

ESPRIT

FREE-OF-CHROME LEATHER TANNING
SUBSTITUTION OF CHROME III TANNING TECHNOLOGIES

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1 INTRODUCTION

Leather is used in human history since 500.000 years and during the industrialization leather became a mass product. Global meat demand drives animal slaughter, thus hides are considered a byproduct of meat industry, a natural re-newable raw material.

Leather is a 3-D-dimensional substrate which becomes a horn-like transparent parchment when it dries up. The principle of tanning is the replacement of water in the natural hides by chemicals, to ensure a soft and voluminous dried up leather.

There are different tanning technologies known, to be classified in inorganic, organic or synthetic origin.

2 BACKGROUND INFORMATION

Collagen is the only element needed of the skin to make leather. All the other components will be preferably removed before the tanning process starts, in the tanning preparation.

The natural skin is a non-homogeneous substrate based on twisted polypeptide structures. The triple helix of the protein contains many amino acids, i.e. carboxylic acids and amino groups. These functional groups are potential docking stations for a chemical bonding. With the pH the reactivity of collagen towards different chemicals can be regulated. Consequently tanning is a chemical reaction between the collagen structure and a functional group of a tanning agent.

Tanning is a complex process and different tanning agents may be combined in pre- and re-tanning.

2.1 Tanning principles

Tanning agents may be classified in

- Mineral salts (inorganic): Chrome III, Zirconium IV, Aluminum III, etc.
- Natural extracts (organic): Quebrachao wood, Mimosa barks, etc.
- Synthetic origin; syntans, formaldehyde, glutaraldehyde, etc.

3 CHROME TANNING

Chrome tanning is the most relevant tanning agent in the leather industry. The world consumption of the mineral tanning agent lies around 85-90%. This is based on the unique advantage of the chrome tanning agent: it fits perfectly in the collagen structure through a complexation reaction with the carboxylic groups of the collagen.

Trivalent chromium, Cr (III) is employed for tanning. However, if the process is not perfectly mastered, some hexavalent chromium- Cr (VI), may appear in leather.

Cr (VI) is an allergenic substance and since May 2015, according to European legislation, Cr (VI)'s content in leather must not exceed 3 ppm¹.

3.1 Esprit supports suppliers to stabilize Chrome (III) tanning

In order to minimize the risk of Cr (VI) formation we support our suppliers with the help of best practices during production. We published a guideline with detailed explanations of root causes and preventive measurements in our vendor portal. We focus on productions rules to follow in order to diminish the Cr (VI) formation. These may be summed up as following:

- Avoid the use of oxidizing agents before and after tanning (e.g. bleaching agent)
- Finish the wet process at pH between 3.5 and 4, avoid pH peaks
- Preserve wet blue with sufficiently with biocides
- Limit or avoid ammonia in dyeing process for penetration
- Use saturated fat liquors instead of unsaturated fat oils as softener
- Don't use chromate pigments (e.g. relevant for blue)
- Use vegetable tannins for re-tanning (1 to 3%) (additional protection against oxidation)
- Rinse at the end of tanning, carry out an additional washing procedure

Besides providing best practices, we audit our leather suppliers on a regular basis. These tier 2 audits are based on sustainability (among others: environmental management, waste water, air emission and general waste reduction), chemical management and production process control, and an adjusted tannery part focusing on raw material, tanning and finishing operations. The aim of the audits is a status analysis as well as tool to install improvement measurements in terms of corrective actions.

4 TANNING ALTERNATIVES TO CHROME III

Even though chrome tanning may be considered as the most popular tanning technology in fashion industry (ca. 95%), and besides promoting best practices for chrome tanning, Esprit evaluates possible tanning alternatives for our leather products.

4.1 Vegetable tanning

Currently we already have vegetable tanned leather styles in our collection (season 04/05 and 08/09 2018). These styles are belts of the men collection and are tanned with chestnut, mimosa or quebracho. The styles may be found under these style numbers: 048EA2S003, 048EA2S004, 048EA2S005, 058EA2S002, 088EA2S002 and 098EA2S002.

¹ REACH annex 17, §47

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048EA2S003

048EA2S004

048EA2S005

058EA2S002



058EA2S002

088EA2S002

098EA2S002

We are trying to enhance our amount of vegetable tanned leather in our production during the next seasons.

4.2 Wet white tanning

We made first trails with our biggest leather supplier to tan leather with reactive tanning agents. This technology is also known as wet white, since the intermediate after the pre tanning is white colored. We made trails with leather jackets, bags and wallets. The leathers involved were goat, sheep and cow skins. The wet white tanning agents used are chrome free system based on sulphone and poly aldehyde combination or glutaraldehyde.

For now we face some challenges with wet white tanning regarding less elastic handfeel, stiffness and dull color compared to our chrome (III) tanned versions. Thus we are in contact with the chemical supplier TFL Ledertechnik GmbH and their Application Technology department in order to stabilize the process for the

wanted outcome. To achieve Esprit's quality requirements is a self-evident precondition. The project is still ongoing.

5 FURTHER STEPS

Besides conducting tannery audits and providing supplier supportive tools, we are pushing and encouraging our suppliers to help us achieving our aim to increase chrome free tanned leathers in our collections. Based on current research and developments in wet white leather we face some limitations, thus we are increasing our trails in order to be confident to shift bulk production in near future.