

DLG-Test Report 6821

DeLaval

Cubicle Roll CR 20

Deformability/Elasticity, Permanent Tread Load,
Abrasion, Slip resistance



**DELAVAL
CUBICLE ROLL CR 20**

- ✓ Deformability/Elasticity
- ✓ Permanent Tread Load
- ✓ Abrasion
- ✓ Slip resistance

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Overview

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,” includes technical measurements on test stands of the DLG Test Center. The deformability and elasticity, the abrasion resistance, the slip 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 April 2010. Other criteria were not investigated.



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Assessment – Brief Summary

The DeLaval cubicle roll CR 20 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, the abrasion resistance, the slip resistance, were measured and a permanent tread load was applied.

Table 1:
Overview of results

Test characteristic	Test result	Evaluation*
Deformability and elasticity		
– in new condition	10,2 mm	+
– following endurance test	9,6 mm	+
Permanent tread load		
	no lasting deformation	++
	wear on the surface and on the small knobs at the underside	○
Abrasion test		
	good wear resistance	+
Rutschfestigkeit**		
	good slip resistance on dry and wet mat surface	+

* Evaluation range: +++ / ++ / + / ○ / - / -- (○ = standard)

** Evaluation range: + / -

The Product

Manufacturer and Applicant

DeLaval International AB site Glinde, P.O. Box 1136, DE-21509 Glinde/Germany

Product:

DeLaval cubicle roll CR 20

Contact:

Telephone +49 (0)4030 3344-308

Telefax +49 (0)4030 3344-349

Mathias.Reichert@delaval.com

www.delaval.com

Description and Technical Data

Black, profiled cubicle rubber mat

- approx. 20 mm tick
- surface with a hammerstroke structure
- underside with small and great conical knops
 - knops approx. 9 mm high
 - great knops diameter at the bottom: approx.. 27 mm
 - small knops diameter at the bottom: approx. 14 mm
- seamless installation
- Shore A: approx. 78

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.

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.

The Test Results in Detail

Deformability and elasticity

In the ball penetration tests in new condition with a calotte ($r = 120$ mm), penetration depth was 10.2 mm. The resulting calculated bearing pressure of 26.0 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 decreased from 10.2 mm to 9.6 mm.

The bearing pressure increased from 26.0 N/cm² to 27.6 N/cm² (see Fig. 2). This means that deformability and elasticity slightly decrease.

Permanent tread load

Wear on the surface and on the small knobs at the underside was observed on the rubber mat following exposure to permanent tread load on a test stand with 100,000 alternating loads at 10,000 N. No lasting deformation was observed.

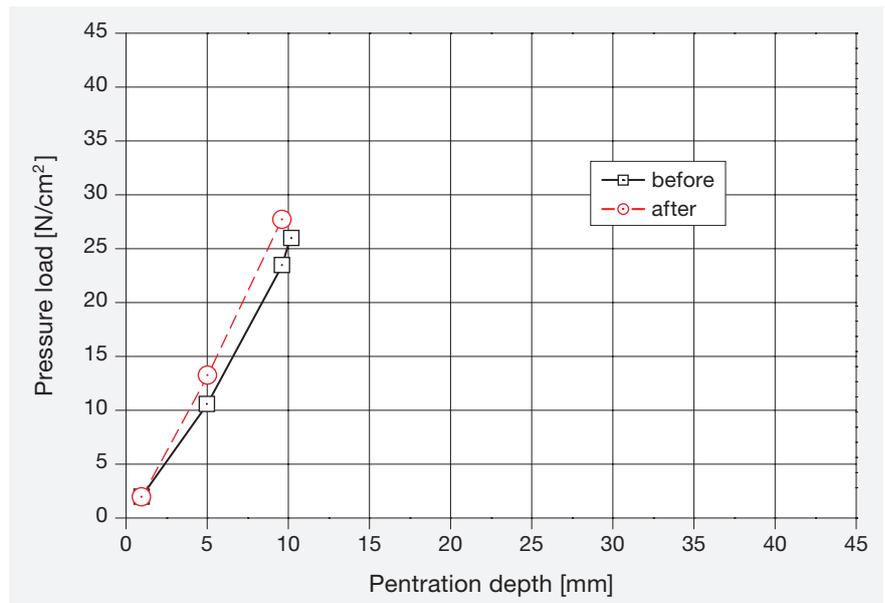


Figure 2:
Deformability as a function of bearing pressure

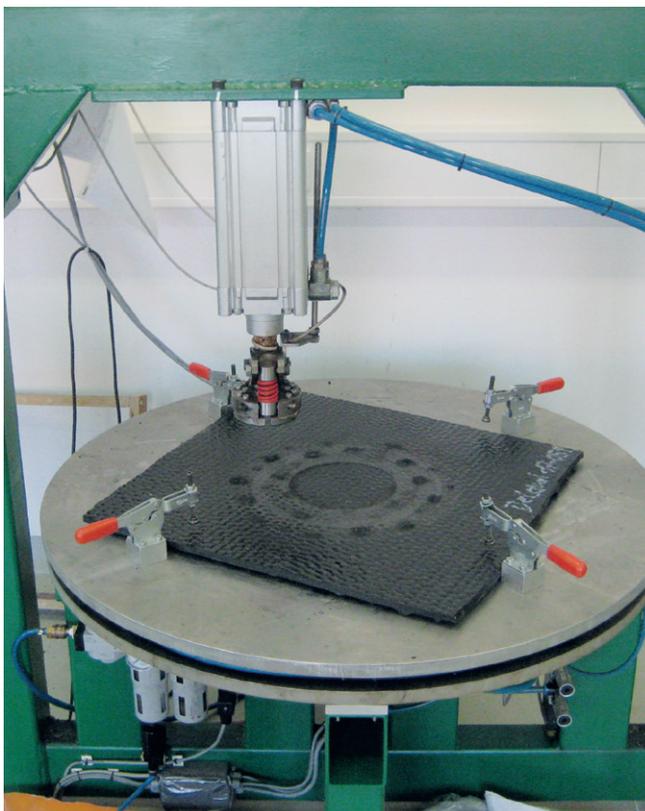


Figure 3:
Permanent tread load



Figure 4:
Measuring the deformability

Abrasion test

The abrasion depth after 10,000 cycles amounted to 2.5 mm, this corresponds to approximately 12 % of the rubber thickness. Of the ground surface 6.0 grams were rubbed off.

The abrasion depth and the slight grit implicate a good wear resistance of the rubber 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) all surpassed the minimal value of $\mu = 0.45$ which speaks for a good foothold.



Figure 5:
Test sample after abrasion test

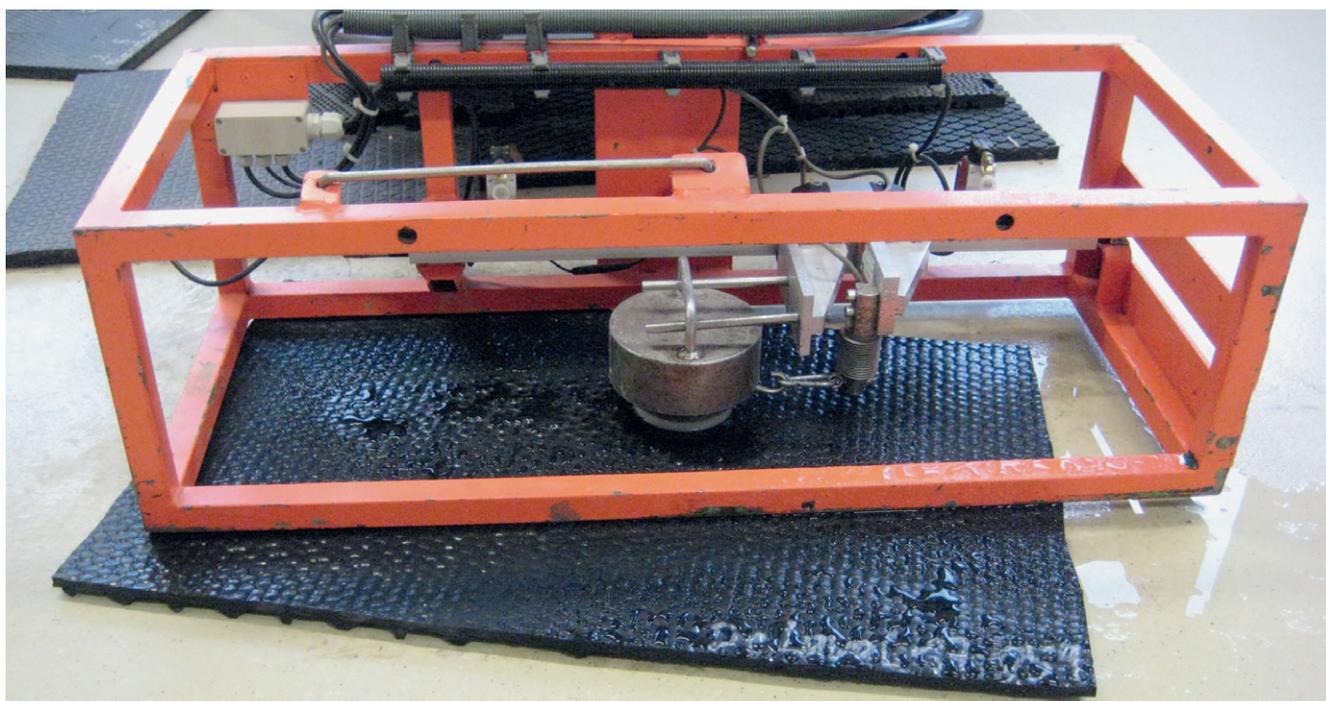


Figure 6:
Slip resistance measurement

Summary

Based on test-stand investigations, the criteria tested in this DLG-Approved test for single value-determining criteria evaluate the comfort and durability properties of the DeLaval cubicle roll CR 20 for use in the resting area of high cubicles in cubicle houses.

The tested DeLaval cubicle roll CR 20 met the requirements of the Testing Framework with respect to the investigated criteria.

More information

Further test results for mats for lying boxes are available to download at www.dlg-test.de/stalleinrichtungen.

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 implementation

The tests are carried out on behalf of the DLG by the DLG TestService GmbH as testing agency.

DLG test scope

DLG-APPROVED test for single value-determining criteria “Elastic Stable Flooring” (current as of 04/2010)

Department

Indoor operations

Head of Department

Graduate engineer. agr. Susanne Gäckler

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 techniques at our ultra-modern facilities applying also international standards. The actual testing agency is the DLG TestService GmbH which holds multiple accreditations to perform these tests.

Internal test code DLG: 17-059

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DLG e.V.

Test Center Technology and Farm Inputs

Max-Eyth-Weg 1 • 64823 Groß-Umstadt • Germany

Phone: +49 69 24788-600 • Fax: +49 69 24788-690

Tech@DLG.org • www.DLG.org

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