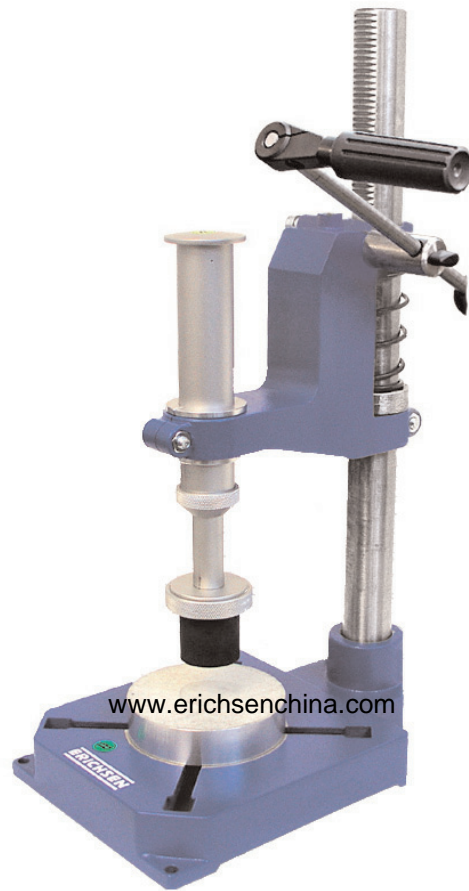


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**Chalking Rate  
Tester  
acc. to Kempf  
Model 241**



**DIN 53 159  
Titangesellschaft mbH  
(Kronos Titan GmbH)**

testing equipment for quality management

**ERICHSEN**

**For quick determination  
of the chalking rate  
of coating materials**

## Introduction

The first sign of a paint coating being affected by the weather is an initial disintegration of the surface film where some of the pigment becomes loose when originally firmly held in the paint by means of a bonding agent. This stage of deterioration can be shown by simply wiping the surface, loose pigment particles will be removed. This is called „chalking“.

The sooner the paint commences to chalk, the sooner the decomposition of the film has begun; the life expectancy of the finish will therefore be accordingly shorter.

### *Self-cleansing paints*

On the other hand, paints are being manufactured nowadays which are accurately adjusted for a predetermined chalking effect. Such self-cleansing paints renew their surface after every rainfall by the washing off of the contaminated pigment. Their life is practically the same and they show a high degree of colour durability and cleanliness.

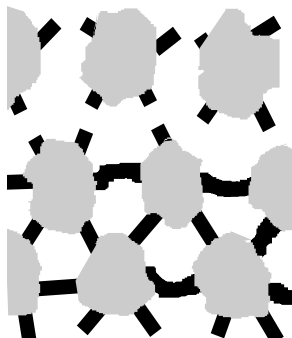
## Purpose and application

The quantitative determination of the chalking rate is therefore of great importance for

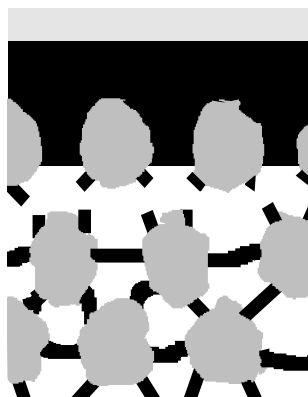
- ◆ the choice of the correct raw material for each intended purpose;
- ◆ the determination of the maximum pigment/volume concentration in respect to weathering resistance or self-cleansing properties;
- ◆ the evaluation of natural or short-term weathering tests;
- ◆ a comparative assessment of raw materials and finished products (testing of competitors' samples);
- ◆ determining the maximum warrantable period for large contracts.

## Principle

The pigment particles, lying loose on the film surface because of binder decay, are pressed under a specified pressure (250 N) into the steeped gelatine of photographic paper.



**Fig. 1:** The upper pigment layer has lost cohesion with the rest of the film



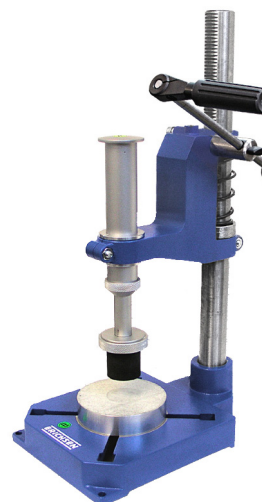
**Fig. 2:** Pressed into the gelatine layer of the photographic paper, the loose pigment particles are lifted out.

In accordance with the relevant evaluation method, the impression in the photographic paper is visually compared with a chalking scale or a comparison paint.

## Design and operation

The Kempf Chalking Tester, Model 241, consists of a light metal cylinder equipped with a 40 mm dia. rubber stamp (Shore-hardness A 60 ± 5). A strong integral spring allows the loading of the punch with a force of between 50 to 250 N. Ring markings engraved at 50 N intervals into the stamp shaft permit the application of lower pressures than the standard load of 250 N.

Guiding the loading device by hand is often not accurate enough for guaranteeing an even pressure over the whole area of the stamp. It is therefore recommended that the special stand (available as an accessory) be used which provides an accurate vertical guide during application of pressure.



**Fig. 3:** Testing the chalking rate using a stand

## Test procedure

The photographic paper is soaked in water at room temperature for four minutes. After removing any water adhering to the surface with filter paper, it is laid upon the paint to be tested, gelatine face down.

Placing the rubber stamp on the reverse side of the paper, the Chalking Tester is pressed down as *vertically* as possible with the ball of the thumb - or with the lever when using the stand - with a pressure of 25 kg (55 lbs) until the ring mark 250 is reached

After lifting the stamp the photographic paper is pulled off and dried.

### Notes:

#### Load:

In special cases - to be agreed upon - a smaller load may be used.

#### Duration:

The duration of pressure does not influence the test result.

#### Photographic paper:

In order to avoid measuring errors it is recommended to obtain the same quality of paper from the same supplier.

#### Dirty coatings:

Surface contamination of paints that have undergone weathering in the open air may simulate chalking of the paint on impressions of unexposed fixed (therefore white) photographic paper, although only the soiled layer has been lifted off the paint surface. To be able to discern in such cases between contamination and chalking it is advisable to make the impressions on white as well as on black photographic paper.

## Evaluation of the test

Several methods are known in practice, namely:

### 1. Kempf standard comparison method

This approved method is specially suitable for white or light-colour pigmented paints.

For comparison with the chalking marks obtained, it uses standard photographic diagrams which are supplied as Kempf Chalking Scale with every instrument.

The comparison (Fig. 4) is made visually with the 6 chalking stages, whereby 0 represents the weakest and 5 the strongest chalking value.

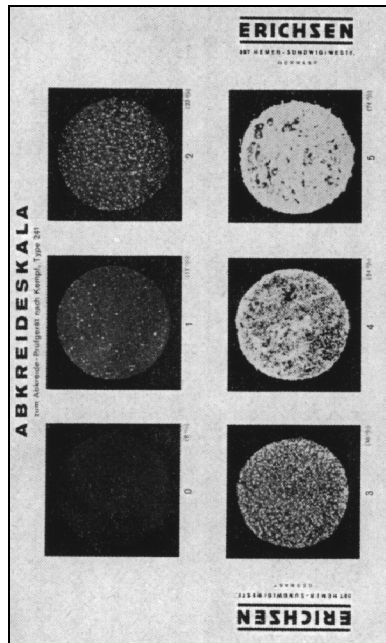


Fig. 4 Kempf Chalking Scale

### 2. Modified method of the Titangesellschaft, Leverkusen

(now: Kronos Titan GmbH)

Used only for paints pigmented with titanium dioxide (TiO<sub>2</sub>).

For this method a standard scale is divided into 10 stages of chalking intensity of brightness. The distances between the stages of brightness are of an exactly defined photometric value and these measurements are reproducible. See chalking scale next page.

The brightness limit values of 10 and 1 represent absolute freedom from chalking and vice-versa a strong chalking effect.

#### Chalking value 10

(highest chalking resistance) corresponds with the brightness value of 10 (lowest brightness value) for an unaltered black photographic paper without any imprint.

#### Chalking value 1

(lowest chalking resistance) corresponds with the brightness value of 64,2 (highest brightness) which has been measured on an imprint obtained from most intensive chalking.

### 3. Method acc. to DIN 53 159

This is a method which should be given preference whenever coloured paints have to be tested; testing of white and very light colours is, of course, also possible.

The evaluation here is not carried out by using a scale but by comparison with paints which had been produced and weathered under similar conditions.

By visually comparing the impressions in the gelatine layer of the test specimen with the comparison paint, the differences in the chalking between the test samples and the comparison paints are established.

## Maintenance

Basically the instrument does not require any maintenance.

Signs of wear on the rubber stamp and tensioning spring fatigue may occur after several years or after very frequent use. These parts are available as spares.

### *Exchange of stamp:*

The rubber stamp is removed by unscrewing the knurled supporting ring.

### *Exchange of tensioning spring:*

The tensioning spring is replaced by unscrewing the domed cap on top of the loading device.

## Technical data

### *Chalking Tester*

Dimensions:

Height: 270 mm  
Ø: 50 mm

Load: up to 250 N

Net weight: approx. 1.2 kg

### *Special Stand*

Dimensions:

Height: approx. 450 mm  
Width: approx. 150 mm  
Depth: approx. 250 mm

Net weight: approx. 5.5 kg

## Ordering Information

Ord.-No.	Product Description
0076.01.31	Chalking Tester acc. to Kempf <b>Model 241</b> , incl. Chalking Scale

## Accessories / Spare Parts

Ord.-No.	Product Description
0207.01.32	<b>Special stand</b>
48760117	Rubber stamp
220091441	Tensioning spring

## Chalking Scale in accordance with the test devised by the Titangesellschaft mbH, Leverkusen

Leucometer-brightness	Chalking stage	Chalking value
10 e <sup>1,8594</sup>	64,2	1 highest chalking rate (lowest chalking resistance)
10 e <sup>1,6528</sup>	52,2	2
10 e <sup>1,4462</sup>	42,5	3
10 e <sup>1,2396</sup>	34,6	4
10 e <sup>1,0330</sup>	28,1	5 medium chalking rate (medium chalking resistance)
10 e <sup>0,8264</sup>	22,9	6
10 e <sup>0,6198</sup>	18,6	7
10 e <sup>0,4132</sup>	15,1	8
10 e <sup>0,2066</sup>	12,3	9
10 e <sup>0</sup>	10	10 no chalking (highest chalking resistance)