DLG Test Report 7438

WAGO GmbH & Co. KG

Gelbox for Splicing Connectors

Resistance to ammonia

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 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-APPROVED individual criteria test concerning the resistance of barn components to ammonia encompasses testing the resistance of splicing connectors and switch boxes to ammonia-laden barn air under laboratory conditions. This resistance is evaluated on the basis of visual and gravimetric characteristics as well as electrical parameters. DIN EN 60999-1 is used for orientation in this process.

Other criteria were not investigated.

Assessment in brief

The Gelbox from WAGO GmbH & Co. KG has successfully completed the resistance to ammonia test. It can therefore be assumed that no accelerated ageing will occur during use in practice.

No relevant differences were ascertained when the splicing connectors were tested electrically before and after the DLG chamber test. A significant increase in electrical resistance at the tested connection points was ruled out. None of the test samples revealed any anomalies during either the final visual inspection or the gravimetric analysis before and after the chamber test.

The test results are briefly summarised in Table 1.

Table 1:
Overview of results

DLG QUALITY PROFILE	Evaluation*
Resistance to ammonia	■■■■□

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

The product

Manufacturer and applicant

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Product:
Gelbox for Splicing Connectors

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Description

The WAGO Gelbox is a small, compact box that is filled with silicone-free gel. It is a tested and certified complete system consisting of Gelboxes and WAGO Splicing Connectors.

The WAGO Gelbox offers WAGO Splicing Connectors protection against moisture in accordance with protection class IPX8. This therefore enables them to be permanently protected against moisture and the influence of ammonia.

Table 2 contains an overview of the most important characteristics of the gelbox.

Table 2:
Technical data (according to manufacturer)

	Gelbox for Splicing Connectors							
Item number	207-1331	207-1332	207-1333	207-1431	207-1432	207-1433	207-1372	207-1373
Conductor cross-section range*	up to 4 mm²			0.5 to 6 mm³			0.2 to 4 mm³	
Housing material	Polypropylene							
Gel material	Polyurethane							
Voltage range*	see connector voltage							
Rated current*	see connector current							
Rated surge voltage	2.5 kV							
Insulation resistance	5 MΩ							
Physical properties	IPX8							

* The conductor cross-section range, voltage range and rated current are dependent on the splicing connector that is used and are specified in the respective data sheet. Further information in this regard can be found on the manufacturer's website.

The method

Resistance to ammonia

The DLG-APPROVED individual criteria test concerning the resistance of barn components to ammonia was conducted as a laboratory test according to the DLG test standard for agricultural use. This laboratory test is intended to determine whether a product is suitable for withstanding the harmful effects of barn air over a period of 10 to 20 years.

To conduct the test, several gelboxes of different sizes were placed in the DLG test chamber together with multiple corresponding splicing connectors and were exposed to ammonia over a period of time. The test in the test chamber was conducted under the following climatic conditions:

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

To evaluate their resistance to ammonia, the test samples were visually inspected and analysed gravimetrically and by measuring the voltage drop before and after the climate test. The gelbox/connector combinations that are regarded as particularly critical were used as test samples. The most critical combinations are those with the highest loads. This applies to the connections with the highest number of conductors and to the highest displaced volume in the gelboxes.

The voltage drop measurement was conducted on the basis of DIN EN 60999-1:2000, whereby three identical samples were tested for each critical combination. A total of 30 samples were subjected to a voltage drop test. A permanent current line was routed to each connection within a gelbox. Measurement leads routed in parallel enable a voltage drop measurement to be carried out at each connection. In deviation from the standard, loading with rated current for one hour beforehand was forgone. 1/10 of the specified rated current was selected as the test current. In accordance with the standard, each connection point may drop by a maximum of 15 mV. A maximum of 3.0 mV is therefore permissible with reference to the selected test current and the measurement via a connection.

The gelbox/connector combinations were additionally tested as separate test samples in order to ascertain gravimetric changes. An untested sample was also available as a reference sample for each test sample.

Detailed account of the test results

Resistance to ammonia

The resistance of the materials to ammonia was investigated in the form of a laboratory test according to the DLG test standard for agricultural use.

Visual inspection

During the visual inspection, no relevant changes were ascertained after the climate test. The slight discolouration of the gel may be due to the increased temperature in the test chamber. Following the chamber test, both the gelboxes and the splicing connectors corresponded visually to the specifications for proper operation.

Gravimetric analysis

No anomalies were determined during the gravimetric analysis. The comparable differences before and after the climate test were < 1 %.

Voltage drop test

The requirements for the permissible voltage drop were adhered to in accordance with DIN EN 60999-1:2000. Less than 3 mV were measured at all of the tested connections both before and after the climate test. The average comparable change in voltage before and after the climate test was 6 % to 7 %.

Based on the available results, it can be assumed that the gelbox is resistant to ammonia in combination with the corresponding splicing connectors.

Summary

The WAGO Gelbox has passed the DLG-APPROVED individual criteria test concerning resistance to ammonia in the tested form. Based on this result, it can be assumed that the gelbox is resistant to ammonia-laden barn air in combination with the splicing connectors specified by the manufacturer and that no additional acceleration of the ageing that is normally to be expected occurs.

Further information

Testing agency

DLG TestService GmbH,
Gross-Umstadt location, Germany

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

DLG test framework

'Resistance of barn components to ammonia',
status 07/2023

Department

Agriculture

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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: 2306-0004

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