

# IUE – 8: RECOMMENDATIONS FOR ODOUR CONTROL IN TANNERY

## 2008 Updated Document

Odours in tanneries have various origins. They mainly originate from the putrefaction of hides, skins, trimmings and fleshings, from the release of hydrogen sulphide and ammonia, and from the use of volatile organic compounds (VOCs). They can also occur in the wastewater treatment both in effluent processing and in sludge dewatering. Odours are no longer accepted by communities. This document gives some recommendations for the control of odours both inside and outside tanneries.

### Air treatment

Tanneries should be well ventilated and the air from odorous areas should be exhausted and treated. Air treatment can be done biologically by blowing the odorous air through a moist bio-filter bed (compost, peat, humus) rich in micro-organisms. For effective elimination of the odour, retention time of about 20 seconds is recommended. These biofilters are now widely used and are very cost effective. Air can also be scrubbed using chemical treatments (acid, alkali and oxidant washing of the air), but running costs are higher. Areas requiring treatment include delimiting drums and areas where VOCs such as glutaraldehyde and solvents are used.

### Putrefaction

Care should be taken in the preservation and storage of wet salted hides/skins, particularly in hot weather. Cooling equipment can be used to maintain storage temperatures below 30°C.

Putrefaction of untanned solid waste can be an important source of odour. Wet waste should only be kept in the factory for a very limited time and can be partially stabilised with lime or by cooling.

### Hydrogen sulphide

The very toxic gas hydrogen sulphide (H<sub>2</sub>S) has the odour of rotten eggs and is released when sulphide-containing liquors or hides are acidified. This occurs in delimiting and when alkaline effluent liquors mix with acidic streams. Concentrations of 200 ppm H<sub>2</sub>S for 1 min can cause loss of consciousness, 500 ppm causes a deep coma with convulsions and exposure for 1 min at 900 ppm causes death. The limits for exposure are 10 ppm for 8 hours or 15 ppm for 15 min. The odour threshold for H<sub>2</sub>S is 0.08-2 ppm. H<sub>2</sub>S is especially dangerous because at levels over 200 ppm the odour is no longer detectable by the human nose. Portable detection devices are therefore essential.

Delimiting should be done in a closed vessel to reduce release of both H<sub>2</sub>S and ammonia. The addition of small quantities of oxidising compounds (such as hydrogen peroxide or sodium bisulphite) can reduce H<sub>2</sub>S release during delimiting.

Effluent from unhairing and liming processes contains high concentrations of sulphide. These liquors should be oxidised, usually using manganese sulphate as a catalyst, before being mixed with acid effluent or being discharged to the general mixing tank

which generally has a pH of 8.5 - 9. Alkaline and acid floats should be kept separately in the tannery.

## **Wastewater treatment and sludges**

Effluent is an important source of odour. H<sub>2</sub>S release occurs at different steps and care should be taken to limit its formation by maintaining the pH over 10 in the equalising tank and in the sulphide oxidation tank. H<sub>2</sub>S is also generated when sulphate containing liquors and sludges become anaerobic. Anaerobic conditions in tannery waste are odorous and dangerous. Low levels of manganese sulphate can help to avoid odours in treated effluent as it facilitates the oxidation of any sulphides present.

Tannery sludge storage in a thickener, or at a dry solid content below 30%, causes noxious odours. Sludges can be stabilised with lime to minimise odour problems. It is recommended that sludges are in the thickener for the minimum time and are quickly de-watered by centrifugation or filter press and dried. Biofilters can also be used to treat the air in areas where sludge is thickened and de-watered.

## **Volatile organic compounds**

The VOCs in tanneries include solvents used in finishing, dry-cleaning and degreasing, cross-linking agents, polymeric finishing agents and volatile tanning agents.

The finishing step is one of the main sources of VOCs, for example, butyl acetate, ethyl acetate, acetone, methyl isobutylketone and methyl ethylketone. They should be restricted to a minimum.

Most VOCs used in tanneries have a strong smell and many of them, including aqueous-based products such as formaldehyde, glutaraldehyde, etc. are toxic when present in the air at low concentrations (there is a safety limit of 0.6 mg/m<sup>3</sup> for formaldehyde). All areas where VOCs may be present should be well ventilated and the air should be exhausted and treated appropriately.

Solvent degreasing is a source of odour. Care should be taken to control odours during float recovery, solvent distillation or skins storage.

Cleaning solvents can be used in various steps of the process, mainly for maintenance purpose.

Storage of leather with finishes containing organic solvents can lead to occupational safety and health problems if ventilation is not adequate.

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