

# DLG Test Report 7411

Continental

## LED work lights “NightViu LED Lights”

Luminous efficiency and colour rendering, shock and vibration resistance, IP rating, electromagnetic compatibility, handling and operation



- CONTINENTAL  
NIGHTVIU® LED LIGHTS**
- ✓ Luminous efficiency and color rendering
  - ✓ Shock-/Vibration resistance
  - ✓ Protection type
  - ✓ Electromagnetic compatibility
  - ✓ Handling and operation
- DLG Test Report 7411



## 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 recognised 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 recognised 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 DLG test assesses the work lights and their suitability for use on agricultural and forestry vehicles and machines. The test evaluates the following technical parameters: Luminous efficiency and colour rendering, durability under field conditions (shock and vibration resistance) as well as handling and operation which is tested by operators in the field. The test was carried out in line with the DLG test framework “Work lights” (date of issue October 2022). Other criteria were not tested.



### CONTINENTAL NIGHTVIU® LED LIGHTS

- ✓ Luminous efficiency and color rendering
- ✓ Shock-/Vibration resistance
- ✓ Protection type
- ✓ Electromagnetic compatibility
- ✓ Handling and operation

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## Assessment in brief

The “NightViu LED Lights” LED work lights from Continental were tested under the DLG test scheme on individual criteria. The technical parameters were tested at the lab and in the field.

The data on product service life, e.g. resistance to shocks and vibration, have been proven by external test reports.

Table 1:  
Overview of results

DLG QUALITY PROFILE	Evaluation
<b>Luminous efficiency and colour rendering</b>	
– Luminous efficiency	■ ■ ■ ■ ■ *
– Colour rendering	✓ **
<b>Shock resistance</b>	■ ■ ■ □ □ *
<b>Vibration resistance</b>	■ ■ ■ ■ □ *
<b>IP rating</b>	■ ■ ■ ■ ■ *
<b>Electromagnetic compatibility</b>	■ ■ ■ ■ ■ *
<b>Handling and operation</b>	
– Reverse polarity protection	✓ **
– Housing susceptibility to heating	■ ■ ■ ■ □ *

The DLG test framework provides the following options in its evaluation schemes:  
 \* ■ ■ ■ or better = meets, exceeds or clearly exceeds the specified DLG standard,  
 ■ □ = meets the legal requirements for marketability, ■ = failed  
 \*\* Evaluation range: requirements fulfilled (✓)/requirements not fulfilled (✗)

## The product

### Manufacturer and applicant

Continental Aftermarket and Services GmbH  
Sodener Straße 9  
D-65824 Schwalbach  
Germany

Contact:  
NightViu@Continental.com

### Description and technical data

The tested light is the “NightViu LED Lights” work light.

Table 2:

Technical data (manufacturer information)

Product name	LED Work Light UW RE 3500 LED Work Light WD RE 3500 LED Work Light FL RE 3500 LED Work Light SP RE 3500
Dimensions (height/width/depth)	113.5 mm x 117.5 mm x 65.0 mm
Casing material	Aluminum
Connector	Deutsch connector
Product weight incl. bracket	986 g (Heavy Duty bracket), 830 g (standard bracket)
Optional accessories	Standard and heavy-duty holder
Input voltage range	9 to 32 Volt
Service life in hours	> 5000 (The luminaire is considered defective when the light output drops below 70 % in half of the LEDs.)
Reverse polarity protection	max. -32 Volt
Wattage	35 Watt
Luminous flux	3,500 Lumen
Colour temperature	6,000 K +/- 500 K
IP rating	IP6K8, IP6K9K
Vibration resistance <sup>1)</sup>	ISO 16750-3 / IEC 60068-2-64-5 (4.1.2.7.2 Tables 12 and 13) Standard bracket: 8 g rms Heavy duty bracket: 12 g rms / Y-axis 32 hours
Shock resistance <sup>1)</sup>	DIN EN 60068 2-27 3 shocks, per direction, ( $\pm X$ , $\pm Y$ , $\pm Z$ ) 6 directions, 18 shocks in total Heavy duty bracket: 50 g, 6 ms Standard bracket: 30 g, 6 ms
Electromagnetic compatibility (EMC) <sup>1)</sup>	UN ECE-R10 and CISPR25 Class 5 limits, FCC Part 15b

1) Source: external test reports by an accredited lab

## The method

### Luminous efficiency

The light distribution is measured at the lab and under field conditions. For this, the luminaire is installed at a height of 2.5 m from the ground and at a -15° angle. The table shows the luminous efficiency also of one H3 work light and one no-name LED work light for subjective reader assessment of the test products. The luminous efficiency is expressed in Lumen per Watt.

### Colour rendering

The colour rendering of the work lights is measured at the lab. Colour rendering is measured, because extensive comparative tests showed that a natural (daylight) colour rendering enhances operators' sense of safety during night work. When interpreting the CRI parameter, readers should bear in mind that the "100 %" reference value refers to a halogen light. The smaller the CRI, the greater is the colour rendering difference between the work light and the light spectrum of a halogen light.

Another useful parameter for assessing natural light quality is the colour temperature. If the colour temperature is much lower or higher than 5000 K, the more unnatural is the light perceived. All requirements and assessments are set and made to UNECE R46 standards. The light emitted by the work light must be within the range that is specified by these standards. If the lab results are out of range,

this will be presented in a field test and documented in the test report.

### Reference lights

The work lights that come to the DLG test are tested in conjunction with a standard H3 work light and a popular no-name LED work light that was purchased online. The specifications of these compare with those of the tested lights.

### Vibration and shock resistance

The ISO 16750-3 standard defines the mechanical stresses to which electrical and electronic equipment for on-road vehicles is exposed in various test cycles.

The minimum requirements on all system components with respect to vibration are tested in the test cycle "Passenger car, sprung masses (vehicle body)". If in addition, the product also passes the "Utility vehicle, cab removed" test cycle, the score will be "good".

The minimum requirements in terms of shock resistance are measured in the test cycle "Rigidly mounted body parts". If in addition, the components also pass the test cycle "Parts in doors and flaps", the score will be "good".

The product must not show any mechanical damage in any of the above test cycles.

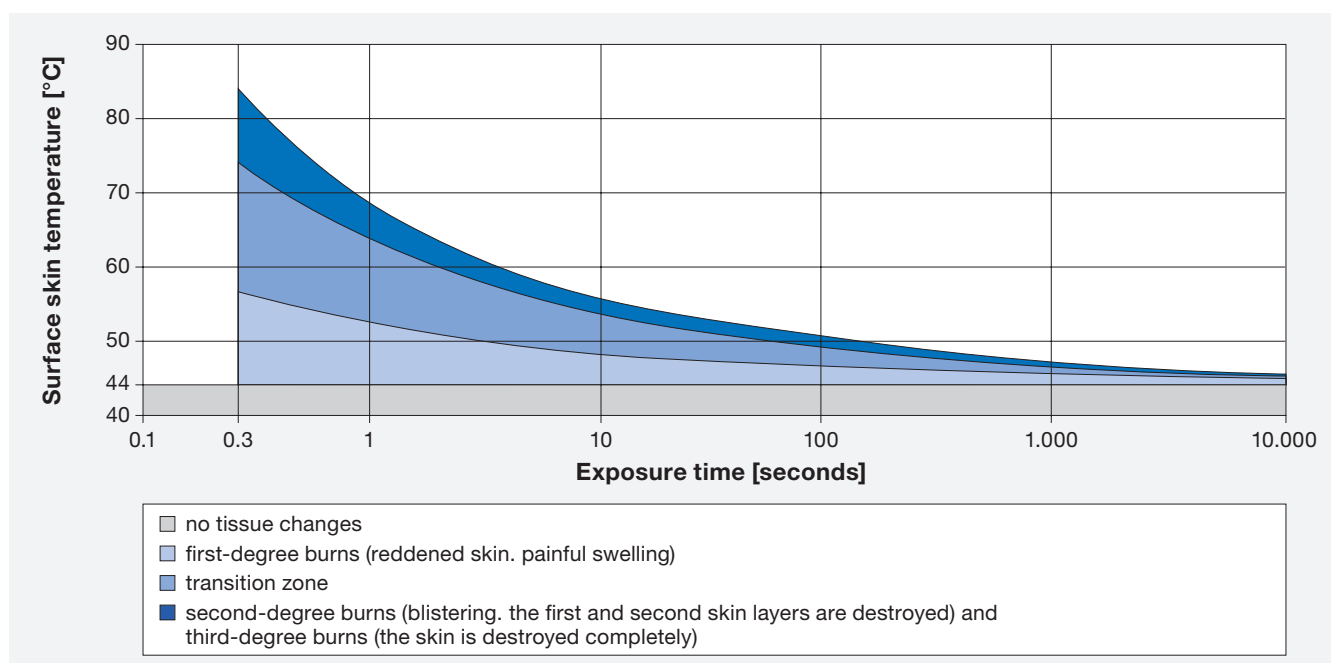


Figure 2:  
Classification of burns by skin temperature and exposure time

## IP rating

The IP rating is assessed on the information provided by the manufacturer's test reports. The minimum IP rating for the test object and its connectors is IP67. This specifies a dust-tight casing (the first digit is 6) and protection against temporary immersion (the second digit is 7). The casing will score "good", if the housing is protected against permanent submersion (IP68). The casing will score "very good", if all its components withstand cleaning with a pressure washer (IP 69).

## Electromagnetic compatibility

All lights must at least meet UN-ECE R10 standards. If the work lights meet EMC class 5 (Cisper 25) standards, the score will be "good". Class 5 compliance is particularly useful for electric devices that

are operated on modern machines, because in that case they will not cause interferences with the tractor's on-board electronics.

## Handling and operation

The product's reverse polarity protection is tested at the lab. To do this, the work light is plugged into reverse polarity at maximum input voltage. This test is carried out at 25 °C. The light must withstand the reverse polarity test undamaged. The surface temperature of the lamp is measured at the lab with the help of a thermal camera. Surface temperature is an important parameter for preventing contact burn injuries. This test is carried out at 25 °C. As a minimum requirement, the housing temperature must not exceed 70 °C as per DIN EN ISO 13732-1 standard. A temperature below 55 °C is to be rated as "good", a temperature below 44 °C as "very good".

## Detailed account of the test results

All tests were carried out on the "NightViu LED Lights" work light 3,500 Lumen model.

### Luminous efficiency and colour rendering

The luminous efficiency of the Spot (SP) and Flood (FL) models is very good, testing 100 lm/W and even 103 lm/W. The models Wide (WD) and Ultra Wide (UW) generate a good luminous efficiency 98 lm/W and 90 lm/W which clearly exceeds the luminous efficiency of the standard H3 work light and also the efficiency of the no-name reference LED work light.

Table 3 lists luminous flux, wattage and luminous efficiency of the four test models as well as of regular H3 work lights and one no-name LED work light.

Table 3:  
Luminous flux, wattage and luminous efficiency compared

Work light	Luminous flux [Lumen]	Wattage [watt at 12V]	Luminous efficiency [Lumen per watt]
LED Work Light UW RE 3500	3,252	36	90
LED Work Light FL RE 3500	3,733	36	103
LED Work Light WD RE 3500	3,537	36	98
LED Work Light SP RE 3500	3,661	36	100
H3 work light	1,168	58	20
No-name LED work light	1,214	23	52

The images in Figure 3 (page 6) show the distribution of light in the Isolux tests – both by the tested lights on the one hand and the reference H3 and no-name LED work lights on the other.

The colour temperatures and colour renderings of all test lights and reference lights are listed in Table 4 (see page 6).

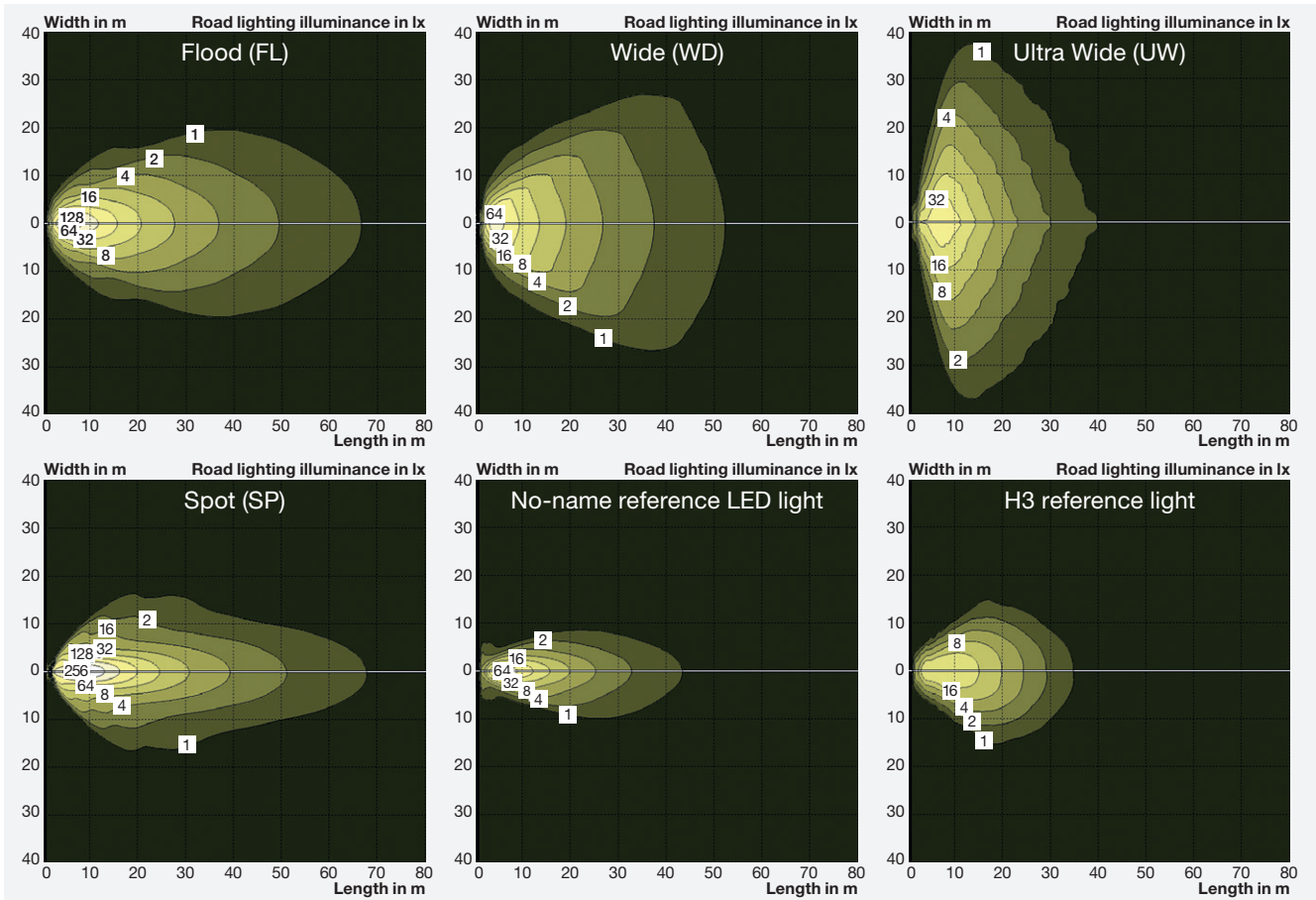


Figure 3:  
Actual distribution of the light in the Isolux measurements

Table 4:  
Colour temperature and colour rendering

Work light	Colour temperature (K)	Colour rendering (CRI)
LED Work Light UW RE 3500	5,850	70
LED Work Light FL RE 3500	5,885	70
LED Work Light WD RE 3500	5,939	70
LED Work Light SP RE 3500	5,970	69
No-name reference LED light	7,908	73
H3 reference light	3,338	100

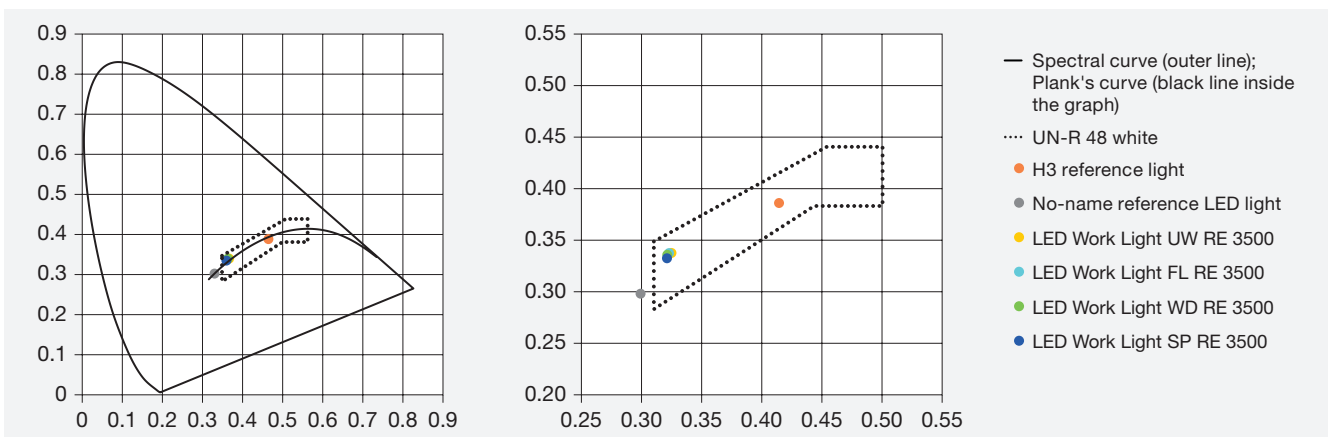


Figure 4:  
The left graph illustrates the measurements in the colour space.  
The right-hand graph shows a zoomed-in zone within the colour space (right).

H3 work lights always score 100%, because this design sets the standard in colour rendering. This means that all other head lights are tested for their differences from this score and whether this difference is still within range.

Figures 4 and 5 reveal that the tested Continental lights produce a light that is rated as white under UN-R 48 for use on public roads. The graph shows the great distance between all other lights and the H3 unit the light of which has a larger red component. The no-name LED work light is totally out of range, because its spectrum has more blue. Therefore it is not perceived as white by the human eye. Hence, this type of colour rendering would not be permitted for road use.

### Vibration and shock resistance

The tested “NightViu LED Lights” work light meets all shock resistance parameters. This means that parts which are rigidly mounted to a vehicle body withstand damage from shock loads.

The performance as to shock resistance meets the demanding standards that are applied in the test cycle on sprung masses on utility vehicles. This result scores a “good”.

### IP rating

The protection class is IP6K9K, which is rated as “very good”. This means the product can be cleaned with a pressure washer.

### Electromagnetic compatibility

The “NightViu LED Lights” work light meets the EMC class 5 requirements (Cisper 25), which is rated as “good”. The light is unlikely to cause malfunctions in the tractor’s on-board electronics.

### Handling and operation

All Continental work lights withstood the reverse polarity test undamaged. The maximum temperature measured on the casing was 55 °C (“good”).

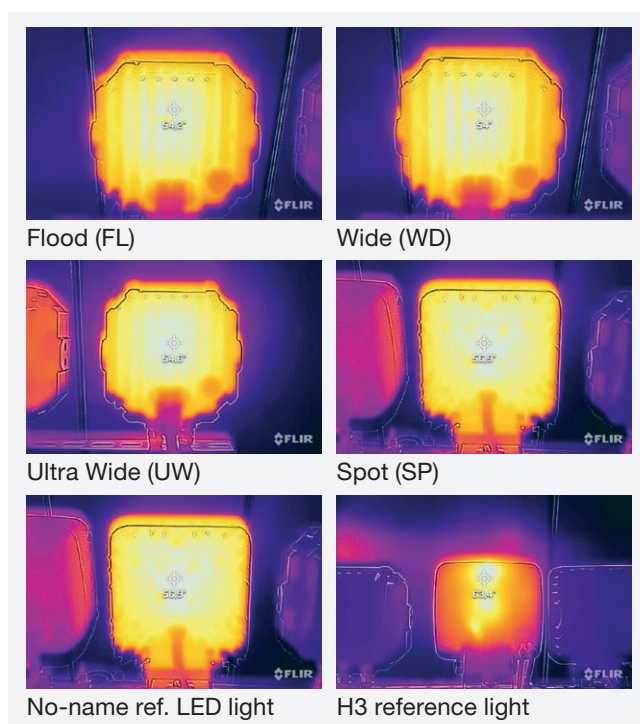


Figure 5:  
Casing surface temperatures compared

## Summary

Based on the test results, the “NightViu LED Lights” work light meets all the requirements laid down in the test framework on the individual criteria “Luminous efficiency and colour rendering”, “Resistance to shock and vibration” and “Handling and operation”.

In addition, in the three criteria stated above the “NightViu LED Lights” exceeded the requirements in several aspects – such as luminous efficiency and vibration resistance. The “NightViu LED Lights” work light is therefore awarded for the DLG-APPROVED test mark for the individual criteria stated in this report.

The NightViu work lights are recommended for use in heavy-duty applications such as agricultural applications.

## Further information

### Testing agency

DLG TestService GmbH,  
Gross-Umstadt location, Germany

The tests are conducted on behalf of DLG e.V.

### DLG test framework

DLG-Approved test "Work lights"  
(date of issue 10/2022)

### Department

Tractors, machines and utility vehicles

### Test engineer(s)

Dipl.-Ing. (FH) Andreas Horn\*

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## 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.

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