

ENVIRONMENTALLY-FRIENDLY LEATHER DRESSING TECHNOLOGY ACCOUNTING FOR A REDUCTION IN WASTE WATER SALINITY AND PROCESS WATER CONSUMPTION

K. Ławińska, K. Kosińska

*Institute of Leather Industry Lodz, Poland
k.lawinska@ips.lodz.pl, k.kosinska@ips.lodz.pl*

Leather tanning is considered a material and labour intensive industry. Water consumption in tanneries amounts to between 14 and 59 m³ of water per a ton of leather, depending on the dressing method. Raw materials constitute between 50 and 70% of production costs, labour – between 7 and 15%, chemicals – 10% and energy – 3%. One of the main reasons why the tanning industry is considered one that poses a major threat to the environment is the amount and quality of waste water that it produces. When analysing the impact of tanneries on the environment we must consider not only the amount and concentration of conventional contaminations, such as sulphides, chromium (III) compounds or the large amounts of inorganic salts that are difficult to remove, but also the use of specific chemical substances, such as biocides, surfactants and organic solvents.

The article involves the establishment of an environmentally-friendly leather dressing technology for a tannery. The aim of this technology is to streamline water and sewage management in the tanning industry and protect water resources by reducing its salt content and tanning waste water substances content. This innovation involves the introduction of used post-manufacturing liquors and treated waste water into the process cycle of a tannery in order to considerably improve the leather dressing technology. High consumption of process water and high concentration of chlorides in tanning waste water pose a considerable problem for the leather industry, in particular due to the fact that so far there are no environmentally-friendly substitutes for sodium chloride. Leather preservation and pickling are the main sources of tanning waste water contamination. The innovative leather dressing technology will establish conditions in which reduced consumption of water does not result in increased waste water contamination indexes. The aim of the tests is to introduce used process liquors and/or treated waste water containing chlorides that do not undergo chemical nor biochemical reactions (that may be used in their entirety, in particular, as an agent preventing the swelling of leather) into the process cycle of a tannery. The results of the study include, above all, environmental effects enabling the protection of water resources through a reduction of water consumption and waste water salinity (including chlorides) in the leather dressing technology.

The state of the global technology as regards the reduction of post-tanning waste water contamination was reflected in, above all, the works of the European Commission (2003), guidelines referred to as the Best Available Technology (BAT) and the Baltic Marine Environment Protection Commission (16/7) containing recommendations as to a reduction in the use of chlorides. The permissible values of waste water (including post-tanning waste water) contamination applicable in Poland are specified in an Ordinance of the Minister of Environment (Polish Journal of Laws of 2014, No. 223, Item 1988).

The conducted tests show that average values of contamination indexes for waste water resulting from leather dressing to the wet-blue phase exceed the permissible values (in accordance with the Ordinance) many times over. The relevant data is given in Table 1.

Table 1 – Values of indexes in post-tanning waste water (in baths)

index	average values	permissible values
BZT	1600 mg O ₂ /l	25.00 mg O ₂ /l
ChZT	4000 mg O ₂ /l	125.00 mg O ₂ /l
total suspension	2300 mg/l	35.00 mg/l
ammonia nitrogen	70 mg/l	10.00 mg/l
chromium Cr ⁺³	160 mg/l	0.5 mg/l
chlorides	4000 mg/l	1000.00 mg/l
sulphates	600 mg/l	500.00 mg/l
pH reaction	9	6.5-9.0

In order to ensure a significant improvement, preventive actions are necessary at the level of leather dressing technology, and the methods of post-tanning waste water salinity reduction and treatment must be streamlined. The application of the proposed environmentally-friendly leather dressing technology will provide for the reduction in process water consumption in a tannery by approx. 20% per month and will reduce post-tanning waste water salinity, especially chlorides, to an acceptable level.

REFERENCES

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