed, this document has been signed digitally only. TUV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TUV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged.*
3	Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt. *Test clauses with remark of * are subcontracted to qualified subcontractors and descripted under the respective test clause in the report.* *Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.*
4	Die Messunsicherheit der in diesem Prüfbericht aufgeführten Messverfahren wird nicht in die Einhaltung der jeweiligen Grenzwerte / Betriebsbedingungen mit einbezogen. *The measurement uncertaincy of the measurement procedures listed in this test report does not include the compliance of the respective limit values / operating conditions.*
5	Sofern mit dem Kunden keine abweichende Regelung getroffen wurde, wird eine Konformitätsbewertung grundsätzlich auf Basis der angewendeten Normen durchgeführt. Auf Kundenwunsch wird die Aussage zur Konformität des in diesem Prüfbericht geprüften Produktes nach den Kriterien / Anforderungen der angewendeten Normen durchgeführt. Davon abweichende Bewertungsbedingungen werden in den jeweiligen Kapiteln gesondert dokumentiert. *Unless oherwise agreed with the customer, a conformity assessment is always carried out based on the applied standards.* *At the customer´s request, the statement on the conformity of the product tested in this test report is carried out according to the criteria / requirements of the applied standards.* *Evaluation conditions deviating from these are documented separately in the respective chapters.*

Produktbeschreibung
Product description

1	**Produktdetails** *Product details*	900W / 230V~ AC / 50-60Hz / 4A / -25°C to +40°C
2	**Maße / Gewicht** *Dimensions / Weight*	Approx. Ø 800mm x 70mm / approx. 8,8Kg
3	**Bedienelemente** *Operating elements*	--
4	**Ausstattung / Zubehör** *Equipment / Accessories*	Laminated LED modules without cover
5	**Verwendete Materialien** *Used materials*	Enclosure made of metal and plastic parts
6	**Sonstiges** *Other*	Test sample(s), as well sample information, description, product details and intended usage was provided by customer.
7	**Prüfmusterbereitstellung**: *Test sample obtaining:*	☒ Sending by customer ☐ Sampling by TÜV Rheinland Group ☐ others:

Abbildung 1 / picture 1: Sample backside

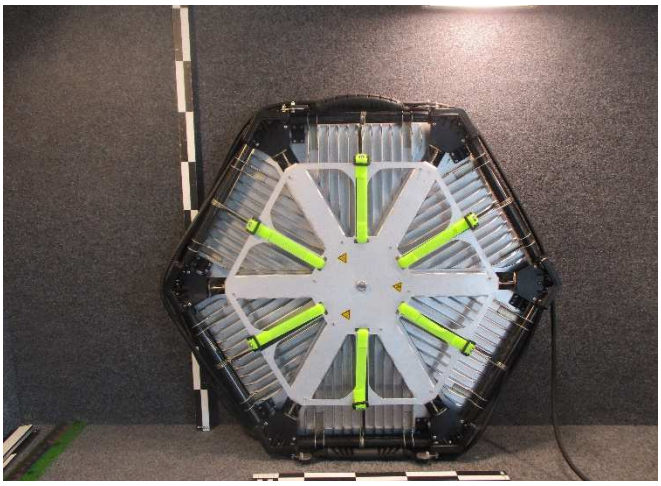


Abbildung 2 / picture 2: Type label

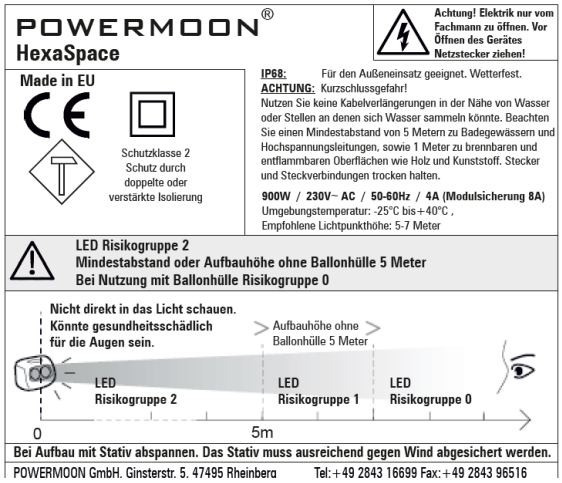


Abbildung 3 / picture 3: After dust test

Abbildung 4 / picture 4: During water test

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
12.3	**IEC 60598-1:2014+AMD1:2017 – Endurance test**		
--	**Conditions:** The test was performed in a climate chamber with parameters listed below. Per cycle the supply voltage was applied to the luminaire for 21 hours and disconnected for the remaining 3 hours. T_{amb} 35 °C Number of cycles 10 Duration 240 h Test voltage 264 V		
--	Sample A003090129-002	After the test no cracks or other damages were visible such that above mentioned requirements were fulfilled. Further the marking of the luminaire was legible.	P ☑ F ☐ N/A ☐ N/T ☐

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
9.2.2	**IEC 60598-1:2014+AMD1:2017 - Dust test for first characteristic numeral 6**		
--	**Conditions:** The luminaire was switched on outside the dust chamber until reaching a stable operating temperature. While still operating, it was placed inside the chamber, which was started after closing the door. After 1 minute the luminaire was switched off. The defined talcum powder was maintained in suspension by air current. At the end of the test no deposit of talcum powder should be observable inside the test sample. Duration 3 h Ambient conditions t_{amb}: 24,3 °C / rH: 54,3 % / p_{amb}: 1011,8 hPa		
--	Sample A003090129-002	The inspection after the test has shown no ingress of dust inside the sample. All live parts are potted so that no dust can penetrate.	P ☑ F ☐ N/A ☐ N/T ☐

Absatz *Clause*	**Anforderungen - Prüfungen /** *Requirements - Tests*	**Messergebnisse – Bemerkungen/** *Measuring results - Remarks*	**Ergebnis** *Result*
9.2.9	**IEC 60598-1:2014+AMD1:2017 - Test for second characteristic numeral 8 (Pressurized water-tight luminaire)**		
--	**Conditions:** Before the test sample was powered until the temperature of the luminaire housing exceeded that of the water in the test tank between 5 °C and 10 °C. Afterwards, the luminaire was switched off and subjected for 30 min to a water pressure of 1.3 times the pressure corresponding to the highest permissible rated immersion depth of the luminaire. After the test there should be no ingress of water, or, if any water has entered, it shall not: - be sufficient to interfere with the correct operation of the equipment or impair safety; - deposit on insulation parts where it could lead to tracking along the creepage distances; - reach live parts or windings not designed to operate when wet; - accumulate near the cable end or enter the cable if any. Depth: 1,3m Duration: 30 Ambient conditions t_{amb}: 24,8 °C / rH: 51,8 % / p_{amb}: 1011,4 hPa		
--	Sample A003090129-002	The inspection has shown that no dust could enter. All live parts are potted so that no water can penetrate.	P ☑ F ☐ N/A ☐ N/T ☐

Absatz *Clause*	Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse – Bemerkungen/ *Measuring results - Remarks*	Ergebnis *Result*

10.2.1	**IEC 60598-1:2014+AMD1:2017 – Insulation resistance**		
--	**Conditions:** According to cl. 9.3 the test was performed immediately after the water test. SELV Insulation resistance: Between current-carrying parts of different polarity : > 440 MΩ Between current-carrying parts and mounting surface : > 440 MΩ Between current-carrying parts and metal parts of the luminaire : > 440 MΩ High voltage test: 2920V AC Ambient conditions t_{amb}: 27,0°C / rH: 46,3 % / p_{amb}: 1016,2 hPa		
--	Sample A003090129-002	The insulation resistance was high enough. The minimum requirement is 1 MΩ.	P ☑ F ☐ N/A ☐ N/T ☐

10.2.2	**IEC 60598-1:2014+AMD1:2017 – Dielectric strength**		
--	**Conditions:** According to cl. 9.3 the test was performed immediately after the water test. Voltage of substantially sine-wave form, with a frequency of 50 Hz or 60 Hz, shall be applied for 1 min across the insulation shown in that table. The test voltage was applied between L&N and enclosure covered by metal foil Duration: 1 min Voltage: 2920 V AC Required maximum current max.: 100 mAC Ambient conditions t_{amb}: 27,0°C / rH: 46,3 % / p_{amb}: 1016,2 hPa		
--	Sample A003090129-002	No flash over or breakdrown occurred.	P ☑ F ☐ N/A ☐ N/T ☐

-- End of report --

ANLAGE 1 zum Prüfbericht-Nr.: DE218EHJ 001
APPENDIX 1 to Test Report No.:

FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

Bild / Picture 1: Sample

Bild / Picture 2: LED converter

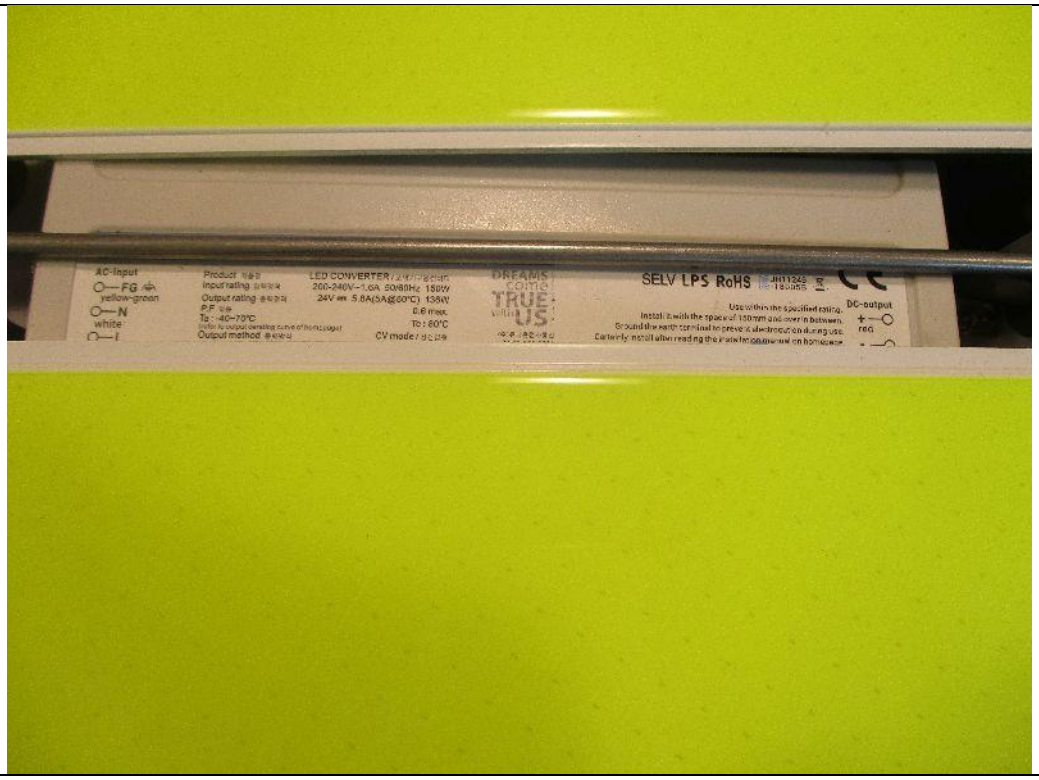


FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

Bild / Picture 3: Sample

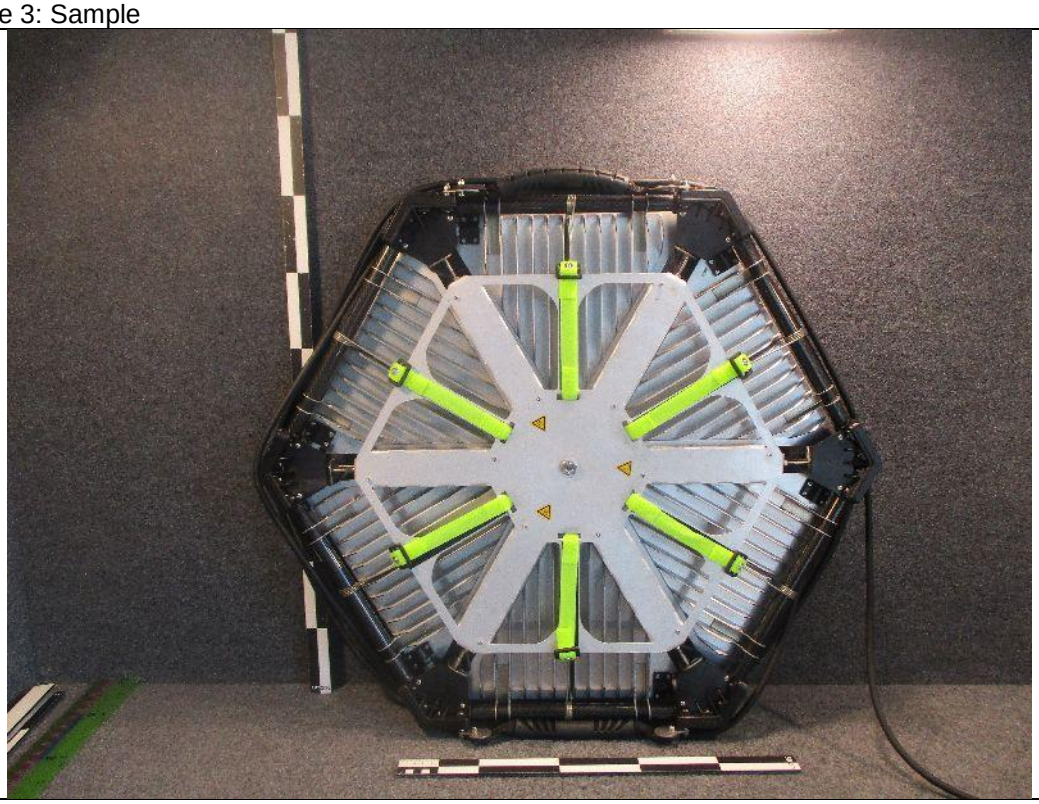


Bild / Picture 4: Sample

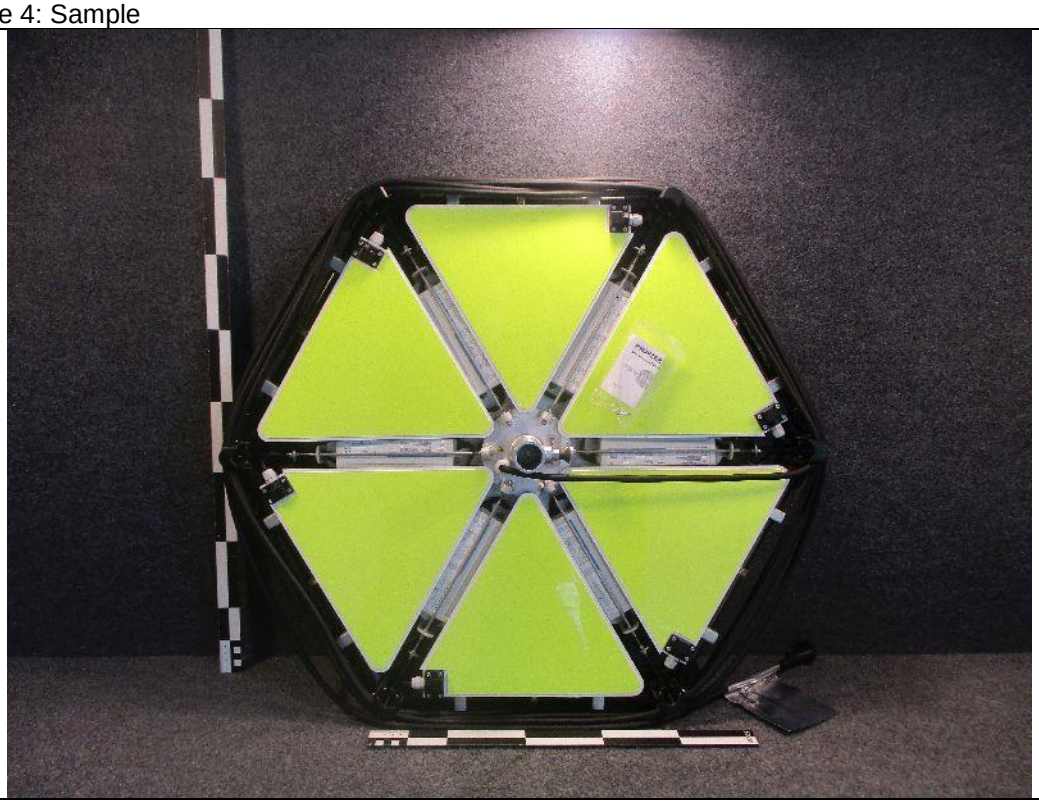


FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

Bild / Picture 5: Cable gland

Bild / Picture 6: TRLP sample number

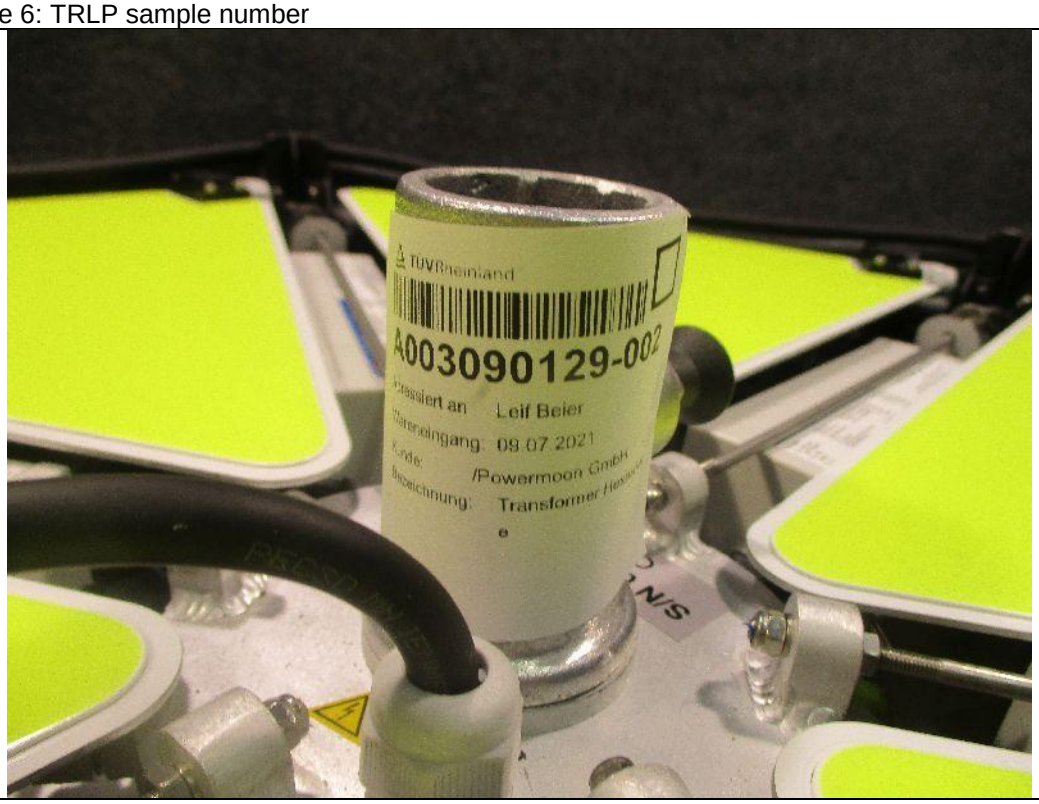


FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

Bild / Picture 7: Securing of LED converter

Bild / Picture 8: Securing of LED converter

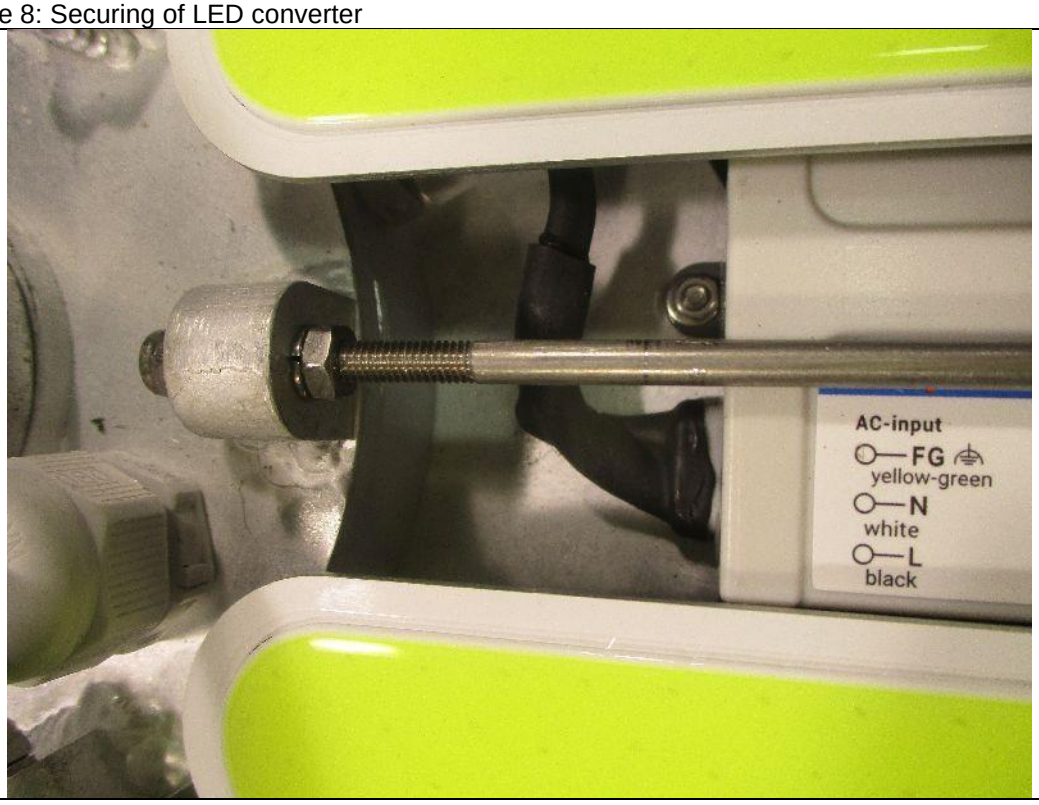


FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

Bild / Picture 9: Mains inlet

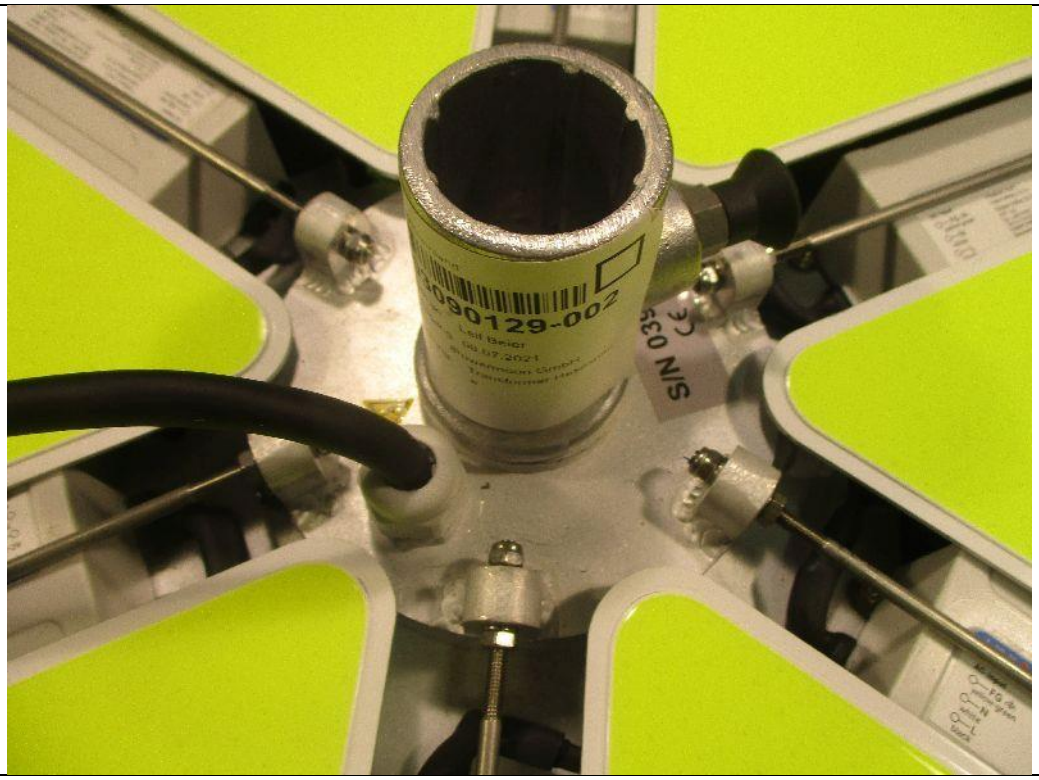


Bild / Picture 10: Cable gland

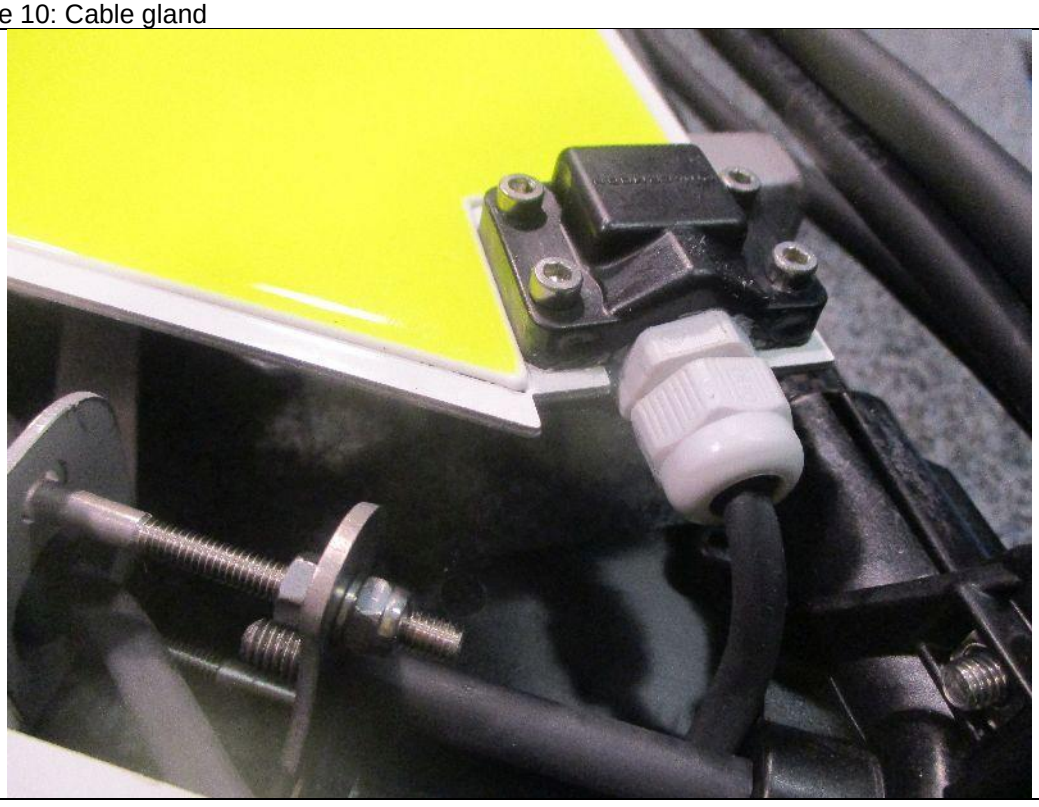


FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

Bild / Picture 11: After dust test

Bild / Picture 12: After dust test

FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

Bild / Picture 13: Depth during water test

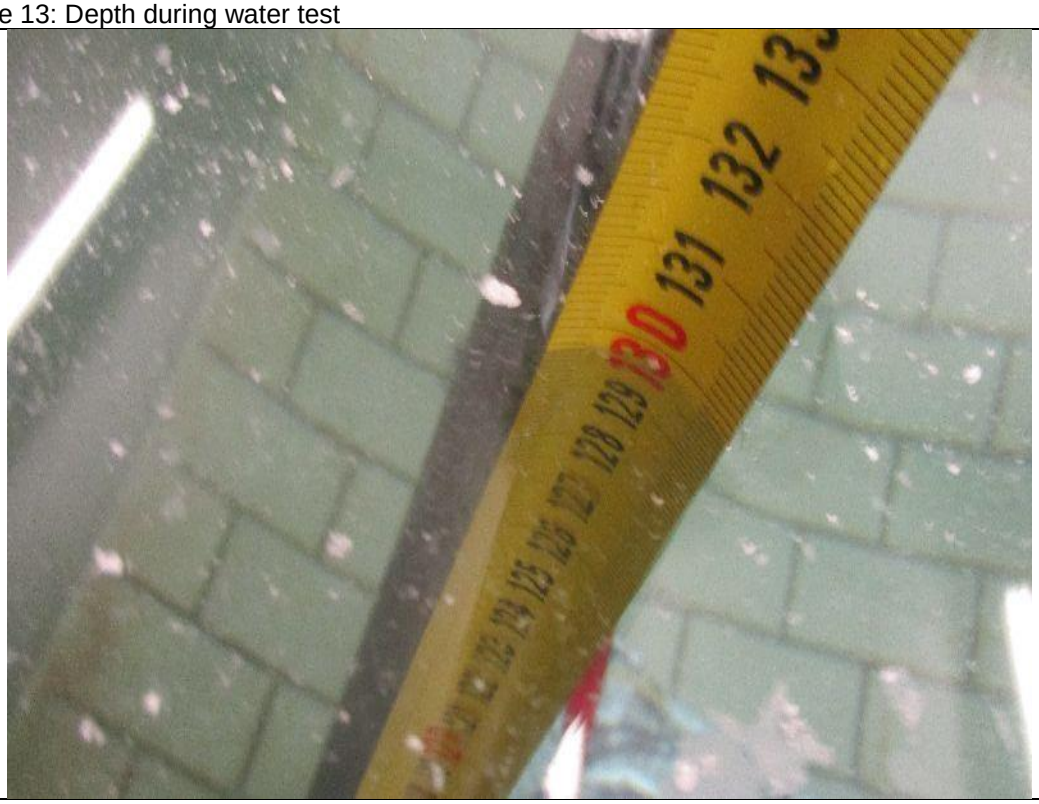


Bild / Picture 14: During water test

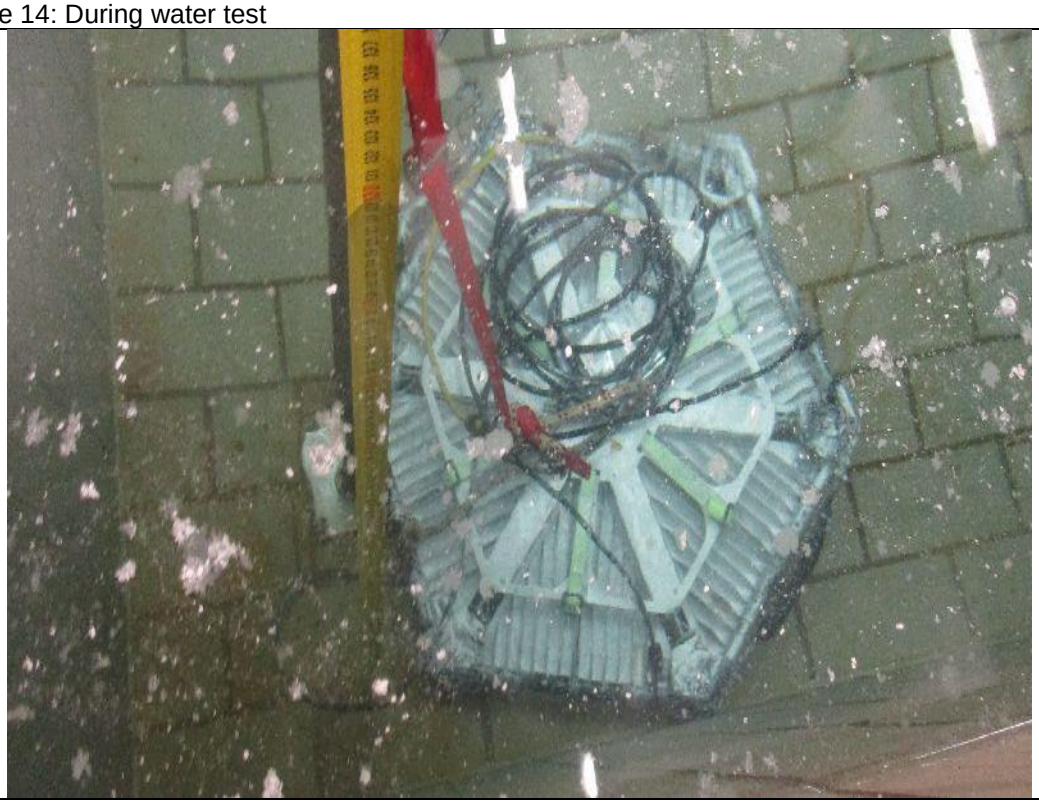


FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

Bild / Picture 15: During water test

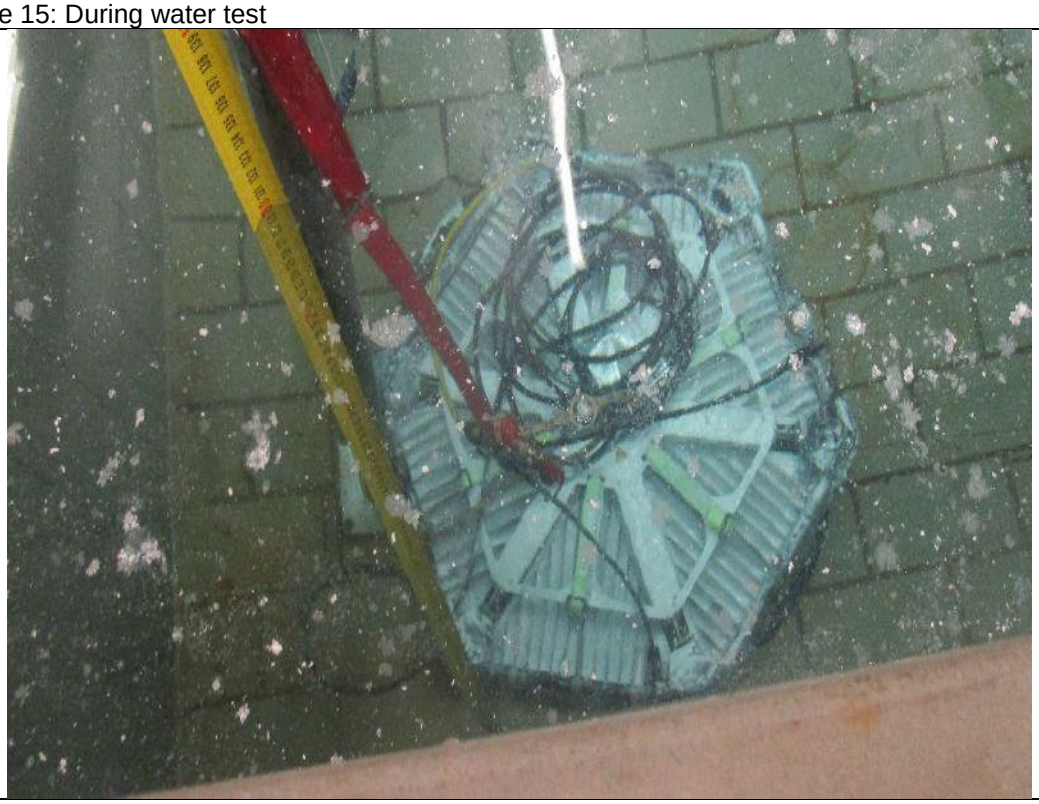


Bild / Picture 16: Inspection

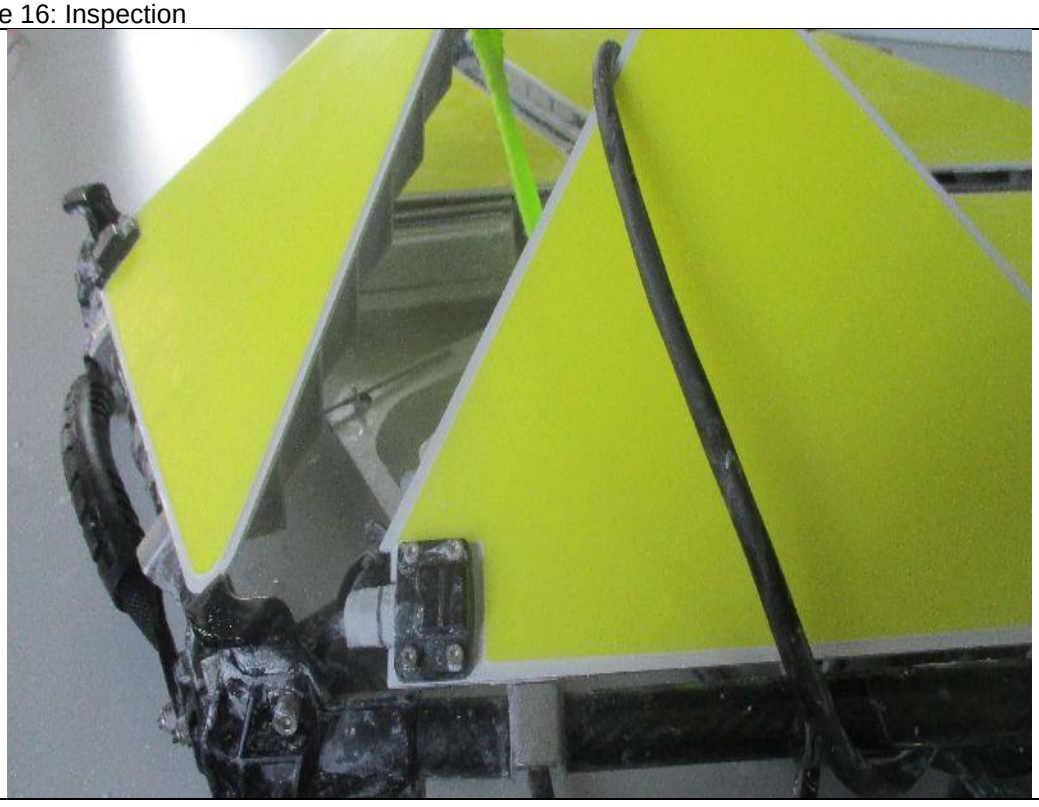


FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

Bild / Picture 17: Inspection

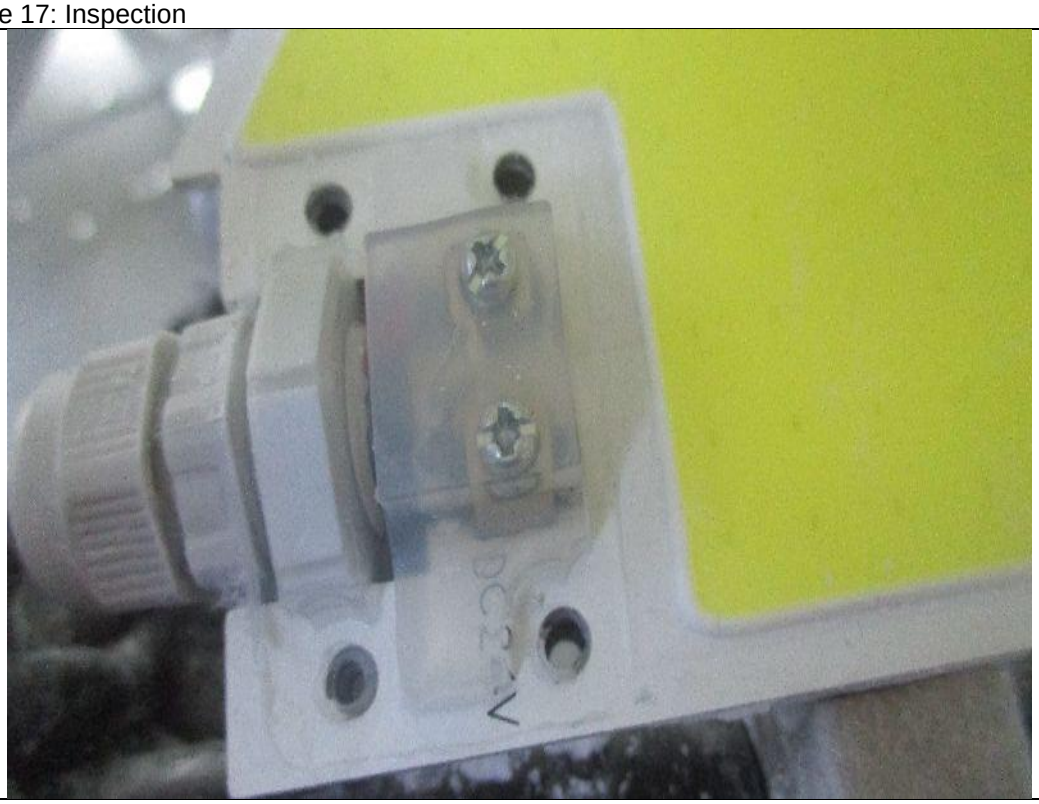


Bild / Picture 18: Inspection

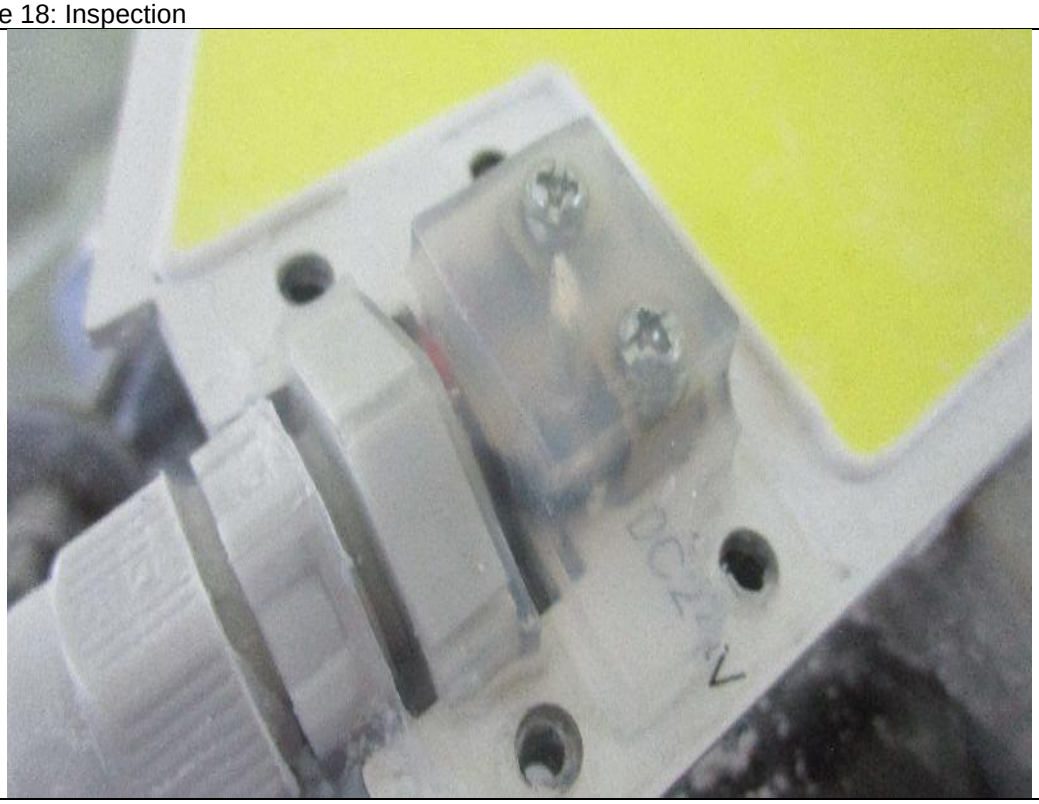
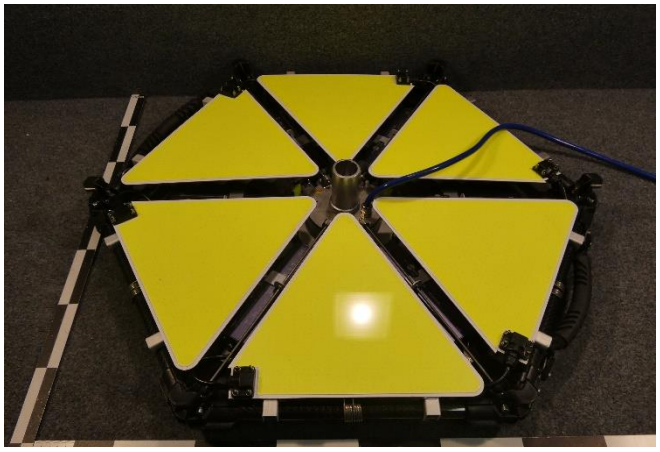


FOTO-DOKUMENTATION
PHOTO-DOCUMENTATION

Bild / Picture 19: Inspection

Prüfbericht-Nr.: *Test report no.*:	**DE22AXEH 001**	**Auftrags-Nr.:** *Order no.*:	280017176	
Kunden-Referenz-Nr.: *Client reference no.*:	1667981	**Auftragsdatum:** *Order date:*	25.05.2022	
Auftraggeber: *Client*:	POWERMOON GmbH Ginsterstr. 5 47495 Rheinberg			
Prüfgegenstand: *Test item*:	Luminaire			
Bezeichnung / Typ-Nr.: *Identification / Type no.*:	POWERMOON HEXASPACE			
Auftrags-Inhalt: *Order content*:	Protection against mechanical stress / IK10			
Prüfgrundlage: *Test specification*:	EN 62262:2002+A1:2021 EN IEC 60598-1:2021			

Wareneingangsdatum: *Date of sample receipt*:	08.07.2022
Prüfmuster-Nr.: *Test sample no:*	A003296929-001
Prüfzeitraum: *Testing period*:	2022.08.24 - 2022.08.24
Ort der Prüfung: *Place of testing*:	Am Grauen Stein 29, 51105 Cologne,
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland LGA Products GmbH, Cologne
Prüfergebnis*: *Test result**:	Pass



geprüft von:
tested by:

Valentin Hancke

Datum:
Date: 2022-08-29

Stellung / Position: Sachverständige(r)/Expert

genehmigt von:
authorized by:

Ausstellungsdatum:
Issue date: 2022-08-29

Stellung / Position: Sachverständige(r)/Expert

Sonstiges / *Other*:	Attachement 1: DE22AXEH 001_attm1_PD	Photo documentation	11 pages
	Attachement 2: DE22AXEH 001_attm2_MD	Measurement device list	01 page

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*P(ass) = passed a.m. test specification(s)*	*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Prüfbericht-Nr.: DE22AXEH 001
Test report no.:

Anmerkungen
Remarks

1	Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden. *The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.*
2	Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben. *As contractually agreed, this document has been signed digitally only. TUV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TUV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged.*
3	Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt. *Test clauses with remark of * are subcontracted to qualified subcontractors and descripted under the respective test clause in the report.* *Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.*
4	Die Entscheidungsregel für Konformitätserklärungen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. *The decision rule for statements of conformity in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report.*
5	

Produktbeschreibung
Product description

1	**Produktdetails** *Product details*	900W / 100-277V AC / 50-60Hz / (120V/5,3A / 230V/3,5A)
2	**Maße / Gewicht** *Dimensions / Weight*	(LxWxH) approx: 700mm x 700mm X 230mm
3	**Bedienelemente** *Operating elements*	--
4	**Ausstattung / Zubehör** *Equipment / Accessories*	--
5	**Verwendete Materialien** *Used materials*	--
6	**Sonstiges** *Other*	Test sample(s), as well sample information, description, product details and intended usage was provided by customer.
7	**Prüfmusterbereitstellung** *Test sample obtaining*	☒ Sending by customer ☐ Sampling by TÜV Rheinland Group ☐ others:

Bild / Picture 1: Complete sample front view

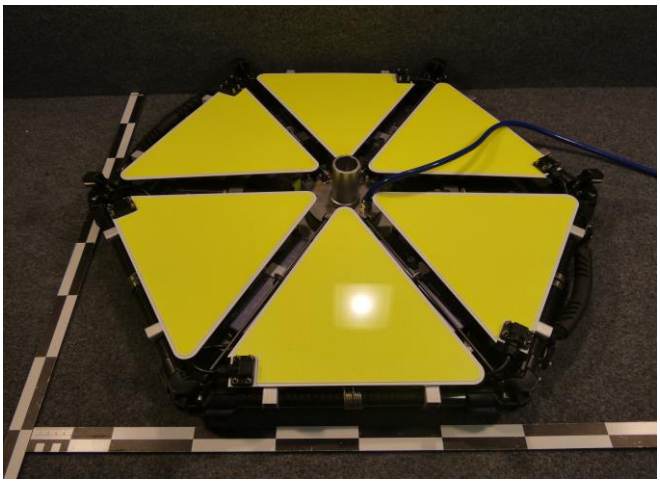


Bild / Picture 2: Complete sample back view

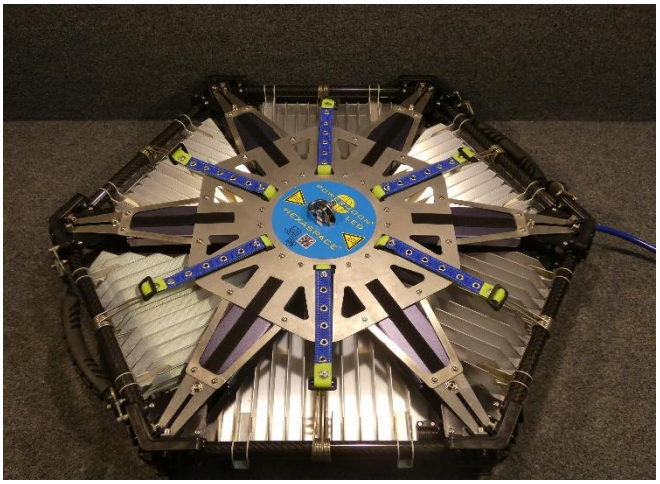


Bild / Picture 3: Complete sample open view

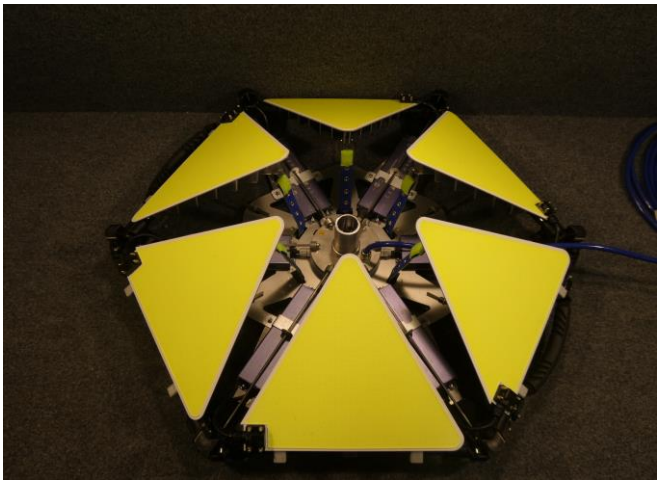


Bild / Picture 4: Type label

Produktbeschreibung
Product description

--	**General information**
	The test to prove protection against mechanical stress. The sample was placed under the vertical hammer and tested at 20 joules (IK10). The sample is rigidly sighted against displacement. Fixed rough service luminaires and portable rough service luminaires (not hand-held) Each of three samples of the luminaire shall be subjected to three single impacts (we have only used one sample because we have enough test locations on the sample.), at points likely to be the weakest, on any surface normally exposed. The sample without lamp (or lamps) is mounted as in normal use on a rigid supporting surface. Each of the three samples of a luminaire intended for outdoor use shall additionally be cooled to a temperature of –5 °C ± 2 °C and maintained at that temperature for 3 h. Whilst the samples are at this temperature, they shall be subjected to the impact test specified above. After the test the luminaire shall show no damage impairing safety and its further use. The parts protecting the lamp against damage shall not have loosened: a) live parts shall not have become accessible; b) the effectiveness of insulating linings and barriers shall not have been impaired; c) the sample shall continue to afford the degree of protection against ingress of dust, solid objects and moisture, in accordance with its classification; d) it shall be possible to remove and to replace external covers without these covers or their insulating linings breaking. Ambient conditions Tamb: 26,0 °C / rH: 37,4 % / pamb: 1014,8 hPa

4.2	**Characteristic group nummerals of the IK code and their meanings**
	Each characteristic group numeral, represents an impact energy value as shown in table 1. Table 1: Relation between IK code and impact energy

IK code	IK00	IK01	IK02	IK03	IK04	IK05	IK06	IK07	IK08	IK09	IK10
Impact energy Joule	*	0,14	0,2	0,35	0,5	0,7	1	2	5	10	20
* not protected according to the standard											

6	Test to verify the protection against mechanical impacts			
--	**IK10**	Number of impacts: 3 (on each sample on different points) Energy = 20 J R = 50 mm Material = Steel Mass = 5 kg D = 100 mm f = 20 mm r = 10 mm l = 63 mm ∆h = 400 mm (free fall hammer used) Test location plastic corner (see photo documentation page 10 picture 17).	The test was performed at the test sample temperature of -5°C. There is no damage visible. The effect of the IP protection and the protection against live parts is still given. (see photo documentation page 10 picture 18).	**P**
			The test was performed at the ambient temperature. There is no damage visible. The effect of the IP protection and the protection against live parts is still given. (see photo documentation page 11 picture 19).	**P**
--	**IK10**	Number of impacts: 3 (on each sample on different points) Energy = 20 J R = 50 mm Material = Steel Mass = 5 kg D = 100 mm f = 20 mm r = 10 mm l = 63 mm ∆h = 400 mm (free fall hammer used) Test location power supply (see photo documentation page 7 picture 11).	The test was performed at the test sample temperature of -5°C. There is no damage visible. The effect of the IP protection and the protection against live parts is still given. (see photo documentation page 7 picture 12).	**P**
			The test was performed at the ambient temperature. There is no damage visible. The effect of the IP protection and the protection against live parts is still given. (see photo documentation page 8 picture 13).	**P**
--	**IK10**	Number of impacts: 3 (on each sample on different points) Energy = 20 J R = 50 mm Material = Steel Mass = 5 kg D = 100 mm f = 20 mm r = 10 mm l = 63 mm ∆h = 400 mm (free fall hammer used) Test location cooling plate(see photo documentation page 8 picture 14).	The test was performed at the test sample temperature of -5°C. There is no damage visible. The effect of the IP protection and the protection against live parts is still given. (see photo documentation page 9 picture 15).	**P**
			The test was performed at the ambient temperature. There is no damage visible. The effect of the IP protection and the protection against live parts is still given. (see photo documentation page 9 picture 16).	**P**