

# DLG Test Report 7163

GEA Royal De Boer Stalinrichtingen B.V.

## Akwatopsoft Waterbed

Deformability/Elasticity, Permanent Tread Load



GEA ROYAL DE BOER  
STALINRICHTINGEN  
AKWATOPSOFT WATERBED  
✓ Deformability/Elasticity  
✓ Permanent Tread Load  
DLG Test Report 7163

## 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 Test “Deformability/Elasticity, Permanent Tread Load” includes technical measurements on test stands of the DLG Test Center. The deformability and elasticity were measured and a permanent tread load was applied. The test was based on the DLG Testing Framework for elastic stable flooring, as of December 2018 and DIN 3763:2020-04 (Elastic floorings for cattle and dairy cows walking and rest surfaces – Requirements and testing).

Other criteria were not investigated.

## Assessment in brief

The Akwatopsoft Waterbed tested here, an elastic floor covering for the resting area in cubicle houses, was investigated with regard to durability and comfort properties on test stands in the DLG Test. The deformability and elasticity of the waterbed were measured and a permanent tread load was applied.

Requirements of DIN 3763 are fulfilled.

Deformation and Elasticity corresponds to class 4 DIN 3763.

*Table 1:  
Assessment in brief*

DLG QUALITY PROFILE	Evaluation*
Deformability and elasticity in new condition	■ ■ ■ ■ ■
Deformability and elasticity following endurance test	■ ■ ■ ■ ■
Lasting deformation following endurance test	■ ■ ■ ■ ■
Wear following endurance test	■ ■ ■ ■ □

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

Royal De Boer Stalinrichtingen B.V.  
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Netherlands

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Akwatopsoft Wasserbett

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### Description and Technical Data

The black Akwatopsoft Waterbed made of rubber is an elastic floor covering in the lying area for high boxes in recumbent boxes.

Stable flooring as rolled goods with two synthetic fabrics reinforced

- Top: screen-printed profiling
- Underside: rough, finely structured surface
- Underlay: 40 mm PU foam wrapped with plastic film

During the production process arise between the two fabric layers, the individual berths, by surrounding each cavity around a rim of SBR rubber/Natural rubber and fabric inserts vulcanized.

Table 2:  
Main dimensions and weight

Length	of railway goods
Length	Railways goods
Width	180 and 190 cm
Thickness with water filling	approx. 70 mm
Thickness without water filling	approx. 49 mm
Weight without water filling	approx. 10.0 kg/m <sup>2</sup>

Table 3:  
Available box width and water filling

box width	water filling
110.0 cm	approx. 45 litres
112.5 cm	approx. 46 litres
115.0 cm	approx. 48 litres
117.5 cm	approx. 49 litres
120.0 cm	approx. 50 litres
122.5 cm	approx. 51 litres
125.0 cm	approx. 53 litres

## The Method

### Deformability and elasticity

The deformability is measured in new condition and following permanent tread load using ball penetration tests with a calotte ( $r = 120$  mm) and a penetration force of 2,000 N (corresponding to approx. 200 kg).

### Permanent tread load

The permanent tread load is measured on a test stand with a round steel foot in the standard test

programme with 100,000 alternating loads at 10,000 N (corresponding to approx. 1,000 kg).

The steel foot is adapted to the natural conditions as an “artificial cow foot”. The foot has a diameter of 105 mm and therefore a contact area of 75 cm<sup>2</sup>; the carrying edge of the hoof is simulated by a 5 mm wide ring on the periphery of the sole that projects 1 mm above the rest of the surface.



## Detailed account of the test results

### Deformability and elasticity

In the ball penetration tests in new condition with a calotte ( $r = 120 \text{ mm}$ ), penetration depth was  $36.0 \text{ mm}$ . The resulting calculated bearing pressure of  $7.4 \text{ N/cm}^2$  indicates a low load on the carpal joints when lying down and getting up. Elasticity was measured following a permanent tread load exerted by a steel foot (contact area:  $75 \text{ cm}^2$ ) with 100,000 alternating loads at 10,000 N. Following the endurance test, the penetration depth of the calotte decreased from  $36.0 \text{ mm}$  to  $32.4 \text{ mm}$ . The bearing pressure increased from  $7.4 \text{ N/cm}^2$  to  $7.6 \text{ N/cm}^2$  (see Fig. 2). This means that deformability and elasticity slightly decrease.

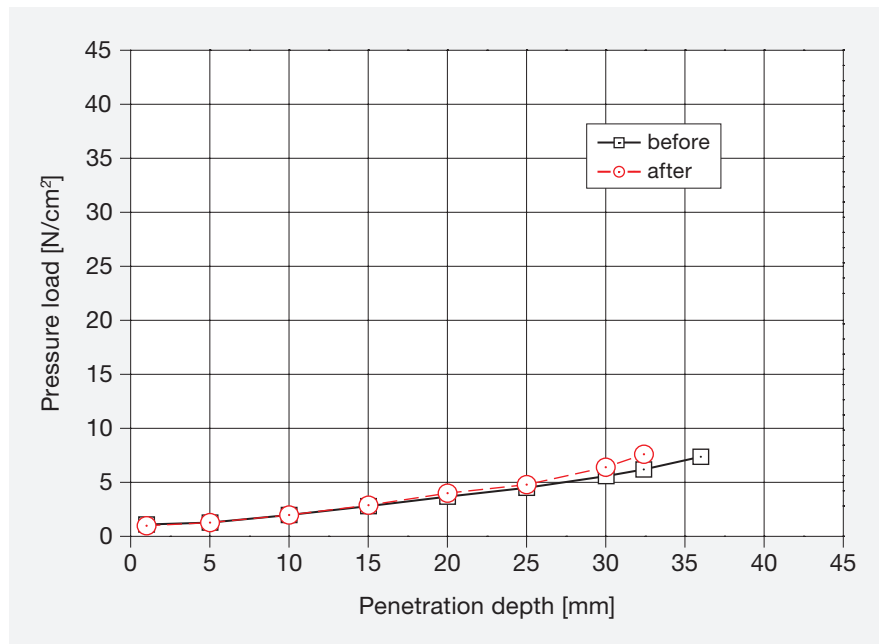


Figure 2:  
Deformability as a function of bearing pressure

### Permanent tread load

No noticeable wear was observed following exposure to permanent tread load on a test stand with 100,000 alternating loads at 10,000 N. No lasting deformation was observed.



Figure 3:  
Deformation measurement

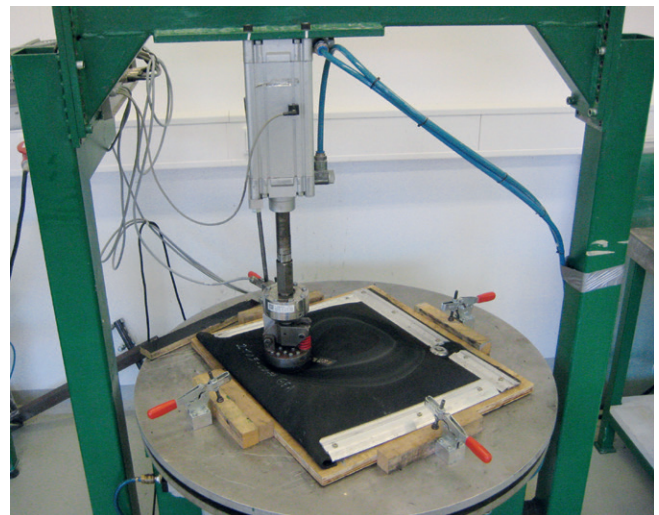


Figure 4:  
Permanent tread load

## Summary

Based on test-stand investigations, the criteria tested in this DLG Approved Test evaluate the comfort and durability properties of the Akwatopsoft Waterbed for use in the resting area of high cubicles in cubicle houses.

The tested Waterbed met the requirements of DIN 3763 and the DLG Testing Framework with respect to the investigated criteria.

## Further information

### Testing agency

DLG TestService GmbH,  
Gross-Umstadt location

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

### DLG test framework

DLG Testing Framework for elastic stable flooring,  
as of April 2010

DIN 3763:2020-04 (Elastic floorings for cattle and  
dairy cows walking and rest surfaces – Requirements  
and testing)

### Department

Agriculture

### Division head

Dr. Ulrich Rubenschuh

### Test engineer(s)

Dr. Harald Reubold\*

\* 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.

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