



# REPORT

issued by an Accredited Laboratory



AB Lindec  
Mikael Voeler  
Box 5  
421 21 Västra Frölunda

Handläggare, enhet / <i>Handled by, department</i>	Datum / <i>Date</i>	Beteckning / <i>Reference</i>	Sida / <i>Page</i>
Rolf Lejestränd, Building Technology, ip Tel +46 (0)33 16 54 34	1998-10-08	98B4,4870 E	1 (3)

This is a translation of the original document in Swedish. In the event of any dispute as to the content of the document, the Swedish text shall take precedence.

## Abrasion tests on concrete floors

### Commission

Official from SP, Swedish National Testing and Research Institute, carried out abrasion tests on concrete floors at the Volvo Arendal plant in Gothenburg on June 30, 1998. The tests took place in the depot for truck spare parts, where three test sites were pointed out by the client. The sites were denoted "Test surface I, packing hall", "Test surface II, 60-area" and "Test surface III, 30-area".

### Information

Concrete designation: Granolithic concrete "Herkulit", 10 mm topping on newly placed concrete.

Date of production: February-March 1998.

### Test method

Swedish Standard SS 13 72 41

### Results

See annex 1. The uncertainty of the measurements falls within the allowable rounding off of the results according to the rules in the test standard.



# REPORT

Datum/Date  
1998-10-08

Beteckning/Reference  
98B4,4870 E

Sida/Page  
1 (1)  
Enclosure 1

## Test results

### Abrasion tests SS 13 72 41

Number of revolutions	Depth of abrasion, mm at		
	Test surface I "Packing hall"	Test surface II "60-area"	Test surface III "30-area"
100	0,01	0,00	0,01
200	0,00	0,00	0,01
400	0,00	0,00	0,02
800	<u>0,01</u>	<u>0,00</u>	<u>0,02</u>
1600	<u>0,11</u>	<u>0,02</u>	<u>0,03</u>

### Requirements

Very high resistance      800 revolutions    ≤ 0,10 mm  
   1600 revolutions   ≤ 0,20 mm

### Comment

Each reported result represents the mean value of eight measurements



## REPORT

Datum/Date  
1998-10-08

Beteckning/Reference  
98B4,4870 E

Sida/Page  
2(2)

### Evaluation

When the test results are evaluated according to the table in the comments to SS 13 72 41, all test surfaces fulfil the requirements for "Very high abrasion resistance" both after 800 and 1600 revolutions.

### SP Swedish National Testing and Research Institute Concrete Section

Kent Malmström  
Technical Manager

Rolf Lejeström  
Technical Officer

### Annex

Test results



Standard prepared by  
**BST, THE SWEDISH BUILDING STANDARDS INSTITUTION**

## **SWEDISH STANDARD SS 13 72 41**

First period of validity 1986-01 -01 Issue 1 Page 1 (3)  
SIS ESTABLISHES AND PUBLISHES SWEDISH STANDARDS AND SELLS NATIONAL AND INTERNATIONAL STANDARD PUBLICATIONS

### **Concrete testing - Hardened concrete - Abrasion resistance**

#### **0 Orientation**

This is a proposed standard. Experience from the application of the standard can, in a few years, bring about a revision.

#### **1 Scope and application**

This standard comprises a method to determine the resistance of horizontal concrete surfaces to loads of rotating and sliding wheels. The method is only applicable to concrete surfaces that have a surface roughness corresponding to a steel-trowelled surface as set out in SIS 81 20 04.

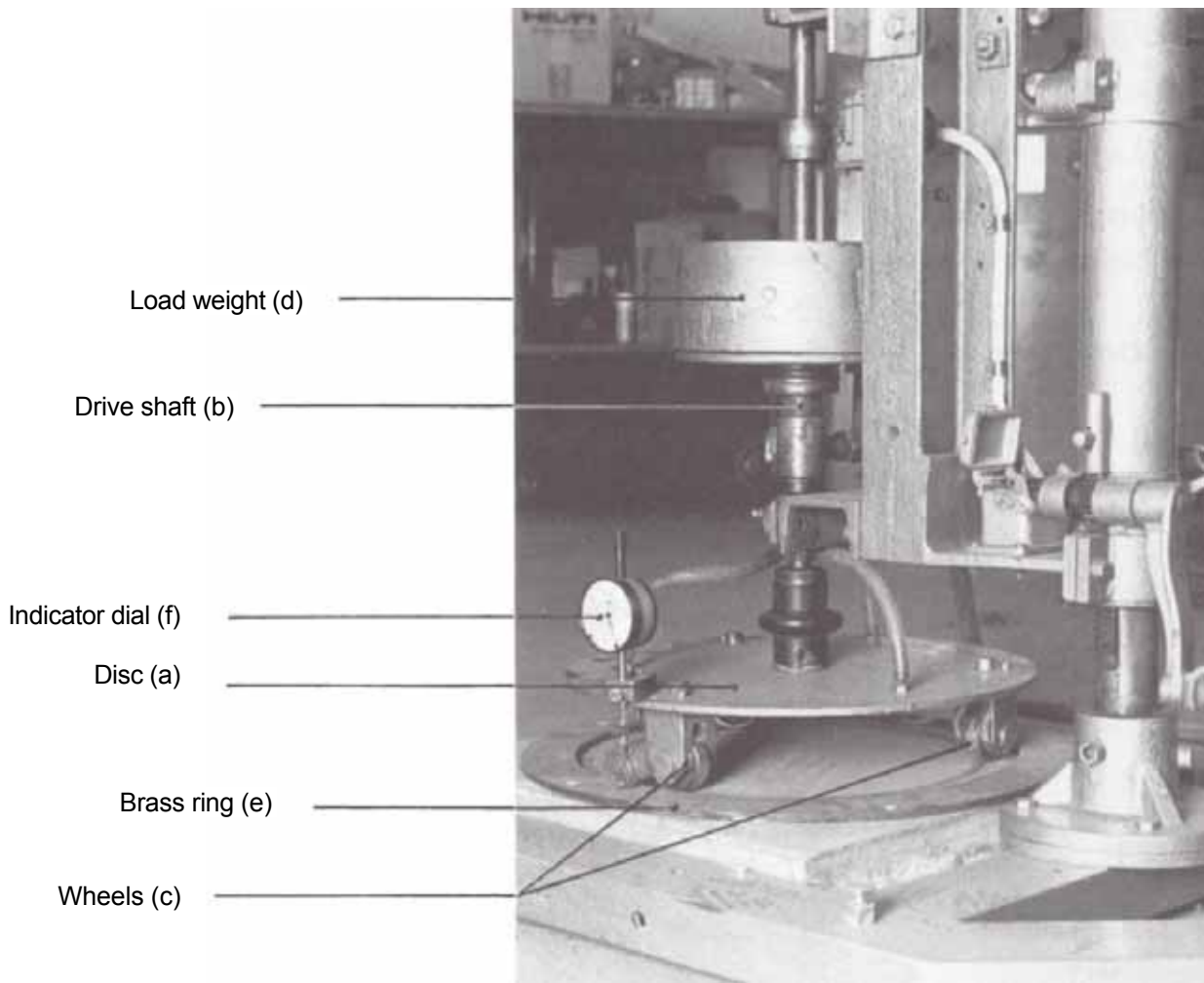
The method can be used in the laboratory and on site. A method is described in SS 92 35 08 to determine the resistance of flooring material and floor structures to loads from rolling swivel castors in the laboratory. A scale is included in the Comments section to evaluate the test result based on the average value of at least three, preferably five tests.

#### **2 Reference**

SIS 81 20 04, Concrete surfaces, Roughness  
SS 92 35 08, Floorings - Determination of effect of rolling heavy duty swivel castors

#### **3 Equipment**

*Abrasion device* as in the figure. Its framework should consist of a horizontal rotating disc (a), approximately 380 mm in diameter with a vertical drive shaft (b) and three abrasion wheels (c). The distance from the disc's centre of rotation to the wheels should be 150 mm and the central angle between the wheels 120°. The disc should be attached to the drive shaft using a ball coupling. The drive shaft should be connected with a drive motor so that a vertical play of 10 mm is possible on the lower part of the drive shaft.



The device's three wheels should be ball bearings of hardened steel with hardness HRV 850 and with a diameter of  $47 \pm 2$  mm and track width of  $14 \pm 1$  mm.

The wheels should be mounted so that one wheel follows the rotation of the disc. The other two wheels should be angled at  $30^\circ$  to the direction of rotation so that they perform both rotating and sliding movement. Each wheel should be loaded with  $130 \pm 5$  N from a load weight (d).

A nozzle, which clears dust from the rotation track using compressed air, should be positioned in front of each wheel. The compressed air must not contain oil and water particles.

The device should have a framework that is possible to raise and lower. It should be possible to straddle the base of the frame over the test surface and it should also be equipped with set and adjuster screws so the frame can be aligned in the intended position over the test surface and kept there during abrasion testing.

The device's drive motor should give the disc a speed of  $60 \pm 1$  revolutions per minute. It should be equipped with a revolution counter and a device that automatically stops the disc after 50, 100, 200, 400, 800 and 1600 revolutions.

*Circular, flat brass ring(e)* with an inside diameter of 360 mm, outside diameter of 400 mm and 6 mm thickness. The ring should be fitted with nine radial markings equally distributed around the periphery. It should be possible to secure the ring against the test surface, for example, using expansion bolts, adhesive or the like.

*Indicator dial (f)* with an accuracy within  $\pm 0.01$  mm to determine the sinking on the concrete surface after abrasion. The stroke length of the dial should be at least 50 mm. The measurement tip should be designed as a wheel with a diameter of approximately 40 mm and ovalness less than 0.005 mm. It should be possible to attach the indicator dial by the rotating disc outside of the non-angled wheel.

Thermometer with an accuracy within  $\pm 1$  °C.

## 4 Testing

The brass ring is attached to the concrete surface. The device is centred over the ring and stabilised with the help of the set and adjuster screws. The wheels are put into contact with the test surface and the load weights added.

The indicator dial is attached to the disc outside of the non-angled wheel so the measurement wheel rolls on the brass ring. The measurement dial is read off in the centre of each marking. Reading is repeated once. The difference between the two values read at the same point may then amount to a maximum of 0.02 mm. In the event of greater differences the device must be stabilised yet further. The starting level for the test surface at each mark is obtained through calculating the average value at each point. These values are called the output values.

The measurement dial is removed. The device is started and the compressed air is turned on.

After 50,100, 200, 400, 800 and 1600 revolutions the measurement dial is attached and the nine markings are read in the same way as when determining the output values. Double determination is not necessary.

The abrasion after 50,100,200,400, 800 and 1600 revolutions at each marking on the measurement frame is calculated as the difference between individual measurement values after abrasion and the output values. The average values after 50,100, 200,400,800 and 1600 revolutions are calculated.

## 5 Result

Abrasion after 50,100, 200,400, 800 and 1600 revolutions is stated in millimetres to two decimal points.

## 6 Report

A report should include at least the following information:

- a) the name and address of the test laboratory
- b) date and identification of the report
- c) test method (SS number and title)
- d) any non-conformity with the method description
- e) temperature when testing
- f) the name and address of the Client
- g) name of the tester
- h) name of the concrete manufacturer
- i) the composition and age of the concrete if possible
- j) identification of the test surfaces
- k) test result
- l) other significant data in order to assess the result
- m) assessment of the result if this is included in the undertaking.

## Comments

Experience gained by the Swedish Testing and Research Institute in using the method has given the following scale for assessing the result:

Demand on abrasion resistance	Concrete quality	Maximum abrasion, mm	
		0—800 rev.	0-1600 rev.
Very high	approx. K50	0.1	0.2
High	approx. K40	0.2	0.4
Moderate	approx. K30	0.4	0.8

When very high demands are made on abrasion resistance it is appropriate to manufacture a reference surface of the required quality.

