

TECHNICAL SPECIAL INFORMATION 06

Wear and abrasion resistance of sealing systems

The abrasion resistance of seals is on everyone's lips and is often the subject of argumentation for or against a seal category or comparable seal types. In fact, it is one of the most important characteristics of a sealing system. It is therefore important to know which factors affect the abrasion resistance and which measurement methods are mainly used to measure abrasion resistance and where their limits lie in their significance in relation to practice. This knowledge should help you to correctly evaluate appropriate advertising statements, some of which are very undifferentiated and misleading.

What is meant by wear and abrasion resistance?

It is explained, among other things, as the resistance of a coating film to the effects of polishing or abrasive friction, which leads to gradual erosion or wear of the film. Abrasion resistance is the result of the interaction of individual coating properties and is influenced by various factors in practice, which are described below.

What are the properties of the lacquer that together form the so-called abrasion resistance in practice?

The following coating properties have a more or less strong influence on the practical abrasion resistance of a sealing film:

1. **Hardness**
Namely the surface hardness (pendulum hardness according to König acc. to DIN 53157) as well as the indentation resistance (so-called Buchholz hardness according to DIN 53153)
2. **Elasticity (elasticity)**
3. **Thermal behaviour (thermoplasticity)**
Does the film soften e.g. due to solar radiation, heating, frictional heat (heel strokes) etc.?
4. **Aging behaviour**
Does the film become harder over the months and years without losing the necessary elasticity or does it become brittle?
5. **Chemical resistance**
Is the film influenced e.g. by the action of care products?
6. **Adhesion to the substrate**
How well is the seal anchored in the wood and how does the seal adhere to itself or to a primer?

The interactions of the individual properties and their effects on the "overall abrasion property" are very significant and have not yet been fully investigated.

On which factors does the service life (wear time) of the seal build-up depend in practice?

The service life (wear time) of a seal depends on the following factors

1. **Actual use of the land**
 - Is it a living room or a stand-up snack?
 - How much dirt is in the room?
 - What kind of dirt?
 - How many shoe contacts per hour and m²?
2. **Intensity and frequency of care**
 - Are the care instructions followed?
 - Is swept often enough?
 - Is the right care product in use?
 - What kind of care product?
 - is the care rhythm right?
3. **Quality of the seal**
 - Which seal category is it?
 - What are the properties of the special seal type (see above)?

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4. Film thickness (layer thickness)
→ How thick is the wear layer?

From this list of factors it becomes clear that the service life of the seal does not only depend on the seal quality. Although this may sound obvious, it is unfortunately all too often forgotten. Always mistrust advertising statements that try to fool you into believing an absolute lifetime of a seal quality without reference to other factors, such as "our product X has a shelf life of up to 40 years" and similar more. Such assertions "go to their knees" under the correspondingly extreme conditions and are misleading.

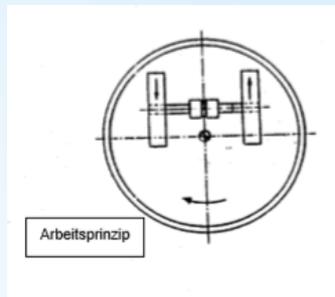
How is abrasion resistance mainly measured today?

From the factors described so far it becomes clear how difficult it must be to measure abrasion resistance in a reproducible and practical way. To date, science has developed approx. 20 methods and testing devices, some of which differ significantly in principle and significance. None of these devices allows a doubtless transferability of the results to the actual abrasion or wear resistance, i.e. the methods disregard one or more factors and thus arrive at more or less impractical, even senseless results. Nevertheless, the development of seals cannot avoid approaching abrasion resistance by measurement and the result is also of limited informative value. For this reason, two main methods and types of equipment have been selected in paint technology today, which at least satisfy with regard to reproducibility. These are the so-called

Taber Abraser (also part of the Swedish SIS standard)

which produces a circular abrasion on the sealing surface with rotating grinding rollers at a defined contact pressure and a certain number of revolutions.

The disadvantage of this method is based in particular on the high influence on the result by thermal (temperature-dependent) reactions on the surface of the test film, such as adhesive effects, sweating, lubrication etc., which are based on friction heat, partially clog the grinding rollers and change their effect. This leads to distorted comparison results. However, this does not prevent one or the other manufacturer from incorrectly highlighting the high quality of product X or Y on the basis of such results.



Summary for the practical seal user

The abrasion resistance in practice results from different properties of the seal which influence each other. The actual wear time of a seal is also determined by other factors outside the actual seal quality. The measurement methods and procedures that exist today are only of limited informative value and the measurement result values found must be interpreted with knowledge of the recipes and carefully appreciated. Meaninglessly distorted measurement results cannot be ruled out, which is why uncommented publications of measurement values should only be viewed extremely critically.

The technical lacquer values as well as the laboratory assessment of the abrasion resistance should always be confirmed by extensive experience in practical long-term use. Because there are different types of abrasion and objects in practice, the experience gained in the large number of cases must be taken into account.