

DLG Test Report 7223

Animat Inc.

Alley Mat Low Emission Mat



FULL TEST
ANIMAT
LOW EMISSION MAT
DLG Test Report 7223



Überblick

The DLG APPROVED FULL TEST quality mark is awarded to agricultural equipment that has passed a comprehensive DLG usability test. A DLG usability test is carried out to independent and recognised test criteria and provides an objective and unbiased assessment of the product and all features considered essential by users. The test comprises individual lab tests as well as field tests in various conditions; in addition to that the product has to prove itself in on-farm applications. The test conditions

and procedures are defined by an independent test commission and described in a test framework which defines the parameters for evaluation. Yet the test conditions and procedures as defined are revised on an ongoing basis so they reflect what is acknowledged as the current state of the art as well as the latest scientific findings and also agricultural insights and requirements. After a product has passed the test, a test report is produced and published and the quality mark is awarded to the product and will retain its validity for five years from the date of award.

This DLG APPROVED FULL TEST consisted of technical measurements, in-situ testing and observation of animal behaviour on livestock farms. On test rigs the deformability and elasticity, the abrasion resistance, the slip resistance, the acid resistance 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).



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Assessment in brief

Table 1:
Overview of results

DLG QUALITY PROFILE	Evaluation*
TECHNICAL CRITERIA	
Lasting deformation following endurance test	■ ■ ■ ■ ■
Waer following endurance test	■ ■ ■ ■ □
Abrasion/Wear 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***	■ ■ ■
Dimensional stability	■ ■ ■ ■ □
Installation by the owner	n.E.
Installation instructions	n.E..
Cleaning	■ ■ ■ ■ □
Recycling concept	■ □ □ □ □
ANIMAL-RELATED CRITERIA	
Movement behaviour observations	■ ■ ■ ■ □
Comfort-/Heatbehaviour observations	■ ■ ■ ■ □
Slip resistance**	■ ■
Secure foothold of the animals**	■ ■
Deformability and elasticity in new condition	■ ■ ■ ■ □
Deformability and elasticity following endurance test	■ ■ ■ ■ □
Toxicological safety	■ ■ ■ □ □

n.E. = no Evaluation

The Animat Low Emission alley mat tested here, was in the laboratory approved in the DLG

Full test for durability and comfort features. In the practical investigations was the assembly and dimensioning assessed and behavioural observations were done.

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 requirements, ■ = failed

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

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

The Product

Manufacturer and Applicant

Animat Inc., 395, rue Rodolphe-Racine
Sherbrooke QC J1R 0S7, Canada

Product:

Animat Laufgangbelag Low Emission Mat

Contact:

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Description and technical data

Before installing the alley mat, the walkways are measured by the dealer.

Based on the dimensions of the walkways the mats are produced in the appropriate size. Depending on the width and length of the walkways the mats are equipped with 2 or 3 pageboy puzzles and a beveled page together with the plastic rail (with an inverted chamfer) for the slide groove supplied.

The installation is carried out by the assembly team of the dealer. The surface on which the mats are placed must be clean and smooth. The mats and the plastic rail are equipped with impact dowels attached to the ground.

- Dimensions plastic rail:
2430 mm x 65 mm x 19.1 mm
- black profiled rubber mat: approx. 19 mm thick
- Surface with hammer impact profile and approx. 30 mm wide grooves, which have a depth of approx. 4 mm; Appearance surface between the grooves approx. 103 mm wide
- Underside with webs (webs are approx. 3 mm wide and approx. 1 mm high), distance between the webs: approx. 5 mm
- Laying interlocked as a puzzle
- Shore hardness A of approx. 70
- Available dimensions: width 1,616 mm, length is determined by the width of the walkway; at larger widths of the walkway become 2 mats connected to each other with interlock connection



Figure 2:
Mounting of the plastic rail



Figure 3:
Laying the rubber mats



Figure 4:
Attachment of the rubber mats

The Method

Suitability

The suitability as well as the possible application and the areas of application of the Animat alley mat Low Emission Mat is assessed on a practical basis.

Survey

A survey of farms that have the same walkway floor system in use, will be used as a supplement of the test results.

TECHNICAL CRITERIA

Permanent tread load

The permanent tread load is measured on a test stand with a round steel foot in the standard test programme with 250,000 alternating loads at 5,000 N (corresponding to approx. 500 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.



Figure 5:
Permanent tread load

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.

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 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.

Dimensional stability

The dimensional stability of the alley mat was evaluated after installation in accordance with the manufacturer's instructions.

In addition, it was assessed whether a length or a change in width was detectable.

Handling, installation and maintenance

The installation method of the Animat alley mat Low Emission Mat, the installation instructions and the required care is assessed in a practice-oriented manner.

Cleaning

Cleaning of the Animat Low Emission alley mat is evaluated in a practice-oriented manner.

Warranty and recycling

The manufacturer shall indicate whether and for how long guarantee is granted and on which the guarantee is based. In addition, the manufacturer shall indicate if there is a recycling concept for the alley mat.

ANIMAL RELATED CRITERIA

Behavioural observations

Movement behaviour

By direct observation of ten randomly selected animals were treated with rapid, uniform gait measured the stride length of the animals. It was checked whether and during which activities slipping occurs. The head posture during walking was observed by 30 animals. A distinction was made between high (angle between neck-withers line and the extended back line less than 20°) and lower (angle larger 20°) head posture. It was also logged whether after installation of the alley mat, more animals lie in the walkway.

Comfort and heat behaviour

Over a period of one hour, a total of 15 active dairy cows were observed, which neither rested in a cubicle, nor at the feeding table Ate. It was recorded whether the animals show estrus or comfort behaviour.

Deformability and elasticity

The deformability is measured in new condition and following permanent tread load with a round steel foot (diameter of 105 mm and therefore a contact area of 75 cm²) and a penetration force of 2,000 N (corresponding to approx. 200 kg).

Slip resistance

A loaded (10 kg) round plastic foot (contact area of 75 cm²) was pulled with a velocity of 20 mm/s across the dry and wet mat.

On a farm that has been using the alley mat since 5 years have been repeated, on at least 12 points in the stable (at least three points per run), the slip resistance measurements.

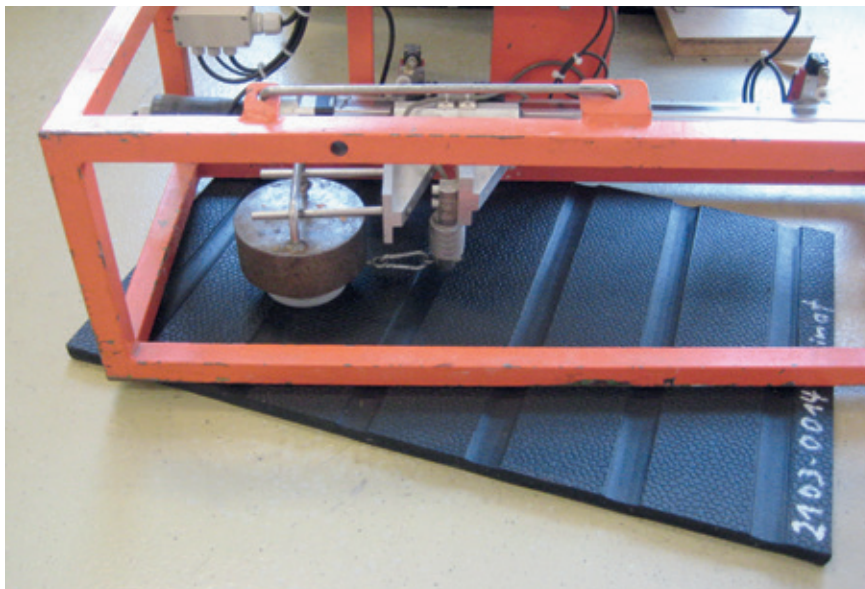


Figure 6:
Slip resistance measurement in the lab



Figure 7:
Slip resistance measurement on farm

Toxicological safety

The manufacturer has to confirm the toxicological safety of the alley mat.

Detailed account of the test results

TECHNICAL CRITERIA

Permanent tread load

After the alley mat had been exposed to a permanent tread load exerted with 250.000 alternating loads of 5.000 N, the mat showed no noticeable wear. Lasting deformation could not be observed.

Abrasion test

The abrasion depth after 10,000 cycles amounted to 2.5 mm. Of the ground surface 9.8 grams were rubbed off.

Acid resistance

The alley mat was resistant against the 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 rubber mat seems to be good suited for the described use.

Dimensional stability

During the test period of 5 years, a noticeable alteration of length and width did not occur in practice after proper installation.

Handling, installation and maintenance

The installation is carried out by the contract company of the manufacturer. A self-installation is due to the manufacturer not provided. On site, there must be a slope to the center of the slider.

The manure slider must be adapted to the alley mat.

Cleaning

The cleaning of the alley mat prepared, after adjustment of the manure slider, no difficulties and the walk way is well cleaned.

When cleaning and disinfecting the alley mat only those specified by the company admissible appropriations should be used.

Warranty and recycling

The applicant grants in accordance with its warranty conditions a warranty of 7 years (100 % the first two years and degressive over the next 60 months).

There is no recycling concept of the manufacturer for the alley mat.

ANIMAL RELATED CRITERIA

Behavioural observations

The behavioral observations were carried out on a farm with 92 dairy cows in a lying box barn.

Movement behaviour

The movement sequence of the cows was quick and relaxed. By direct observation of ten randomly selected animals stride lengths of 73 to 88 cm were measured.

Due to the increased movement activity slips occur without visible impairment of animal behaviour. Head posture while walking was observed in 30 animals.

90 % of the observed animals showed a high and 10 % a low head posture. The high head posture speaks for a safe and relaxed movement sequence.

Comfort- and Heatbehaviour

Over a period of one hour 15 active dairy cows were observed, which neither rested in a lying box, nor at the feed table. Licking of the posterior body was observed 16 times, whereby the animals stood safe on three legs.

Table 4:
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

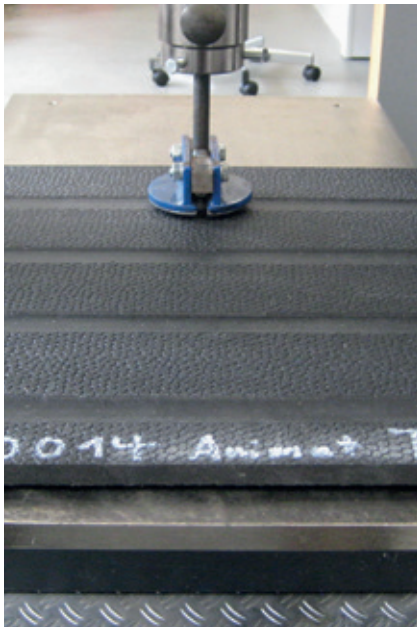


Figure 8:
Deformation measurement

The heat behavior was clearly pronounced with frequent riding. Over a period of one hour, 9 rides were observed. Both the standing cow as well as the jumped cow stood safely on the alley mat. After installation of the alley mat it could not be detected that animals lay in the walkway.

Deformability and elasticity

In the penetration test in new condition with a round steel foot the penetration depth was 2.2 mm. This results in a calculated surface pressure of 26.7 N/cm². Elasticity was measured after the alley mat had been exposed to a permanent tread load exerted by the steel foot (250.000 alternating loads of 5.000 N). After the endurance test, the penetration depth decreased to 2.1 mm (see Fig. 9).

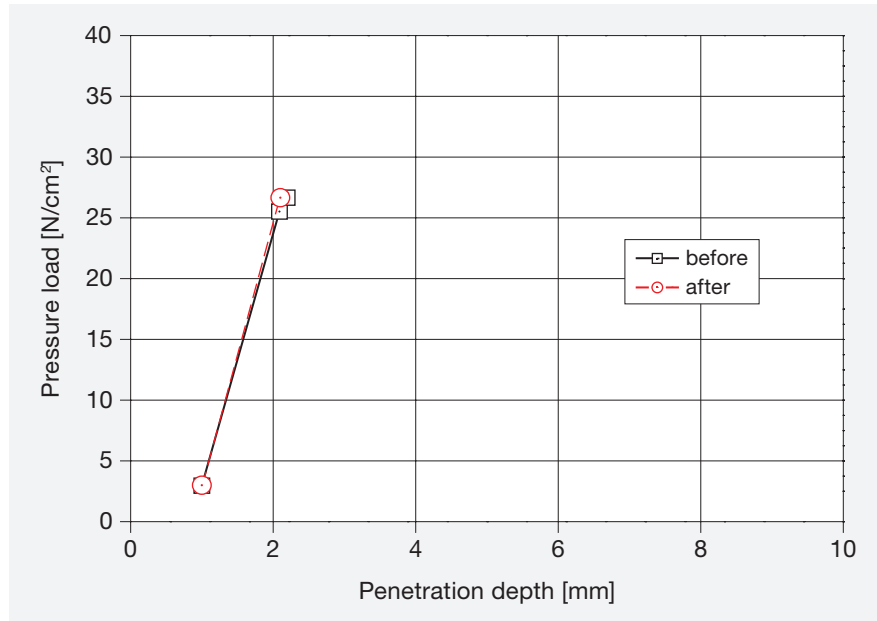


Figure 9:
Deformability as a function of bearing pressure

Slip resistance

The slide pulling tests showed a good slip resistance on the dry or wet mat surface in new condition. The measured friction coefficients (μ) all surpassed the minimal value of $\mu = 0.40$ (DIN 3763) and 0,45 μ (DLG framework) which speaks for a good foothold.

After 5 years of practical use were at 12 points in the stable – at least three points per run – repeats the glide train measurements. The sure-footedness of the animals can, after the animal observations, be judged well.

Suitability

The Animat Low Emission Mat is suitable for use in dairy cow stables.

Survey

A survey of four farms which have the alley mat up to six years in use, confirmed the results obtained the test results. In the farms a total of 2450 m² of the alley mat was installed. At all farms the alley mat was installed from the contracting company of the manufacturer.

All surveyed farms evaluate the animal behaviour on the talley mat with good and could a larger stride length as well as a more active heat behaviour ascertain. In all establishments, also the hoof health improved. Also the durability of the alley mat got from all farms a good rating. Of all companies surveyed the alley mat received a rating from good to very good.

All respondents would buy again the alley mat if necessary.

Summary

The criteria tested in this DLG Approved Full Test evaluate the comfort and durability properties of the Animat Low Emission Mat for use in the walking ways in cubicle houses. The tested Animat Low Emission Mat met the requirements of the Testing Framework with respect to the investigated criteria and is suitable for dairy cow barns.

Further information

Test implementation

DLG TestService GmbH,
Gross-Umstadt location

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

DLG test scope

Approved Test “Elastic Stable Flooring”
(as at 12/2018)

Department

Agriculture

Division head

Dr. Ulrich Rubenschuh

Test engineer(s)

Dr. Harald Reubold *

DLG Test Commission

Dr. agr. Steffen Pache, Köllitsch
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Reiner Schmidt, Ronneburg
Dipl.-Ing. agr. Klaus-Werner Wolf, Höchst

DLG Expert Committee on Animal Welfare

Dr. sc. agr. Christiane Müller, Trenthorst

* 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.

Internal test code DLG: 2103-0014

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