

**Test report**  
Q IWQ MBL 735 1070e

**Reported to:** Nature Foams International Pvt. Ltd.  
No. 2 Hunupitiya Cross Road  
Colombo 2  
Sri Lanka

**Object:** Latexcore  
(1 sample supplied by the client)

**Order:** Durability test and evaluation of the  
resilience characteristic according to  
LGA-Guidelines and DIN EN 1957: 08.2000

**F i n d i n g s**

The mattresscore has been tested in a durability test rick with a roller load of 1400 N in two test stages with a total of 60 000 cycles.

The measurement and the characteristic curve of resilience was taken central to the area as Force-Displacement-Plot.

- a) after 200 strokes
- b) after 30 000 strokes
- c) after 60 000 strokes

The characteristic curve of resilience allows an assessment of the resilience and durability characteristic as well as the subjective hardness rating.

- Characteristics before the test

Hardness index:	3,57
Hysteresis:	13,8 %
Height of the system:	150 mm

- Characteristics after the test

Change in height after the test:	2,1 mm
Change in hardness after 30 000 strokes:	11 %
Change in hardness after the test:	19 %
Resilience loss factor after the test:	7,3

(deviating from DIN EN 1957)

This Test report consists of 11 text pages.

The data are determined based on the LGA-rating system limited to a maximum of 100 points.

The requirement for an increased quality level is 80 points \*).

\* Note:

The minimum value for performance is 50 points. More than 70 points specific a good quality.

The reached total number of points for the 4 characteristic data is 95 points.

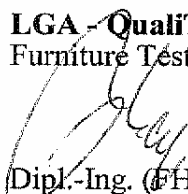
Change in height after test:	25 points
Change in hardness after 30 000 strokes:	25 points
Change in hardness after test:	25 points
Resilience loss factor after test:	20 points

The results of the test refer solely to the tested sample.

The following pages contain further information about test parameters and geometry of the roller, measurement conditions and design of the loading pad, modus of assessment and rating system.

Nürnberg, 08.03.2005  
Q IWQ MBL/hy/th/şe

**LGA - QualiTest GmbH**  
Furniture Testing Institute

  
Dipl.-Ing. (FH) R. Heym



Specialist:



Thomas Thormann

## Test Results

### Object

Article: mattresscore  
Article denomination: Latexcore  
Number of samples: 1  
Date of delivery note: ./.  
Delivered: 27.01.05  
Delivered by: Dames-Willers  
Register Nr. 061

### Scope of tests

General examination

Durability test in two stages according to LGA-Guidelines 33003 and  
DIN EN 1957: 08.2000

- Stage 1: 30 000 strokes with 15 000 cycles
- Stage 2: 30 000 strokes with 15 000 cycles

Evaluation of resilience characteristic curve

- after 200 strokes = 100 cycles
- after 30 000 strokes = 15 000 cycles
- after 60 000 strokes = 30 000 cycles

Assessment of the Force-Displacement-Plot according to LGA-Guidelines 33003 and the  
actual state of art of the European Standardization. Determination according to the LGA-  
rating system limited to a maximum of 100 points.

### Applicability of test results

The test results refer solely to the samples tested. The digital photos - if any - serve only for  
additional explanation and do not constitute any part of the test report.

### Tolerances

Unless otherwise stated dimensions are measured to an accuracy according to DIN 7168-g  
for old design and DIN ISO 2768, Part 1 "c" for new design. For all other physical values  
the measurement uncertainty < 5 %. The tests were carried out under standard indoor  
conditions unless otherwise stated.

## General examination

### Dimensions

Length: 1960 mm

Width: 860 mm

Height: 150 mm

Weight: 22,3 kg

### Design

Core: Latexcore with pin holes

Cover: ./.

Frame: ./.

Handless: ./.

## **Durability Test - Roller Test according to LGA Guidelines 33003 and DIN EN 1957**

### **Test Rick**

The durability test is carried out by means of an electromotoric driven roller test device.

A specified roller made of laquered hard wood rolls over the mattress that is placed on a levelled, rigid, flat base and fixed to prevent slipping.

Rotation symmetric roller

- Length 1000 mm
- Length of the medium section 400 mm,  $\varnothing$  300 mm
- Spherical ends reduced to  $\varnothing$  250 mm
- Outer edges with radius: 20 mm
- Roller load 1400 N

### **Test parameters**

Length of stroke: 500 mm

Cycle: 1 cycle consists of one forward and one backward stroke in sinusoidal motion

Rolling strain: symmetric over the width of the mattress  
Stage 1 for 30 000 strokes  $\ddot{I}$  15 000 cycles  
Stage 2 for 30 000 strokes  $\ddot{I}$  15 000 cycles

Total test for 60 000 strokes  $\ddot{I}$  30 000 cycles

Roller drive: horizontal directed force

Test rate:  $16 \pm 2$  cycles per minute

Condition in the test bay: Standard climate, 23/50-2, DIN 50 014

### **Visual examination**

The mattress has been checked before, during and after the durability test. A necessary interior check is carried out after test and evaluation.

## **Determination of resilience characteristics (Force-Displacement-Plot acc. to LGA Guidelines 33 003 and DIN EN 1957)**

### **Measuring set-up and conditions**

A loading pad as specified applies and removes a load to the mattress at the area of its center of gravity with linear speed.

The load is measured by means of a piezoelectric load cell at the loading pad, the actual compression by means of an inductive displacement sensor.

The fourth characteristic curve after 3 load applications of 1000 N and removal of the load will be recorded.

Measurement uncertainty:  $\pm 1 \%$

Design of the loading pad:

Spherical pad, diameter 355 mm  
Curvature radius 800 mm (surface 1000 cm<sup>2</sup>)

Travel speed: 90 mm/min

The resilience characteristic curves as Force-Displacement-Plots with the axes compression force and depth of impression are taken

- a) after 200 strokes = 100 cycles
- b) after 30 000 strokes = 15 000 cycles
- c) after 60 000 strokes = 30 000 cycles

with a recuperation time of at least 5 hours each.

### **Assessment according to LGA Guidelines 33003 and DIN EN 1957**

Change in height and change in hardness as well as resilience loss are a dimension of durability as measurable functional characteristics.

#### **Change in height**

The change in height is determined after testing under a load of 50 N applied by the loading pad.

The change in height in mm indicates how intensive the mattress will visibly deform under frequent use.

### **Hardness rating and change in hardness rating**

The hardness rating is calculated as mean inclination of the Force-Displacement-Plot at a load of 210 N, 275 N and 340 N.

$$\frac{C_1 + C_2 + C_3}{3}$$

C<sub>1</sub> Inclination at a load of 210 N

C<sub>2</sub> Inclination at a load of 275 N

C<sub>3</sub> Inclination at a load of 340 N

The change in hardness rating in percent is calculated from the relations between the hardness rating after test stage 1 and 2 to the hardness rate before the test.

### **Resilience loss factor (deviating to DIN EN 1957)**

It is calculated from the quotient of the areas between curve a) and c) and the rectangle that is formed by the perpendiculars from the end point of curve c) and the coordinate axes multiplied by the factor 100.

Also the resilience loss factor indicates how the resilience and elasticity of the mattress change during the test. It shows especially how the characteristic curve deviates in the curvature after test from the one before testing.

#### **Note:**

- a) after 100 cycles (200 strokes)
- b) after 15 000 cycles (30 000 strokes)
- c) after 30 000 cycles (60 000 strokes)

### Determination of subjective hardness rating<sup>1)</sup>

The subjective hardness rating LH is a figure on a scale from 1 to 10 that indicates the hardness of the resilience.

$H_S = 1$  is a hard resilience,  $H_S = 10$  is a soft resilience

$H_S$  is determined according to the following function:

$$H_S = 10 (1 - \exp - (K \times a + b))^2$$

K is calculated with the following equation from the Force-Displacement- Plot

$$K = \frac{A}{H}$$

Where:

A = Area under the curve from 0 to 450 N  
from the Force-Displacement-Plot

H = Hardness rating

a =  $5,92 \times 10^{-4}$

b = 0,148

### Determination of the hysteresis

The per cent hysteresis is calculated from the quotient of the area enclosed by the load and deload curves and the area below the load curve (up to max.depth of indentation at 1000 N) multiplied by a factor of 100.

The hysteresis value is a measure of the ratio of applied force and withdrawn force and characterizes how freely the user can move on the mattress (change in sleeping position).

### Results of measurement and assessment

The following pages contain the Force-Displacement-Plot, results of measurement and assessment as well as rating points according to LGA-rating system.

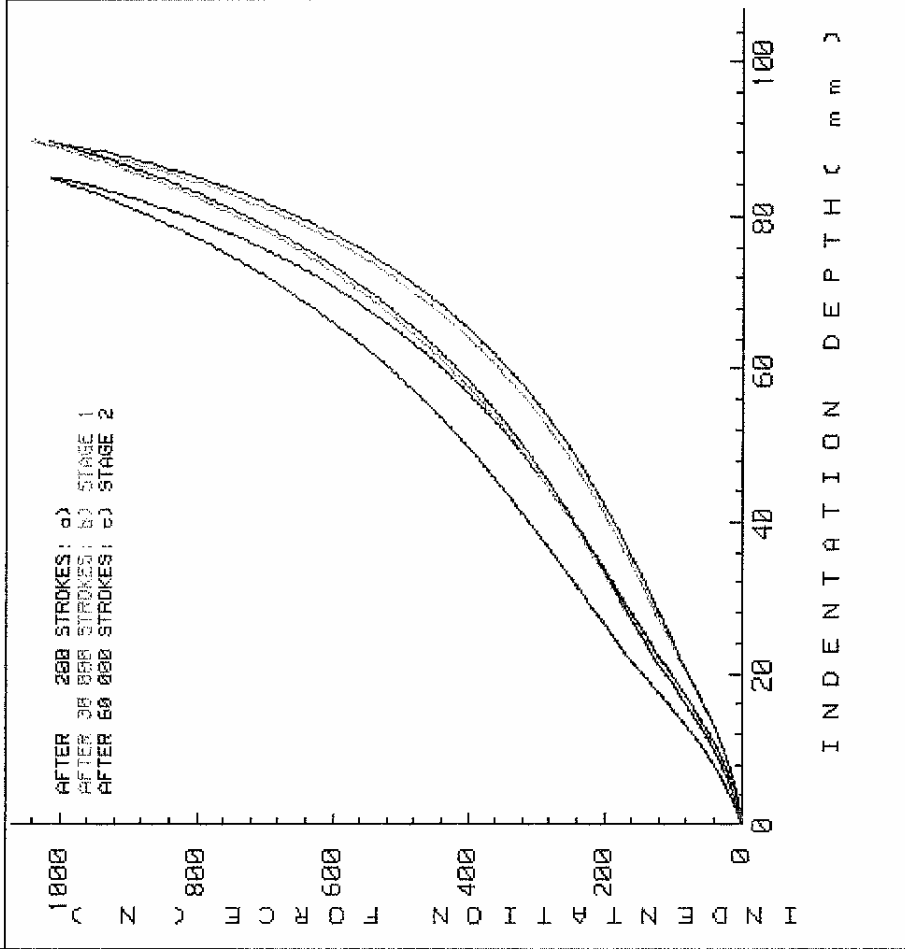
### Note

1) The rating of the subjective hardness is determined by means of hardness value H, that is based on results of empiric studies and indicates the subjective valuation by the user.



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# MATTRESS RESILIENCE CHARACTERISTICS



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 DETERMINATION OF CHARACTERISTICS  
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 DATA AFTER 200 STROKES  
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HARDNESS RATING H 8.77 N/mm  
 AREA A (Ø-450N) 11315 Nmm  
 HARDNESS VALUE K 1289 mm<sup>2</sup>  
 SUBJECTIVE HARDNESS Hs 3.57  
 HYSTERESIS 13.8 %

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 DURABILITY CHARACTERISTICS  
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CHANGE IN HEIGHT 2.1 mm  
 CHANGE IN HARDNESS (STAGE 1) 11 %  
 CHANGE IN HARDNESS (STAGE 2) 19 %  
 RESILIENCE LOSS FACTOR 7.3

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 DURABILITY RATING  
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CHANGE IN HEIGHT 25  
 CHANGE IN HARDNESS (STAGE 1) 25  
 CHANGE IN HARDNESS (STAGE 2) 25  
 RESILIENCE LOSS FACTOR 20

TOTAL NUMBER OF POINTS (MAX. 100 POINTS) 95

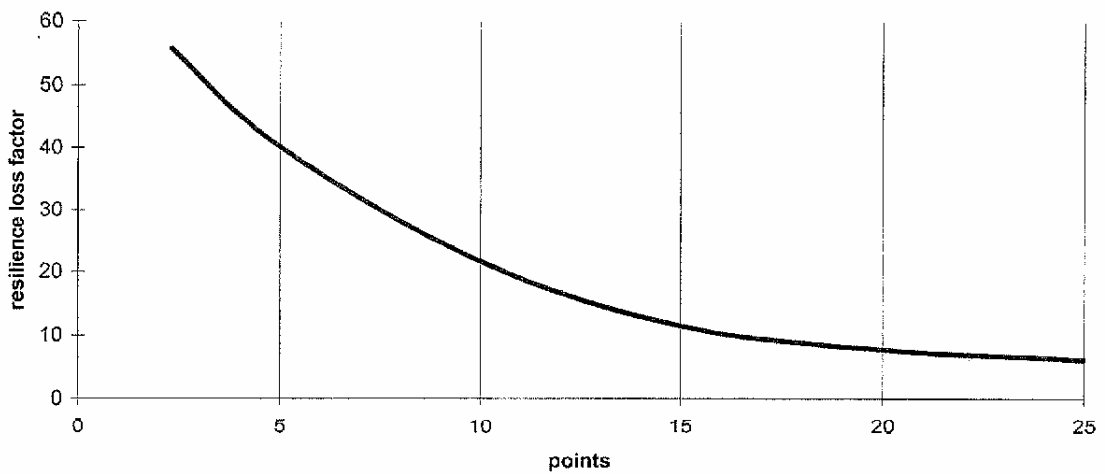
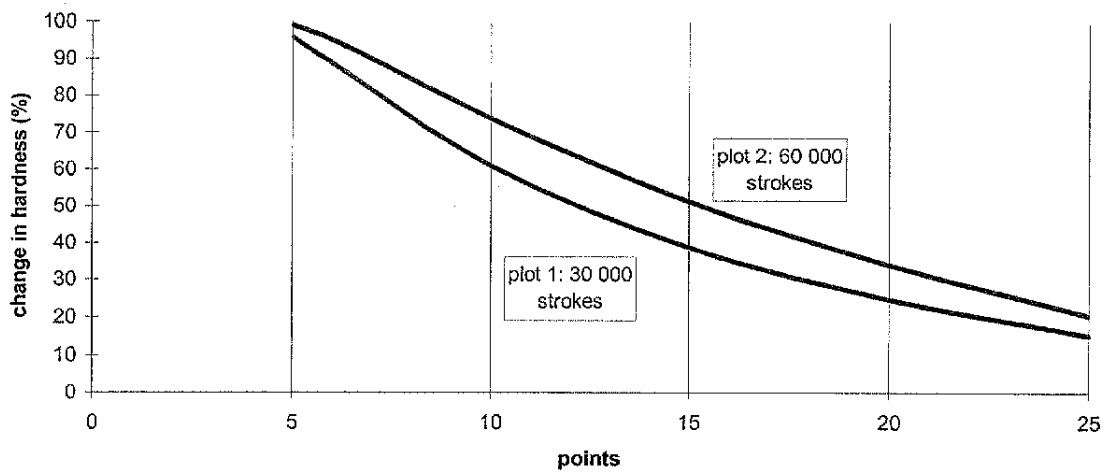
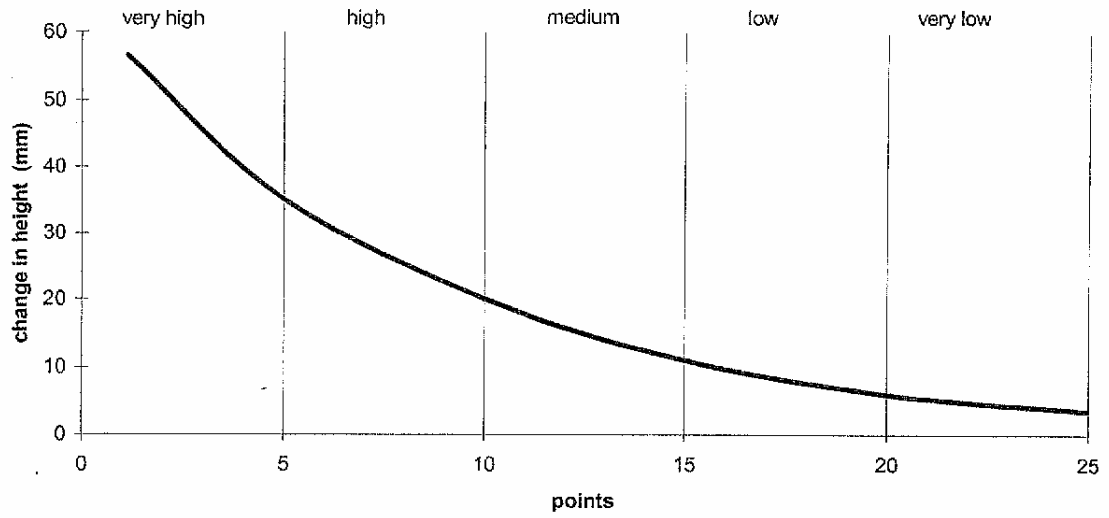
MINIMUM REQUIREMENT: 50

LGA-REQUIREMENTS M E T

LGA-  
 MÖBELPRÜFINSTITUT  
 DATE: 08.03.05  
 SPECIALIST: Thormann

OBJECT: Latex mattresscore  
 CLIENT: Dames-Willers

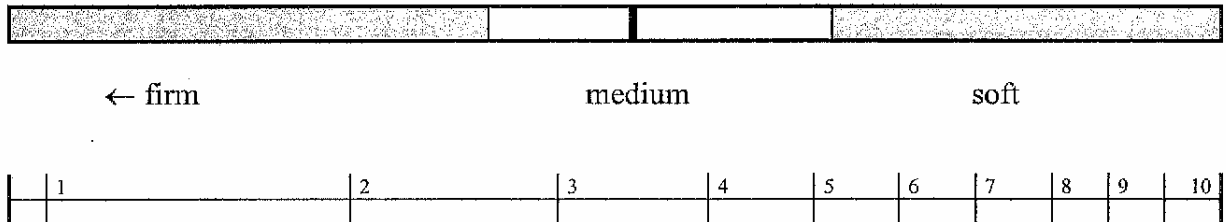
## LGA Rating System



**Results and evaluation according to DIN EN 1957**

Data	Start	15 000 cycles	30 000 cycles
Hardness	3,57	4,01	4,42
Change in hardness	/	11 %	19 %
Change in height	/	2,3 mm	2,1 mm

**Assessment of firmness rating (proposal)\***



\* proposal

The assessment of firmness rating is not part of DIN EN 1957. The proposal is based on empiric data of LGA and is not mandatory.