Animat Inc.

Cow Mattress Animattress I

Deformability/Elasticity, Permanent Tread Load, Abrasion, Slip resistance, Acid resistance, Cleaning distance

www.DLG-Test.de
Overview

**DLG-APPROVED Single value-determining criteria**

A quality mark “DLG-APPROVED for single value-determining criteria” is awarded to agricultural products which successfully passed a smaller-scope DLG usability test according to independent and recognized evaluation criteria. The test intends to highlight special innovations and key criteria of the test item. The test can focus on criteria from the DLG testing framework for full tests or on other individual features or qualitative criteria. The minimum requirements, the test conditions and procedures as well as the evaluation guidelines of the test results are determined in consultation with a DLG expert group. They comply with the generally recognized technology rules as well as with scientific and agricultural knowledge and requirements. The successful test concludes with the publishing of a test report and the awarding of a quality mark which is valid for five years following the award date.

The DLG Approved Test “Deformability/Elasticity, Permanent Tread Load, Abrasion, Slip resistance, Acid resistance, Cleaning distance” includes technical measurements on test stands of the DLG Test Center. The deformability and elasticity, the abrasion resistance, the slip resistance, the acid resistance, the cleaning distance were measured and a permanent tread load was applied. The test was based on the DLG Testing Framework for elastic stable flooring, as at April 2010.

Other criteria were not investigated.

**Assessment – Brief Summary**

The Animattress I 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 Approved Test.

The deformability and elasticity of the cubicle mattress, the abrasion resistance, the slip resistance, the acid resistance, the cleaning distance were measured and a permanent tread load was applied. The deformability and elasticity in new condition and following permanent tread load were significantly better than standard.

**Table 1:** Overview of results

<table>
<thead>
<tr>
<th>Test characteristic</th>
<th>Test result</th>
<th>Bewertung*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deformability and elasticity</td>
<td>in new condition</td>
<td>25.7 mm, very good</td>
</tr>
<tr>
<td></td>
<td>following endurance test</td>
<td>27.7 mm, very good</td>
</tr>
<tr>
<td>Permanent tread load</td>
<td>no lasting deformation</td>
<td>+ +</td>
</tr>
<tr>
<td></td>
<td>slight wear</td>
<td>O</td>
</tr>
<tr>
<td>Abrasion test</td>
<td>good wear resistance</td>
<td>+</td>
</tr>
<tr>
<td>Slip resistance**</td>
<td>good slip resistance on dry and wet mattress surface</td>
<td>+</td>
</tr>
<tr>
<td>Acid resistance***</td>
<td>Feed acid mixture</td>
<td>limited resistant</td>
</tr>
<tr>
<td></td>
<td>Uric acid</td>
<td>resistant</td>
</tr>
<tr>
<td></td>
<td>Sulfurous acid</td>
<td>resistant</td>
</tr>
<tr>
<td></td>
<td>Ammonia solution</td>
<td>limited resistant</td>
</tr>
<tr>
<td></td>
<td>Disinfection liquid</td>
<td>limited resistant</td>
</tr>
<tr>
<td></td>
<td>Peracetic acid</td>
<td>resistant</td>
</tr>
<tr>
<td>Cleaning distance</td>
<td>with flat jet nozzle</td>
<td>20 cm</td>
</tr>
<tr>
<td></td>
<td>with a coarse dirt remover</td>
<td>35 cm</td>
</tr>
</tbody>
</table>

* Evaluation range: ++ / + / o / – / – – (o = standard)

** Evaluation range: + / –

*** Evaluation range: + = resistant / o = limited resistant / – = not resistant
The Product

Manufacturer and Applicant
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Description and Technical Data
The Animattress I cubicle mattress tested here is an elastic floor covering for use in the resting area of high cubicles in cubicle houses; it has a thickness of approx. 53 mm.
- Top cover: black rubber mat, upper side with silkscreen structure, under side with white woven textile, thickness approx. 4.5 mm.
- Shore A hardness: approx. 75.
- Mattress underlay made of approx. 48 mm thick PU foam sheet which is covered with a ca. 1 mm thick colourless film.
- Laid as sheeting.

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 cm²; 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.

Slip resistance
The measurements were carried out with the ComfortControl test rig of the DLG test centre.
A loaded (10 kg) round plastic foot (105 mm diameter, with a contact area of 70 cm², 3 mm wide ring at the periphery of the ground) was pulled with a velocity of 20 mm/s across the mat.

Acid resistance
A permanent dipping test in accordance to DIN EN ISO 175:2000 (performance of synthetic material against liquid chemicals) was carried out. Test samples (size 30 mm x 30 mm) were complete dipped in different test liquids for 24 hours and 28 days (room temperature 20° Celsius). In the 28 days test the liquids were changed weekly. After the 28 days the samples were washed with distillate water and dried for 24 hours. Before and after the dipping the weight, the dimensions and the shore hardness (shore A) of the test samples was measured. Additional a visual evaluation was done for alterations like colour changing, swelling, destruction or crystallisation. All samples were evaluated in comparison to the standard water.

Cleaning distance
In test stand trials with a high pressure cleaner (approximately 145 bar, exposure period 1 minute with a 25° flat jet nozzle and a coarse dirt remover) the distance was measured where no damage occurs.
The Test Results in Detail

Deformability and elasticity
In the ball penetration tests in new condition with a calotte \( r = 120 \text{ mm} \), penetration depth was 25.7 mm. The resulting calculated bearing pressure of 10.3 N/cm² indicates a relatively small 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 cm²) with 100,000 alternating loads at 10,000 N. Following the endurance test, the penetration depth of the calotte increased from 25.7 mm to 27.7 mm. The bearing pressure decreased from 10.3 N/cm² to 9.6 N/cm² (see Fig. 4). This means that deformability and elasticity slightly increase.

Evaluation see Table 1.

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

Evaluation see Table 1.

Abrasives test
The abrasion depth after 10,000 cycles amounted to 1.0 mm, this corresponds to approximately 17% of the rubber thickness.

Of the ground surface 3.4 grams were rubbed off.

Evaluation see Table 1.

Slip resistance
The slide pulling tests showed a good slip resistance on the dry or wet mattress surface in new condition. The measured friction coefficients (\( \mu \)) all surpassed the minimal value of \( \mu = 0.45 \) which speaks for a good foothold.

Evaluation see Table 1.
**Acid resistance**

The cover mat of the mattress was limited resistant against the feed acid mixture, ammonia solution and barn disinfection liquid and resistant against the other used test liquids. The differences in weight, thickness and Shore A hardness between the acid treated and not acid treated samples were minor and lay in the range of water as standard.

Against the used liquids the cover mat seems to be satisfactory suited for the described use.  
*Evaluation see Table 1.*

**Cleaning distance**

In test stand trials with a high pressure cleaner damage to the cover of the mattress only occurred when a minimum distance of 35 cm (with a coarse dirt remover) and 20 cm (with a flat-jet nozzle) was not kept.

For cleaning and disinfection of the floor cover, only the cleaning agents permitted by the manufacturer should be used.  
*Evaluation see Table 1.*

<table>
<thead>
<tr>
<th>Test liquid</th>
<th>concentration</th>
<th>result after 24 hours residence time</th>
<th>result after 28 days residence time</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed acid mixture</td>
<td>concentrate, pH 2</td>
<td>fleece on the back little color changing</td>
<td>fleece on the back color changing</td>
<td>limited resistant</td>
</tr>
<tr>
<td>Excrement acids</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uric acid</td>
<td>saturated urea solution (0,4%)</td>
<td>no changing</td>
<td>no changing</td>
<td>resistant</td>
</tr>
<tr>
<td>Sulfurous acid</td>
<td>5-6% SO₂</td>
<td>no changing</td>
<td>no changing</td>
<td>resistant</td>
</tr>
<tr>
<td>Ammonia solution</td>
<td>32% solution</td>
<td>no changing</td>
<td>fleece on the back in solution</td>
<td>limited resistant</td>
</tr>
<tr>
<td>Disinfection liquid</td>
<td>Barn Disinfection liquid 2%-solution of a product with formic acid and glyoxyl acid</td>
<td>no changing</td>
<td>fleece on the back color changing</td>
<td>limited resistant</td>
</tr>
<tr>
<td>Peracetic acid</td>
<td>3000 ppm</td>
<td>no changing</td>
<td>no changing</td>
<td>resistant</td>
</tr>
</tbody>
</table>

**Figure 7:**  
Samples after acid resistance test

**Figure 8:**  
Test sample after abrasion test

**Summary**

Based on test-stand investigations, the criteria tested in this DLG Approved Test evaluate the comfort and durability properties of the animattress I for use in the resting area of high cubicles in cubicle houses. The tested animattress I met the requirements of the Testing Framework with respect to the investigated criteria.
Further Information

Further test results for cubicle floorings are available for download at:

http://www.dlg.org/stableequipment.html

The relevant DLG committees have published various instruction leaflets on the topics of animal welfare and cattle farming. These are available free of charge in PDF format at:

www.dlg.org/merkblaetter.html

Test execution

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DLG Testing Framework

DLG Approved Test
“Elastic Stable Flooring”
(as at 04/2010)

Field

Indoor operations

Project manager

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Test engineer(s)

Dr Harald Reubold *

* Reporting engineer

The DLG

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