

DLG Test Report 7465

Geyer & Hosaja Sp. z o.o.

“GH-S 2.4 24 mm” Slatted Floor

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



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, Abrasion, Slip resistance, Acid resistance” 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 Frameworks for elastic stable flooring, as of December 2018 and DIN 3763:2022-08 (Elastic floorings for cattle and dairy cows walking and rest surfaces – Requirements and testing).

Other criteria were not investigated.

The product

Manufacturer and Applicant

Geyer & Hosaja Sp. z o.o.
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Product:
“GH-S 2.4 24 mm”,
flooring for calves, cows and bulls
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Description and technical data

The “GH-S 2.4 24 mm” floor covering tested here, is an elastic floor covering for calves.

- Black profiled slatted floor rubber mat 24 mm thick
- Surface: with honeycomb profile
- Underside: groove structure (height of the grooves approx. 1 mm, width of the grooves approx. 3 mm)
- Installation as a single mat
- Hardness Shore A: approx. 75

Assessment in brief

The “GH-S 2.4 24 mm” flooring for calves, cow and bulls tested here, was investigated with regard to durability and comfort properties on test stands in the DLG Test. The deformability and elasticity of the cubicle mat, the abrasion resistance, the slip resistance, the acid resistance and the cleaning distance were measured and a permanent tread load was applied.

Requirements DIN 3763 are fulfilled for the tested criteria.

Deformation and Elasticity corresponds to class 2 DIN 3763 for single pens for calves.

Table 1:
Overview of results

DLG QUALITY PROFILE	Evaluation
Lying measurement deformability and elasticity in new condition	■ ■ ■ *
Lying measurement deformability and elasticity following endurance test	■ ■ ■ *
Walking measurement deformability and elasticity in new condition	■ ■ ■ ■ ■ *
Walking measurement deformability and elasticity following endurance test	■ ■ ■ ■ ■ *
Lasting deformation following 250.000 endurance test	■ ■ ■ ■ ■ *
No noticeable wear/no damage following 250.000 endurance tests	■ ■ ■ ■ *
Slip resistance	■ ■ **
Resistance to feed acid mixture	■ ■ ■ ***
Resistance to uric acid	■ ■ ■ ***
Resistance to sulfurous acid	■ ■ ■ ***
Resistance to ammonia	■ ■ ■ ***
Resistance to barn disinfectants	■ ■ ■ ***
Resistance to peracetic acid	■ ■ ■ ***
Abrasion/Wear resistance	■ ■ ■ ■ *
Cleaning distance with flat jet nozzle	■ ■ ■ *
Cleaning distance with a coarse dirt remover	■ ■ ■ *

DLG Evaluation range:

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

** Single criteria slip resistance: ■ ■ = passed, ■ = failed

*** Single criteria acid resistance: ■ ■ ■ = resistant, ■ ■ = limited resistant, ■ = failed

The method

Deformability and elasticity

Lying measurement

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).

Walking measurement

The deformability is determined in new condition and after the continuous tread load with a cow's foot modeled steel base and a penetration force of 2,000 N (approx. 200 kg). Where: the "artificial cow's foot" in its dimensions is the one used in the continuous tread load.

Permanent tread load

The measurement of the continuous tread load is carried out with 250,000 alternating loads at 5,000 N (corresponds to approx. 500 kg) on a test bench with a round steel foot.

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.

Abrasion test

In a standardised abrasion test with 10.000 cycles the top cover was grinded with an emery cloth (granulation 280) and a grinding pressure of 500 N (= 8.1 N/cm² surface pressure). The friction element was cooled continuous with water to prevent an influence of the generated heat during the abrasion test. The size of the grinded area was 61,5 cm².

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 75 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 3763:2022-08 (performance of synthetic material against liquid chemicals) was carried out. Test samples (size 30 x 30 mm) were completely dipped into 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 were measured.

Additional 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 bench 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.

Detailed account of the test results

Deformability and elasticity

Lying measurement

In the ball penetration tests in new condition with a calotte ($r = 120$ mm), penetration depth was 5.0 mm. The resulting calculated bearing pressure of 53.1 N/cm² indicates a 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 250,000 alternating loads at 5,000 N.

Following the endurance test, the penetration depth of the calotte increased from 5.0 to 5.1 mm.

The bearing pressure decreased from 53.1 N/cm² to 52.0 N/cm² (see Fig. 3a). This means that deformability and elasticity slightly increase.

Walking measurement

In the impression tests with an artificial cow foot the depth of penetration of the walkway surface in new condition 3.0 mm. The calculated bearing pressure is 26.67 N/cm². The elasticity was measured after the permanent load tread by a steel base (contact area 75 cm²) with 250.000 alternating loads measured at 5,000 N.

The depth of penetration increased after the endurance test of 3.0 mm to 3.1 mm. This means, that deformability and elasticity of the walkway covering increase (see Fig. 3b).

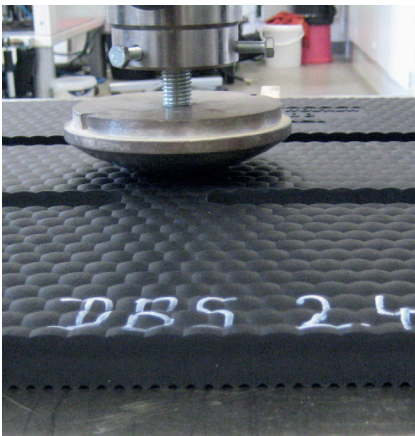


Figure 2:
Deformation measurement

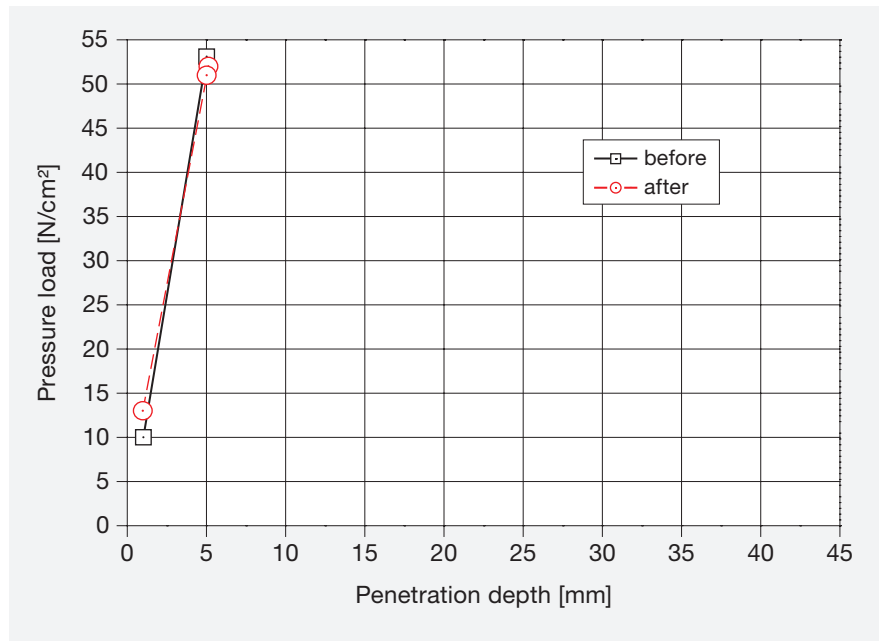


Figure 3a:
Lying measurement – deformability as function of bearing pressure

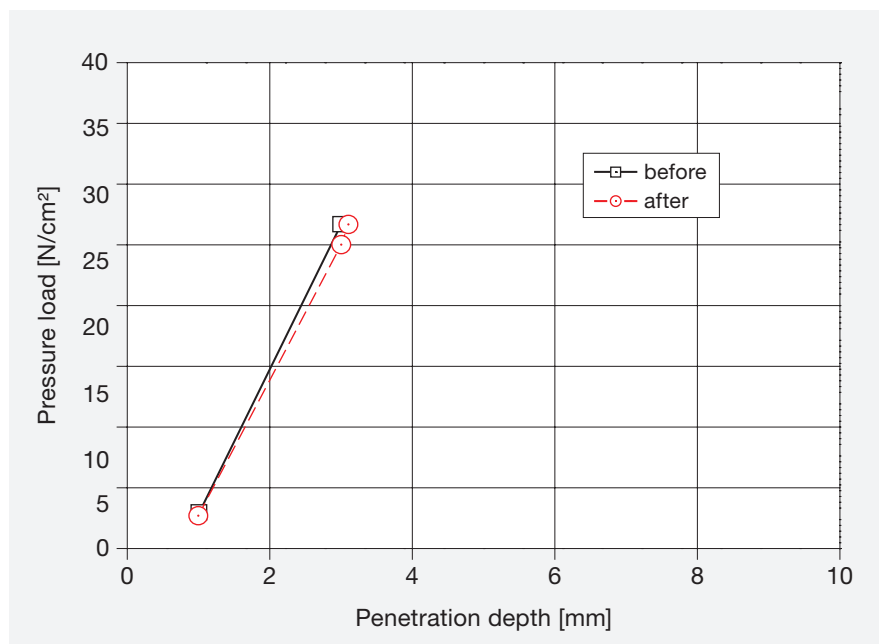


Figure 3b:
Walking measurement – deformability as function of bearing pressure

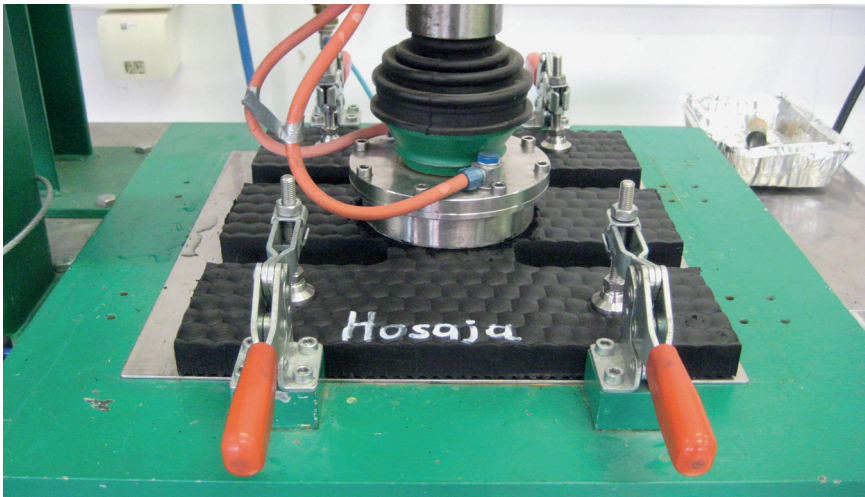


Figure 4:
Test sample after abrasion test



Figure 5:
Slip resistance measurement



Figure 6:
Test samples after acid test

Permanent tread load

After the continuous tread load on a test stand with 250.000 alternating loads at 5.000 N there was observed no noticeable wear and no damage on the surface of the mat. No lasting deformation was observed.

Abrasion test

The abrasion depth after 10,000 cycles amounted to 1.6 mm, this corresponds to approximately 7 % of the rubber thickness. Of the ground surface 4.9 grams were rubbed off. The abrasion depth and the grit implicate a good wear resistance of the cow mat.

Slip Resistance

The slide pulling tests showed a good slip resistance on the dry or wet rubber mat surface in new condition. The measured friction coefficients (μ) surpassed the minimal value of $\mu = 0,40$ (DIN 3763) and $\mu = 0.45$ (DLG test program).

Acid resistance

The rubber mat was resistant to the tested liquids. The differences in weight, thickness and Shore A hardness between the acid treated and not acid treated samples lay in the range of water as standard. Against the used liquids the rubber mat seems to be good for the described use.

Cleaning distance

In test bench trials with a high pressure cleaner damage to the mat only occurred when a minimum distance of 45 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.

Table 2:
Test liquids and results – acid resistance

Test liquid	Concentration	Result after 24 hours residence time	Result after 28 days residence time	Evaluation
Feed acid mixture				
	concentrate, pH 2	no changing	no changing	resistant
Excrement acids				
Uric acid	saturated urea solution (0,4 %)	no changing	no changing	resistant
Sulfurous acid	5-6 % SO ₂	no changing	no changing	resistant
Ammonia solution	32 % solution	no changing	no changing	resistant
Disinfection liquid				
Barn Disinfection liquid	2%-solution of a product with formic acid and glyoxyl acid	no changing	no changing	resistant
Peracetic acid	3000 ppm	no changing	no changing	resistant

Summary

Based on test-stand investigations, the criteria tested in this DLG Approved Test evaluate the comfort and durability properties of the “GH-S 2.4 24 mm” slatted floor.

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

Deformation and Elasticity corresponds to class 2 DIN 3763 for single pens for calves.

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 Frameworks for elastic stable flooring,
as of December 2018

DIN 3763:2022-08 (Elastic floorings for cattle and
dairy cows walking and rest surfaces – Requirements
and testing)

Department

Agriculture

Division head

Dr. Michael Eise

Test engineer(s)

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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.

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Internal test code DLG: 2403-0024

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