Assignment Report

Laboratory tests of area elastic sport floor, Activity Floor from Kährs

Summary

On behalf of AB Gustav Kähr, SINTEF Byggforsk has tested area elastic sport floor called Activity Floor The purpose of these tests was to compare the laboratory results with requirements given in DIN 18032 part 2. The characteristics tested was Shock absorption, Standard deformation, W – 500, Vertical ball rebound, Friction and Ability to withstand loads from rolling wheels.

	Average values	Max - Min values	DIN requirements
Shock absorption	59 %	63 / 54 %	Min. 53 %
Vertical deformation	3,8 mm	4,1 / 3,0 mm	Min. 2,3 mm
W – 500, average all directions	7 %	14,6 / 0 %	Max. 15 %
Vertical ball rebound	94 %	94 / 92 %	Min. 90 %
Friction	0,43	0,44 / 0,41	0,4 – 0,6
Rolling load	1500 N	> 1500 N	> 1500 N

Conclusion:
Activity Floor from AB Gustav Kähr satisfies the DIN requirement for all tested properties.

Address of the building			Built (year)
Constructions	Method DIN 1832, del 2	Keywords Sport floor	Filename 855-Kæhrs-e

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1. INTRODUCTION

SINTEF Byggforsk was commissioned by AB Gustav Kähr c/o Hanna Larsson to carry out laboratory tests of area elastic sport floor called Activity. The assignment was ordered by e-mail of the 3rd September 2007. The purpose of the test was to provide documentation that the flooring system satisfies the requirements for area elastic sport floors set by the German Standard DIN 18032, part 2.

The floor construction was tested for shock-absorption, standard deformation, W-500 (area deflection) friction, vertical ball rebound and ability to withstand rolling loads. The tests were carried out in accordance with DIN 18 032, part 2.

2. FLOOR CONSTRUCTION

The floor construction was build by Kährs on a special finished floorage having a flatness tolerance of less than ± 1 mm deviation over 4 m length. The test floor dimensions was 3,8 m by 3,7 m

The floor construction was based on parquet laminate having a thickness of 15 mm, width of 200 mm and length of 2420 mm. Underneath every joint (along and transverse the parquet laminate) 6 mm HDF with a width of 80 mm was mounted. Yield is provided by means of extruded plastic-foams (2 mm Cellpolyeten and 7 mm Polyeter) glued to the underside of the HDF strips.

3. TEST METHODS

Shock-absorption. The principle involves a 20-kilogram weight falling a predetermined distance onto a spring, thus giving the floor a damped impact. The spring is mounted on a load-sensor so that the reaction force from the floor can be registered. Measurements were taken at six test points on the sample.

The results are calculated in the following manner: The average value for all the impacts is calculated. The result is expressed in relation to the reaction force on the concrete in accordance with the formula:

$$\text{Shock-absorption} = \left(1 - \frac{\text{P flooring}}{\text{P concrete}} \right) \cdot 100\ \%$$

where:

P flooring = Reaction force measured on flooring in question.

P concrete = Reaction force measured on a solid concrete floor.

Deformation. The principles involves the same apparatus as mentioned above. A weaker spring and a different dropp height for the weight were employed for this

test. This results in a lesser impact on the flooring. The reaction force and the deformation at the point of loading is registered. The measurements were taken at the same points as those tested for shock-absorption.

A standard deformation (StV) was calculated in accordance with the formula:

$$StV = 1500 \times \frac{Ymaks}{Fmaks}$$, were

Y_{maks} = the max. registered deformation at the load point

F_{maks} = the max. registered reaction force

W-500 (area deflection) was calculated by individually registering the deformation 0,5 m aside of the load point in four directions. One on each side of the load point in the laminate's longitudinal direction, and one on each side of the load point in the laminate's transverse direction. The registered deformation for each of the four measuring points was calculated as a percentage of the deformation at the load point.

Friction. The principle involves an accurately described test foot of leather which is brought in contact with the flooring system with a specified rotation speed and vertical load (200 N).

The results are calculated in accordance with the following formula:

$$\mu = 0{,}3 \cdot \frac{D}{V}$$

where:

D = measured friction moment in N cm

V = vertical load in N

0,3 is a constant calculated as a consequence of the shape of the test foot.

Ball rebound. The principles allows a basketball of a given weight to fall from a given height (1.80 m measured from the underside of the ball). By means of a stopwatch connected to a microphone, the interval between the first and the second time the ball strikes the floor is timed. From this interval it is then possible to calculate how high the ball rebounds after the initial impact.

The ball rebound was calculated as follows:

$$BR = \frac{\text{H floor}}{\text{H concrete}} \cdot 100\ \%$$

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where:

H floor = Rebound height on the flooring in question
H concrete = Rebound height on a solid concrete floor

Rolling load. The test was carried out by transferring a vertical load of 1.5 kN to the floor by means of an exactly-specified steel wheel. The steel wheel was mounted on a trolley. The trolley was moved backwards and forwards so that the steel wheel imposed a load on the floor within a test area measuring 1,0 m x 0,1 m. The wheel was moved backwards and forwards 150 times along the entire length of the test area. Two areas was tested, along and transverse the longitudinal direction of the parquet laminate's.

4. TEST RESULTS

Table 1, Average:

Characteristics	Results	DIN requirements area elastic floors
Schock-Absorption (KA55)	mean: 59 % max. : 63 % min. : 54 %	min. 53 %
Deformation (StV)	mean : 3,8 mm max. : 4,1 mm min. : 3,0 mm	min. 2,3 mm
W – 500 Average, longitudinal direction Average, transverse direction	mean : 7 % max. : 14,6% min. : 0 %	max. 15 %
Ball rebound (BR)	mean : 94 max. : 94 % min. : 92 %	min. 90 %
Friction	mean . 0,43 max. : 0,44 min. : 0,41	0.4 - 0.6
Rolling load (VRL)	> 1500 N	Must withstand a load equivalent to 1500 N without being damaged

5. CONCLUSION

Activity Floor from AB Gustav Kähr satisfies the requirement for all tested characteristics according to DIN 18032, part 2.

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INDIVIDUAL RESULTS FOR TEST FLOOR FROM KÄHRS

Table 1. Individual results for shock absorption, deformation and ball rebound:

Location of test point	Shock abs.	Deformation	Ball rebound
1, at center of laminate	54 %	4,1 mm	93 %
2, on longitudinal joint	55 %	4,0 mm	94 %
3, on longitudinal joint	57 %	4,1 mm	94 %
4, at center of laminate	63 %	3,0 mm	94 %
5, at center of laminate	63 %	3,4 mm	92 %
6, 20 mm aside of longitudinal joint	63 %	3,9 mm	94 %
Average value	**59 %**	**3,8 mm**	**94 %**

Table 2. W - 500

Test point	A – along longitudinal direction	B – along longitudinal direction, opposite side	C – transverse longitudinal direction	C – transverse longitudinal direction, opposite side
1	14,6 %	14,6 %	0 %	0 %
2	11,8 %	19,9 %	0 %	0 %
3	15,9 %	14,8 %	0 %	0 %
4	13,3 %	14,3 %	0 %	0 %
5	12,4 %	12,0 %	0 %	0 %
6	12, 3 %	11,8 %	0 %	0 %
Average	**13,4 %**	**14,6 %**	**0 %**	**0 %**