

SmiTools - Light & Heat

the causes and the ways to minimize the risks

In this SmiTools Smit & Zoon is sharing a synopsis on the topic 'Light fastness & Heat resistance'. Learn about the yellowing of leather by the influence of warmth and/or light and time. How do you minimize the risk and how are the assessments done.

Introduction

Leather contains a large variety of chemical compounds, added depending on the end users requirements for the leather. The source of these chemicals can be phenolic or nitrogen-based products, or synthetic and natural oils, amongst others. Because of the chemical composition of these products many of them are subject to yellowing due to exposure to heat, light or long time storage. Depending on the end users requirements specific products are to be chosen in order to meet their demands.

What is yellowing?

Yellowing is the slow generation of yellow tones of colour in white textiles, coating, paper, leather etc. under the influence of air and/or light.

Yellowing is also a result of a product's gradual loss of original colour and turning yellow.

What turns leathers yellow?

Yellowing is caused by auto-oxidation of unsaturated compounds in the presence of atmospheric oxygen under the influence of warmth and/or light and time. Also atmospheric pollutants and contaminants from both natural and industrial sources can lead to yellowing. The specific pollutants include oxides of nitrogen, sulphur dioxide, and ozone.

Other contaminants can be part of materials in contact with the leather, e.g. cardboard boxes or dividers, plastic sheets, or bags. Most yellowing, however, can be traced back to the leather's constituents, chemical additives or auxiliaries used during its production.



Constituents as cause

Some of leather's constituents can cause yellowing under the influence of heat or light

- natural fat
- preservatives
- fatliquors
- organic tanning agents
- finishing auxiliaries
- all other (partly) unsaturated compounds

Ways to minimize the risk of yellowing

Possibilities to minimize the risk of yellowing and minimize the risks are found in the constitution of the auxiliaries and in the tannery itself.

The auxiliaries need to be developed under consideration of their behaviour under light and during periods of elevated temperatures, or a combination of both.

For the auxiliaries this could mean:

- development of products resistant to heat yellowing
- chemical pre-treatment of natural oils
- addition of antioxidants
- product stability

In the tannery areas of consideration are:

- removal of natural fats
- using the right auxiliaries
- packing leather in plastic foil for long-term storage
- storage in cool & dark conditions

What products have best resistant to light and heat?

The performance of leather chemicals depend fully on their composition. In general products that are developed for leathers with high demands, e.g. automotive, perform best. Examples of this are Synthol CS 588 and Synthol CL 788. The best performances are often obtained with fully synthetic products while vegetable extracts and fish oils (unless specially treated) are know to perform less. Our Leather Service Centre would gladly help you selecting the products meeting your requirements.

Testing

A leather's behaviour under circumstances provoking yellowing can be tested in different ways, with or without combining the various adverse factors (light, heat or a combination). Light fastness is commonly tested for 72 hours at 50°C where heat resistance is commonly tested for 24 hours at 100°C. There are however a large variety of different test methods that in many cases are company of industry related.



Assessment

Assessment can be done in three different manners:

- Visual
- Grey scale
- Colorimetric

Visual

The only advantage of a merely visual inspection is its easy implementation. The leather is inspected with the eye and a personal description of the result is reported. The disadvantages of such assessment prevail:

- The assessment is subjective
- No reference or standard exists for comparison
- The assessment is disturbed by interference from light sources and personal sensitivity of the eye
- Comparisons to previous tests are not possible
- The reporting is by verbal statement.

Summary:

Visual inspection is a subjective assessment without a reference.

Grey Scale

The advantage of using a Grey Scale above a merely visual inspection is that it is a reference-based method of assessing the results. Its is an easily implemented methods. The disadvantages are somewhat less than those of the merely visual inspection, but the assessment with a Grey Scale remains subjective. Colour is not distinguished during the assessment. The results are reported as an increment of light-dark contrast. The problem of interference due to light source and sensitivity of the eye persists.

Summary:

A subjective reference-based assessment of light-dark contrasts.

Colorimetric

With a colorimetric assessment the true deviation is expressed by an expression of the colour yellow. The results are reproducible and the assessment is free of interferences and independent of individual visual inspection. The disadvantages are mainly the specific handling of a colorimeter and the cost of investment The results are expressed as tristimulus (L*a*b*) values and yellow index (DIN 6167)

Summary:

An objective assessment of a shade's alteration towards yellow.

Contact Smit & zoon for further information

The information given in this SmiTools is just a short synopsis on the topic. We would be glad to help you further in case of questions, the sharing of information or help with choosing the right wet-end products for your application. Please feel to contact our Leather Service Centre, our leather testing lab or your usual relation within Smit & zoon.

Contact details

Smit & zoon

E-mail : info@smitzoon.com

Website : <http://www.smitwet-end.com>

Phone : 0031 294 238 800