DLG Test Report 7156

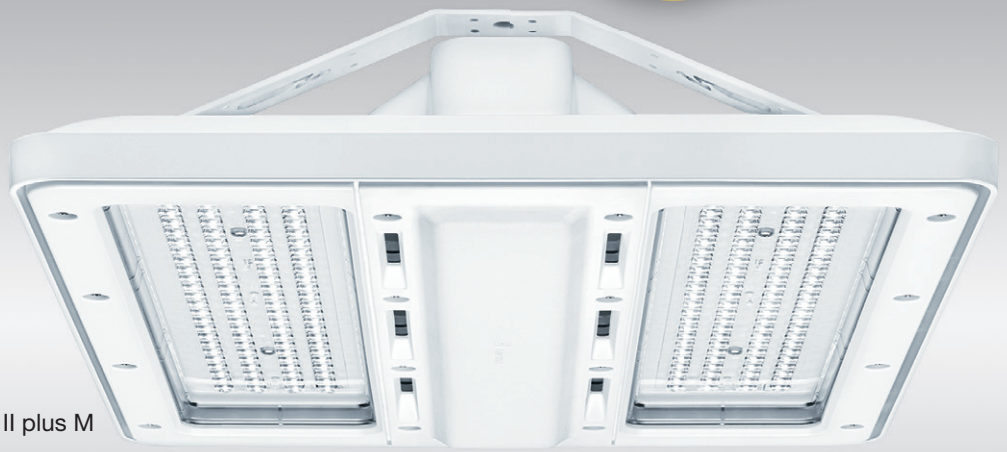
Additions on page 3

Zumtobel Lighting GmbH

CRAFT II plus

Resistance to ammonia,
cleaning distance, flicker free

ZUMTOBEL CRAFT II PLUS
✓ Resistance to ammonia
✓ Cleaning distance
✓ flicker free
DLG Test Report 7156



CRAFT II plus M

CRAFT II plus L

www.DLG-Test.de

Overview

A test mark "DLG-APPROVED for individual criteria" is awarded for agricultural products which have successfully fulfilled a scope-reduced usability testing conducted by DLG according to independent and recognized evaluation criteria. The test is intended to highlight particular innovations and key criteria of the test object. The test may contain criteria from the DLG test scope for overall tests, or focus on other value-determining characteristics and properties of the test subject. The minimum requirements, test conditions and procedures as well as the evaluation bases of the test results will be specified in consultation with an expert group of DLG. They correspond to the recognized rules of technology, as well as scientific and agricultural knowledge and requirements. The successful testing is concluded with the publication of a test report, as well as the awarding of the test mark which is valid for five years from the date of awarding.

The ammonia resistance test was performed as a laboratory test according to the patented DLG test standard. This test is intended to determine the suitability of equipment for animal living areas to withstand the impacts of animal environments. The cleaning distance test assesses the suitability for cleaning animal living areas.
In the "Flicker-free" test – if necessary also with different dimming levels – frequencies and the modulation depth of a luminaire's flicker is measured. Since the corresponding stressor does not apply, flicker-free light has a positive effect on animal health.

Other critera were not tested.

Assessment – Brief Summary

The highbay "CRAFT II plus" from Zumtobel Lighting Gmbh has successfully completed the DLG test for ammonia resistance, cleaning distance and flicker free.

According to this result, it can be assumed that these luminaires are resistant to the typical environmental conditions of animal living areas and that no accelerated reduction of the product lifetime will occur.

In addition, highbay "CRAFT II plus" was operated actively in the chamber for the entirety of the test. No product damage was observed here.

Furthermore, the cleaning distance is regarded as suitable for the cleaning of animal houses.

In undimmed state the LED-highbay is almost flicker free. When dimmed, it shows a slightly increased flicker that still meets the high DLG standards regarding its frequency and modulation depth.

Table 1:
Assessment in brief

DLG QUALITY PROFILE	Evaluation*
Ammonia resistance	■ ■ ■ ■ □
Preservation of the luminous flux	■ ■ ■ ■ □
Flicker free "CRAFT II plus M", not dimmed	■ ■ ■ ■ ■
Flicker free "CRAFT II plus M", dimmed	■ ■ ■ □ □
Flicker free "CRAFT II plus L", not dimmed	■ ■ ■ ■ ■
Flicker free "CRAFT II plus L", dimmed	■ ■ ■ □ □
Cleaning distance	■ ■ ■ □ □

* DLG Evaluation range:
■ ■ ■ or better = meets, exceeds or significantly exceeds the established DLG standards
■ ■ = meets the legal requirements for marketability, ■ = failed

The Product

Applicant

Zumtobel Lighting GmbH
Schweizer Str. 30
6850 Dornbirn
Österreich

Product:
LED-highbay “CRAFT II plus M“ and “CRAFT II plus L“

Contact:
Phone +49 (0) 5572 390-0
info@zumtobel.com
www.zumtobel.com

Description and Technical Data

The LED-highbay “CRAFT II plus” tested here are suitable for the use in riding halls and can also be used in each agricultural buldings where a high amout of ammonia is expected.

Table 2:
Technical data (according to manufacturer) *[1]*

	CRAFT II plus M (CR2PL M17k-840 PM WB LDO WH)	**CRAFT II plus L (CR2PL L35k-840 PM WB EVG WH)**
Electrical connection		
Voltage	220 V to 240 V	
Frequency	50/60 Hz	
Performance	113.5 W	222.7 W
Dimension and weight		
Length x Width x Height	518 mm x 414 mm x 109 mm	1025 mm x 414 mm x 109 mm
Weight	7 kg	13.2 kg
Additional technical data		
Number of LED modules	2	4
Housing material	Die-cast aluminium	
Diffuser material	PMMA	
Degree of protection	IP66	
Colour temperature	4000 K	
dimmable	yes	
Light angle	wide beaming	
Luminous flux	16,860 lm	34,800 lm
Light yield	149 lm/W	156 lm/W

[1] PC replaced by PM in the product name

The Method

Resistance to ammonia

The ammonia resistance of the LED-highbay “CRAFT II plus” was determined by a laboratory test with two luminaires according to the patented DLG test standard for agricultural use. The laboratory test is designed to replicate the conditions of a usage period of about 10 years exposure to animal living areas.

The test was carried out in a climate chamber under the following climate conditions:

Test duration	1500 h
Air temperature	70 °C
Relative humidity	70 %
Ammonia concentration	750 ppm

For assessing the ammonia resistance, each luminaire was examined visually, gravimetrically and the plastic parts additionally through measurement of the hardness (Shore D) before and after the climate testing.
The luminaires have additionally been following a cycle of operation predefined by DLG (3 hours on, 1 hour off) in order to evaluate any thermal impacts caused by switch-on and -off procedures during ammonia fumigation. Furthermore the luminous flux was measured according to DIN EN 13032 before and after the fumigation in order to get additional information regarding the aging process.

In order to avoid overheating (> 70 °C), the luminaires could be operated at a reduced power level during the testing period.

Cleaning distance

During test bench examinations of the mechanical resistance to high-pressure cleaners, the minimum cleaning distance was determined.

The minimum cleaning distance is defined as the distance between nozzle and surface when no damages can be observed at the housing surface.

The test was conducted under the conditions presented in table 3.

Table 3:
Test conditions cleaning distance

Line pressure	~150 bar
Water	cold, approx. 1,000 l/h, no detergents
Nozzle type	Flat spray nozzle, 25°
Exposition time	1 minute
Distance	250 mm, 200 mm, 150 mm, 100 mm, 50 mm
Ambient temperature	10-20 °C

Flicker free

The frequency and modulation depth of the flicker of two test samples for each type of luminaire were measured and assessed at full power. If the luminaire provided is dimmable and dimming is also recommended for practical use, the above tests were also carried ot at 50 % and 10 % of the nominal power.

For all test procedures, the LED-highbays “CRAFT II plus M” in the length of 356 mm and “CRAFT II plus L” in the length of 1025 mm have been used. After the tests, the luminaires underwent visual examination to a reference sample that was identical in construction.

The Test Results in Detail

Resistance to ammonia

Visual test: The comparative visual examination after the ammonia exposure has shown minor discolorations in the luminaire housing. A slight bending of the diffusers could be observed, possibly caused by thermal load. During the test, the luminaire appeared to be sufficiently gas-tight. Nevertheless it cannot be ruled out, that a limited amount of ammonia respectively ammonium compounds could enter the luminaire housing. Again, no negative impact on the luminaire performance needs to be expected. The defects are rated as insignificant. The examination of the manufacturer's mounting parts didn't also show any defects.

Gravimetric test: Weight comparisions before and after the ammonia fumigation have not shown any measurable increases or decreases in weight.

Hardness test: During the hardness test (Shore D) no measurable changes were observed. All determined changes were within the measurement incertainty.

Functional test: No defects were observed. All luminaires worked after the conducted tests.

Preservation of the luminous flux: After completion of the test the luminaire still had a luminous flux of 85 % (CRAFT II plus M) or 88 % (CRAFT II plus L). The luminous flux measurement of the CRAFT II plus L was in each case performed with reduced performance.

Based on the results of these tested parameters, the luminaire is evaluated as resistant to ammonia.

Cleaning distance

Even at a cleaning distance of only 15 cm, no damages to the luminaire could be observed. At no time a water ingress into the luminaires was noticed. In order to avoid damage to the luminaires during cleaning a minimum cleaning distance of 15 cm should always be ensured.

Flicker free

The frequency of the undimmed "CRAFT II plus M" luminaire was 1461 Hz (modulation depth 0.8 %), in dimmed state 1461 Hz (1.6 % at 50 % dimming and 5.9 % at dimming to 10 %). The frequency of the "CRAFT II plus L" was 100 Hz (0.32 %) at full power, whilest being 100 Hz in dimmed state (0.7 % at 50 % dimming and 2.4 % at dimming to 10 %).

Summary

The results show that the LED-highbay "CRAFT II plus" fulfills the testing requirements for ammonia resistance, cleaning distance and flicker free and thus receives the test mark DLG-Approved. It can be expected that the luminaire is resistant to ammonical air in animal living areas and that no accelerated reduction of the product lifetime occurs.

The LED-highbay was operated both passively and actively during the ammonia fumigation in the test chamber and passed both tests successfully. It is also recommended in any case to keep a minimum distance of 15 cm during cleaning.

When dimmed, the LED-highbay meets the DLG requirements for flicker-free operation. If not dimmed, the DLG standard is clearly exceeded.

More information

Testing agency

DLG TestService GmbH, Gross-Umstadt location
The tests are conducted on behalf of DLG e.V.

DLG test framework

DLG-Approved Test “Ammonia resistance”
(current as of 03/2021)

Department

Agriculture

Division head

Dr. Ulrich Rubenschuh

Test engineer(s)

Dipl-Ing (FH) Tommy Pfeifer*

* Author

DLG – the open network and professional voice

Founded in 1885 by the German engineer Max Eyth, DLG (Deutsche Landwirtschafts-Gesellschaft – German Agricultural Society) is an expert organisation in the fields of agriculture, agribusiness and the food sector. Its mission is to promote progress through the transfer of knowledge, quality standards and technology. As such, DLG is an open network and acts as the professional voice of the agricultural, agribusiness and food sectors.

As one of the leading organisations in the agricultural and food market, DLG organises international trade fairs and events in the specialist areas of crop production, animal husbandry, machinery and equipment for farming and forestry work as well as energy supply and food technology. DLG’s quality tests for food, agricultural equipment and farm inputs are highly acclaimed around the world.

For more than 130 years, our mission has also been to promote dialogue between academia, farmers and the general public across disciplines and national borders. As an open and independent organisation, our network of experts collaborate with farmers, academics, consultants, policymakers and specialists in administration in the development of future-proof solutions for the challenges facing the agriculture and the food industry.

Leaders in the testing of agricultural equipment and input products

The DLG Test Center Technology and Farm Inputs and its test methods, test profiles and quality seals hold a leading position in testing and certifying equipment and inputs for the agricultural industry. Our test methods and test profiles are developed by an independent and impartial commission to simulate in-field applications of the products. All tests are carried out using state-of-the-art measuring and test methods applying also international standards.

Internal test code DLG: 2010-0008

DLG TestService GmbH
Groß-Umstadt location
Max-Eyth-Weg 1 • 64823 Groß-Umstadt • Germany
Phone: +49 69 24788-600 • Fax: +49 69 24788-690
Tech@DLG.org • www.DLG.org