



IUE 11 – Occupational Health and Safety in the use of Chemicals in Tanneries

2018 updated document

Although other factors to establish occupational safety and health recommendations could be taken into account, such as health hazards and safety risks or safety of machines and installations, we have deliberately limited this document to the chemical aspect of safety.

This document has been prepared based on UNIDO presentations on occupational safety and health aspects of leather manufacture. For information on UNIDO publications go to:
<https://leatherpanel.org/>

The European Agency for Safety and Health at Work has developed together with COTANCE an on-line risk assessment project for leather tanning. The English version of the leather and tanning on-line tool can be viewed at:

https://oiraproject.eu/en/oiraprojects?text=&field_language%3Avalue%5Ben%5D=en&field_sector%5B222%5D=222&sort=date

1. Introduction

More than 250 different chemicals are used in the production of leather. Workers in the tannery are exposed to these chemicals in various ways:

- Inhalation in form of airborne substances (gases, dust, vapours, mist, aerosols and fumes).
- Ingestion, when workers are eating, drinking or smoking in the work area or by transfer from contaminated hands.
- Skin absorption or contact, generally through the pores or cuts/wounds of unprotected hands, arms and body.

Though each chemical is not necessarily hazardous to human health, the inherent source of the hazard can be either the chemical itself, any emission generated during the use or handling of the chemical (e.g. vapours, fumes, effluent) or the containers used for storage and transport of these chemicals.

The impact of such exposure can cause temporary effects: such as dizziness, headache, irritation of eyes, skin or lungs, allergic reactions, poisoning of liver, kidney or nervous system or collapse due to lack of oxygen. Longer term illness can occur: such as occupational asthma, ulcers, bronchitis or genetic defects. In some rare cases, even death has occurred.

Beside the adverse effect on the human body, chemicals can be the source and the cause of

fire, corrosion and damage to structures and electrical installations and may have a harmful effect on the surrounding environment when released in an uncontrolled manner.

The following recommendations must be taken into account for chemical handling in chemical stores, in the tannery, in the analytical laboratory and in effluent treatment plant.

2. Safety information on chemicals

2.1 Information on chemical container labels

Source: ILO – Code of practice

1. Trade name of the chemical
2. Identity of the chemical
3. Name, address and telephone number of supplier
4. Hazard symbols
5. Nature of special risks associated with the use of chemical
6. Safety precautions
7. Identification of the batch
8. Statement that a material safety data sheet giving additional information is available with the tanner
9. Classification assigned under the system established by the competent authority

Chemicals should not be brought into the tannery if they are not properly labelled or marked.

Please note that labels for points 2.1.4 and 2.1.5 are different for transport and handling.

2.2 Information in material safety data sheets (MSDS)

Source: EU safety data sheet (EU Directive 93/112 EEC)

1. Chemical product and company identification
2. Information on ingredients/composition of the chemical
3. Possible hazards classification
4. First aid measures
5. Fire-fighting measures
6. Measures in case of accidental release (e.g. spillage)
7. Guidelines on handling and storage
8. Information on how to control exposure and what personal protective equipment to use
9. Physico-chemical properties of the product

10. Security and reactive ness of the chemical
11. Toxicological information
12. Eco-toxicological information
13. Guidelines on disposal
14. Guidelines on transport
15. Guidelines on classification and labelling
16. Any additional information for the safety and health of the workers

Information from the MSDS should be used to create safe working procedures. These procedures should be available at the work place. The aim is to provide useful, understandable information to the workers, in order to create a safe working environment.

Do not use new chemicals until information on them, as outlined above, is obtained.

3. Control of chemical hazards

Workers are exposed to chemical hazards during:

1. Loading, unloading and handling of chemical containers in the chemical store;
2. Transfer of chemicals from containers in the chemical store;
3. Mixing of chemical recipes in the chemical store or workplace;
4. Transfer of chemicals from chemical store to the workplace;
5. Handling of chemicals in the workplace;
6. Loading/unloading of raw material/pelt/leather into/from pits, paddles, drums, machines;
7. Removal of chemical waste and effluent from the workplace;
8. Disposal of chemicals or effluent;
9. Washing and disposing of chemical containers

As chemicals emit fumes, mist, vapours or dust during storage and handling, any worker may be exposed to these airborne pollutants in any part of the workplace. Chemicals in liquid and gaseous form also affect the immediate neighbourhood, when released into drains or removed from the workplace by exhaust blowers and chimneys.

It is necessary to avoid chemical exposure of workers, whether through inhalation, ingestion or skin contact.

For safe handling of chemicals, several preventive measures must be taken.

Eliminate, whenever possible, hazardous chemicals from the workplace, for example:

- Replace organic solvent based chemicals by water based chemicals in degreasing and finishing.

Limit the chances of exposure to hazardous chemicals:

- Dose or transfer chemicals in fully or partly closed systems.
- Always put lids and covers on chemical containers.
- Use extraction systems on dry shaving, buffing, de-dusting, spraying machines and chemical weighing.
- Control discharge of floats from paddles and drums with a hose or gutter connected to the sewer.
- Use hand or motor pumps for transferring hazardous chemicals such as acids.
- Whenever possible, instead of spraying, use equipment such as roller coating, which produces less emission to air.
- Reduce the concentration of airborne pollutants using ventilation and natural airflow.
- Ensure good housekeeping practices, such as regular cleaning of work areas, floors, walls and machines, removal of waste and adherence to safe storing and handling practices.
- Reduce the number of workers in areas with hazardous chemicals and limit access to areas where hazardous chemicals are likely to be present (chemical store, effluent treatment plant).
- Reduce the exposure time, e.g. do all weighing at one time.

As a last resort, prevent exposure to hazardous chemicals by the use of protective equipment.

- Gloves, boots and aprons should be available for every worker in the wet-end of the tannery.
- Respirator type masks with particulate filters and glasses should be used when handling powder and liquid chemicals.

4. Safe chemicals storage

4.1 Adequate storage facility

1. Storage of chemicals should be separated from production areas, occupied buildings, other storage areas, workshop or areas with a potential source of ignition.
2. The floor should be flat (for ease of handling) and non-permeable to prevent soil pollution.
3. Emergency drains should be available and connected to the effluent treatment plant.
4. It should have at least two emergency exits to allow easy escape for personnel.
5. Electrical installations and other equipment for flammable chemicals should be “explosion proof”.

6. Natural and artificial ventilation should be provided at low and high level.
7. Access should be restricted to authorised, trained personnel.
8. Fire fighting equipment, e.g. powder ABC, should be kept ready in a suitable location, which can be easily and conveniently accessed in an emergency.
9. A washbasin, eye/face rinsing station and safety shower should be available in or near the chemical store.

4.2 Adequate storage organisation

1. Keep chemicals that will react separated, eg acids away from sodium sulfide and alkali away from ammonium salts: any accidental mixing results in generating dangerous gas - H₂S, NH₃.
2. Design and install pipes, valves, etc. in such a way that creates physical hindrances to incorrect addition or mixing of incompatible chemicals, eg from a tanker lorry into the wrong storage tank (acid into a sulfide solution).
3. Group and store different chemicals according to their compatibility. For easier stock-keeping, provide boards indicating name, maximum, minimum and current stock for each group.
4. For maintaining better storage discipline, allot the specific storage areas for each group and mark the designated areas with yellow floor marking.
5. Avoid storage of chemicals directly on the floor.
6. Racks and shelves can store small containers such as dyes and fatliquors samples.
7. Heavier chemical containers – particularly those containing liquid chemicals (eg acids) – should be stored on wooden or plastic pallets at the floor level.
8. Barrels containing liquid hazardous chemicals must be stored in catch pits or in a walled area.
9. Ensure sufficient width for movement of persons and materials (more than one metre for handling of chemicals, more than two metres for movement of pallet or fork lift trucks).
10. Whenever possible, solvents and other flammable or pyrophoric chemicals should be stored in a separate chemical room.

5. Safe chemicals handling

As a general principle, the quantity of chemicals in or at the work place should be restricted to that required for daily or batch use.

5.1 Training of workers

Training and education play important roles in the control of chemical hazards. People who work with chemicals should be aware of:

1. The possible health risks caused by chemicals
2. Safe working procedures
3. Care and use of protective equipment
4. Emergency and first-aid measures

Moreover, workers should be trained to identify when control measures fail and to interpret the labels provided on chemical containers.

Training is essential for new workers, while experienced workers should participate in regular refresher courses.

5.2 Transfer of chemicals from chemical containers

1. Make sure that the smaller containers used to transfer chemicals from the chemical store to the workplace are clearly labelled and marked.
2. When transferring chemicals, take advantage of simple tools or arrangements such as hand piston pumps (e.g. for acids) or positioning of barrels on horizontal racks (e.g. for fatliquors).
3. Do not use the same spoon, spatula, measuring cups for taking out different chemicals, to avoid contamination of chemicals.
4. Avoid mixing and preparing chemical recipes in the work area. Ideally, designate a separate area in your tannery.
5. Carrying of chemicals manually and in open containers should be avoided, to prevent spillage, distribution of vapours and chemical accidents. Use closed containers, trolleys and pallet trucks.

5.3 Basic rules and principles in handling chemicals

1. Never mix chemicals randomly and indiscriminately.
2. Always add concentrated acid to water, never water to acid.
3. Avoid breathing chemical fumes, dust or vapours using local exhaust ventilation. As a last resort use appropriate respirators.
4. Avoid skin contact with chemicals. Use safety goggles and other personal protective equipment, as required by the applicable material safety data sheet.
5. Wash hands with soap or other proprietary cleaner after handling chemicals.
6. Wash off chemical spills on skin or eyes immediately with running water.
7. Any chemical spillage should be reported to the supervisor and then cleaned up safely without delay.
8. For a large size tannery, all chemicals should be distributed from a gangway located over the beamhouse, tanning and post-tanning drums. The gangway should be equipped with adapted tanks connected to the drum axle.

9. For a small size tannery, install a fixed funnel connected to the drum axle. Install steps to the funnel, which are not higher than 20 cm each. The upper edge of the funnel should not be higher than the hip of the worker when standing on the platform.

6. Disposal of chemical waste and packing materials

Empty chemical containers can pose a safety risk and a health hazard, when not disposed of properly.

1. Remove empty chemical containers from the store and work areas.
2. Rinse out recoverable barrels and if possible use the rinsing water in processing. If not reused, the rinsing water is to be discharged to the effluent treatment plant.
3. Safely store the containers in a separate area of your tannery.
4. Do not pour or mix different waste chemicals into the same waste container or barrel.
5. Returning empty containers back to the supplier for refill and reuse is an option to be promoted.
6. Do not permit waste containers to be used for storing drinking water or food products.
7. Waste chemicals should be collected and disposed of according to local regulations.

Bibliography

1. Safety Handbook – How to deal with hydrogen sulphide gas in tanneries and effluent treatment plants, UNIDO (J Buljan, J Hannak, G Jayaraj), 19 pages, Madras – RePO-UNIDO, 1997
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