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BASE IMPACTS® DATA DOCUMENTATION

CATEGORY: LEATHER

3 levels of documentation are available for the datasets in Base Impacts®:

- A **general documentation** explaining general information on the datasets and data general requirements
- A **sectorial documentation**: one document per sector describing the available datasets and their characteristics (technological representativeness, geographical representativeness), and providing the information on the datasets in a common layout. Information comes from the consultation specifications, the dataset commissioner technical proposal and the metadata
- The **datasets metadata** can be viewed directly in the datasets sheets. They include more detailed information (flow diagrams, Etc.)

This document is the category documentation for leather.

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A. PRESENTATION OF THE DATASETS

1. List of available datasets

The following datasets are available:

Technological representativity			Geographical representativity	Dataset type
Leather wet blue	Chromium tanning	Waste water average	Europe, Asia	Partly terminated dataset
		Waste water best case	Europe, Asia	Partly terminated dataset
		Waste water worst case	Europe, Asia	Partly terminated dataset
Leather wet white	Aldehyde tanning	Waste water average	Europe, Asia	Partly terminated dataset
		Waste water best case	Europe, Asia	Partly terminated dataset
		Waste water worst case	Europe, Asia	Partly terminated dataset
Post-tanning / finishing leather	Chromium tanning	Waste water average	Europe, Asia	Partly terminated dataset
		Waste water best case	Europe, Asia	Partly terminated dataset
		Waste water worst case	Europe, Asia	Partly terminated dataset
	Aldehyde tanning	Waste water average	Europe, Asia	Partly terminated dataset
		Waste water best case	Europe, Asia	Partly terminated dataset
		Waste water worst case	Europe, Asia	Partly terminated dataset
Leather surface treatment			Europe, Asia	Partly terminated dataset
Leather painting	PU lacquers	Europe, Asia	Partly terminated dataset	
	PVC lacquers	Europe, Asia	Partly terminated dataset	

Table 1 : Available datasets

2. Structure of available datasets

The following diagram is used to present the structure of the datasets:

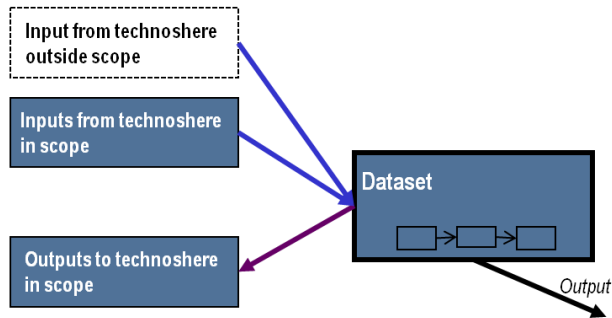


Figure 1 : Structure of the datasets

The impacts of bovine breeding and provision of hide are not included in the datasets, due to the chosen allocation process. Bovine breeding is allocated to milk and meat production and not to hide production.

The available datasets include the following elements:

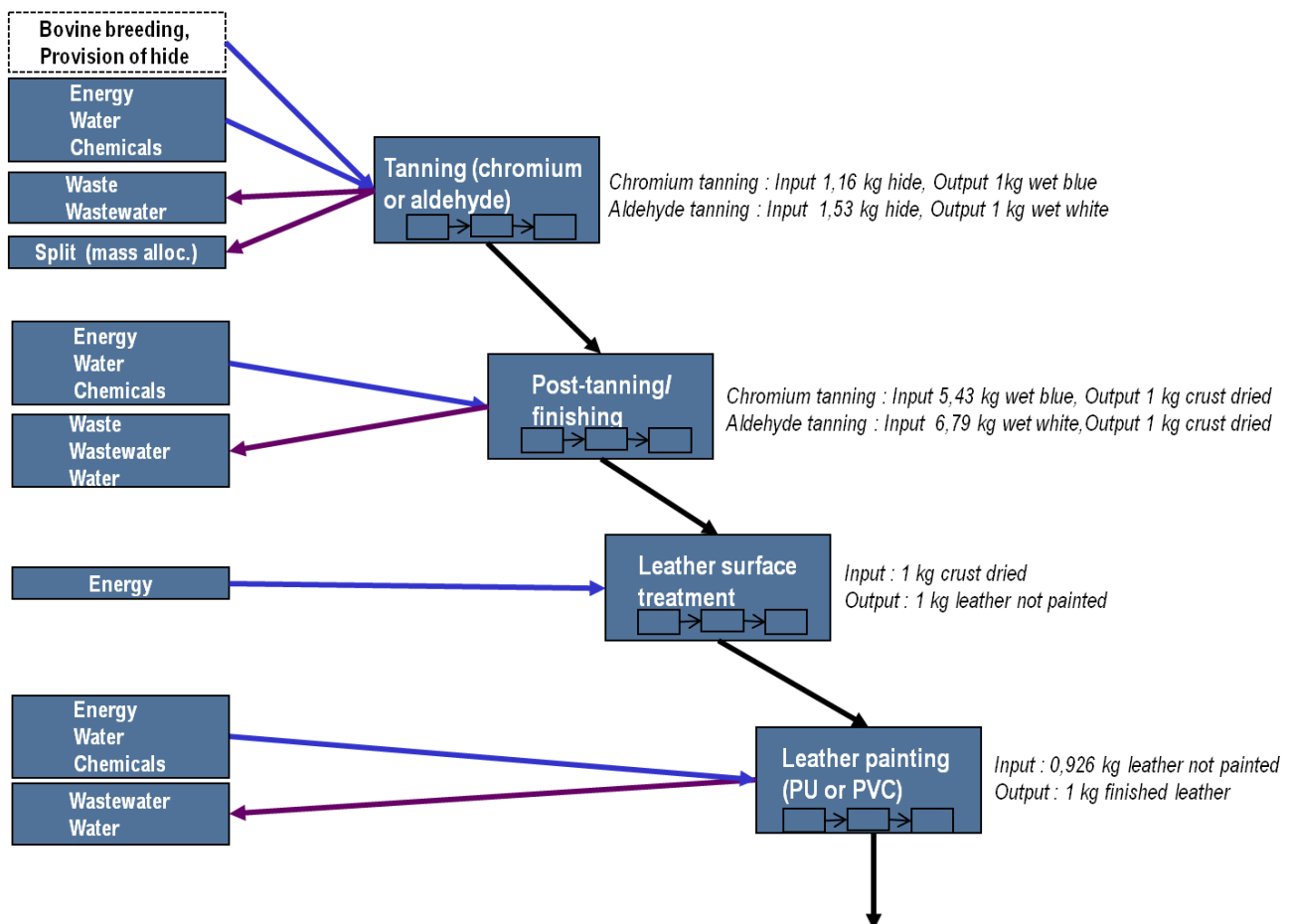


Figure 2 : Structure of the leather datasets

All leather datasets are partly terminated datasets which must be aggregated.

For instance, if the modeler needs to model 1 kg of PVC painted and chromium-tanned leather, the following elements must be modeled by taking into account the yield of the processes:

- 1kg leather painting (PU or PVC)
- 1 x 0,926 kg leather surface treatment
- 1 x 0,926 x 1 kg post-tanning / finishing (chromium)
- 1 x 0,926 x 1 x 5,43 kg tanning (chromium)

3. Technical specifications

The provided datasets describe the production and treatment of **bovine** leather.

Datasets were provided with **3 different wastewater treatment scenarios**: emission rates are based on primary data and the Integrated Pollution Prevention and Control (IPPC) Reference Document on Best Available Techniques for the Tanning of Hides and Skins of the EC:

- Average : waste water quality after treatment in a wastewater treatment plant with average removal efficiencies
- Best case : waste water quality after treatment in a wastewater treatment plant with best removal efficiencies
- Worst case : the quality of the waste water before it enters further treatment (emissions to the wastewater plant);

B. SCOPE OF THE DATASETS

1. Reference flow, functional unit

The processes are provided for 1 kg of output.

2. System boundaries

2.1. General foreground system boundaries

Cut-off for each unit process:

The datasets cover at least 95% of mass and energy of the input and output flows, and 98% of the environmental relevance (according to expert judgment).

Infrastructures

Infrastructure of leather manufacturing site is not considered.

2.2. Dataset-specific foreground system boundaries

2.2.1. Chromium or aldehyde tanning

This dataset covers the chrome/aldehyde tanning route of leather to arrive at wet blue/white leather, including all beamhouse and tannery processing steps.

Environmental impacts of provision of hide are not included.

Production losses are included:

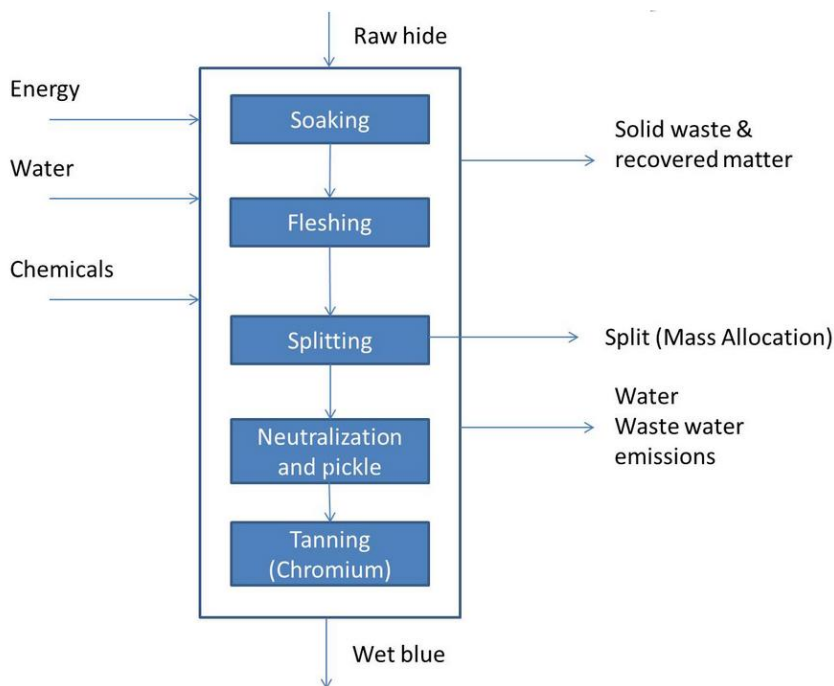
- *the input process flow is more than 1 kg (1kg + process losses);*
- *Treatment of losses is aggregated in the dataset.*

It includes the different process steps in tanning:

- The first step before the tanning process is the delimiting of the hide in a drum of acid. Next the hides are treated with enzymes to smooth the leather. Tanning and pickling is executed in the same drum. The step of pickling is reducing the ph-value. The chemicals used are highly influenced by the following tanning process.
- At the beam house operations (soaking, unhairing, liming and splitting) the pickled hide is prepared for tanning. Soaking is carried out in process vessels. Soaking additives are used. The function of unhairing and liming is to remove hair, meat and other undesirable material which is still part of the raw hide. The hides are soaked in a mixture of water and lime, which loosens the hair. The hair and all the other undesirable material is then removed mechanically which is called flashing or scudding.
- Next the hide is split into two layers (grain split and split leather). Split leather is often further processed into velours leathers used in shoes or sport articles, while the grain

split is used where smooth leather surfaces are needed. In this dataset mass allocation between the two splits was applied, assuming that further treatment of the different splits is comparable.

- At the tanning process, the hides are soaked into a tanning agent solution :
 - For chromium tanning, into a chromium-sulphate solution; the resulting product is called wet blue.
 - For aldehyde tanning, into a glutaraldehyde solution; the resulting product is called wet white



2.2.2. Post-tanning/finishing after chrome or aldehyde tanning

This dataset covers post-tanning operations excluding painting and surface treatment, which are provided in a separate datasets.

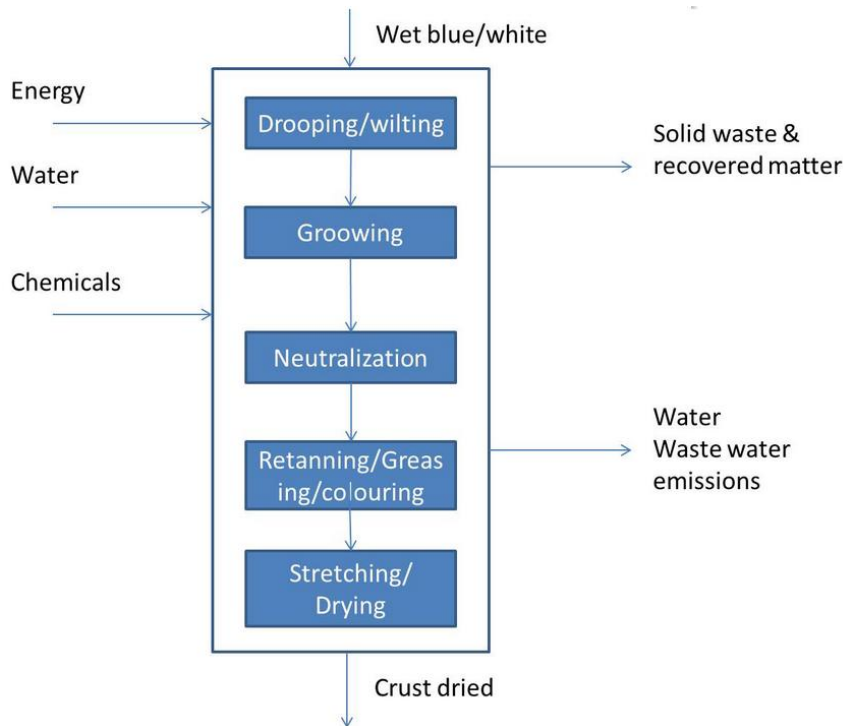
Surface treatment and painting of the leather (typically the final processing steps) are excluded in this dataset and provided separately.

No losses are taken into account.

After tanning, the hide is drained and skived.

Post tanning processes are: neutralization, retanning, fatting and different drying processes.

- Neutralization is necessary to neutralize the acid of the tanning process.
- Retanning is performed to improve the characteristics.
- Fat is being added to soften the leather by regaining its fat content lost during the previous steps. Due to its specification water based colour is being added to the bath.
- The leather is then dried and mechanically softened by stretching, called staking, to avoid fibers sticking together.
- The resulting product is called crust leather (dried).

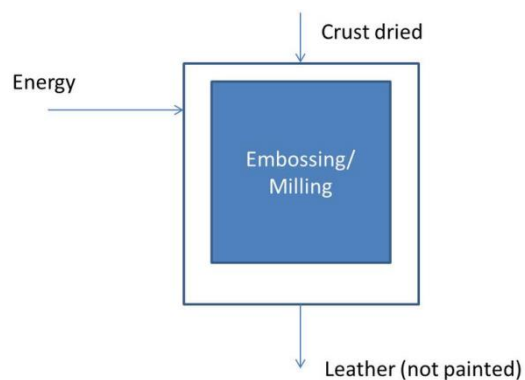


2.2.3. Leather surface treatment

This dataset covers surface treatment of leather before painting: grinding, embossing, clamping, milling

Painting of the leather (typically the final processing step) is excluded in this dataset and provided separately.

No losses are taken into account.



2.2.4. Leather painting

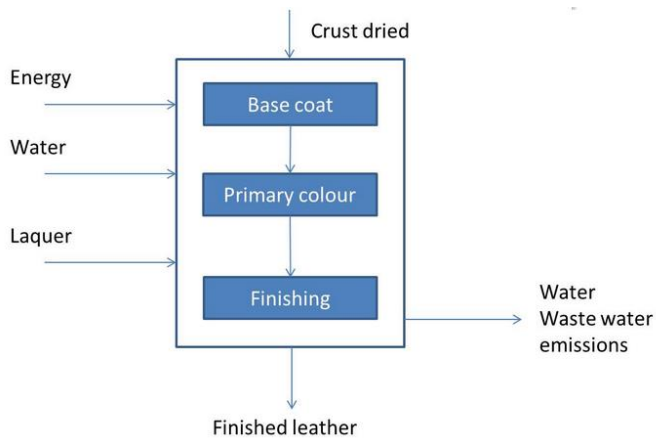
By finishing the surface of the crust leather with polymer binders and lacquers it is upgraded to the final leather.

No losses are taken into account.

Datasets are proposed for the use of:

- PVC (Polyvinyl chloride) based lacquers.
- PU (Polyurethane) based lacquers.

Waste air purification is assumed.



2.3. Background system boundaries

Background system boundaries follow the rules defined by PE International.

C. DATA SOURCES AND QUALITY

1. Data quality requirements

Quality requirements for Base Impacts® datasets are detailed in the general Base Impacts® documentation.

No specific quality requirements were set for the leather datasets.

2. Types and sources of data

The data sources for the complete product system are sufficiently consistent: primary data from industry was supplemented and validated with different literature data (see technology description for references).

The datasets were created with the use of the following elements and references:

- Primary data from industry;
- Integrated Pollution Prevention and Control (IPPC) Reference Document on Best Available Techniques for the Tanning of Hides and Skins of the EC, for the different wastewater scenarios;
- Günter Reich (2010), Leather, Ullmans Encyclopedia of Industrial chemicals;
- J. Buljan et al. (2000): Mass Balance In Leather Processing, United Nations Industrial Development Organization, Regional Programme for Pollution Control in the Tanning Industry

3. Data quality

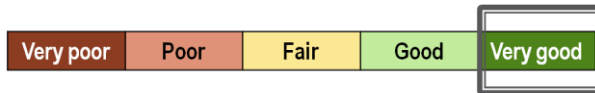
3.1. Technological representativeness



3.2. Time-related coverage

Reference year: 2011 (Data collection period 2010-2012)

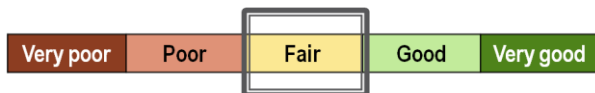
Annual average



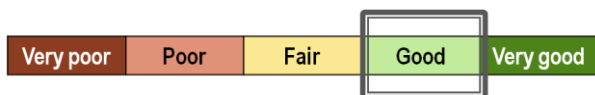
3.3. Geographical coverage

Datasets were provided for Europe and Asia

- Asia :



- Europe :



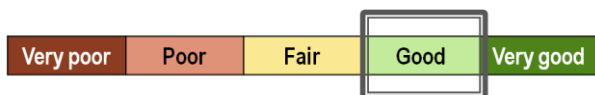
The basis production processes are the same. Only the energy and chemicals production chains are changed to the country specificities for the several leather production locations.

3.4. Precision

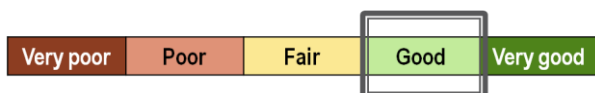


3.5. Completeness

All relevant flows quantified



3.6. Consistency



4. Multi-functionality and allocation procedure

4.1. Foreground system allocation procedure

Allocation was used for the chromium / aldehyde tanning process: Allocation according to market value between the two co-products of leather splitting, grain split leather and (drop) split leather, assuming that further treatment of the different splits is comparable. The more valuable grain split leather is the main product for this dataset. Data source is defined by the data provider in collaboration with internal farm specialists.

The other leather processes do not require allocation procedures.

4.2. Background system allocation procedure

Background system allocation procedure follows the rules defined by PE International.

D. CRITICAL REVIEW

All Base Impacts® datasets follow the ILCD Entry Level requirements, which require a review either internal with public report or external.

The leather datasets were reviewed by internal review:

- Raw data: Validation of data sources, Sample tests on calculations, Cross-check with other source, Expert judgement
- Unit process(es), single operation, black box: Energy balance, Element balance, Cross-check with other source, Cross-check with other data set, Expert judgement, Mass balance, Compliance with ISO 14040 to 14044
- LCI results or Partly terminated system: Energy balance, Element balance, Cross-check with other source, Cross-check with other data set, Expert judgement, Mass balance, Compliance with ISO 14040 to 14044
- LCIA results : Cross-check with other source, Cross-check with other data set, Expert judgement, Compliance with ISO 14040 to 14044
- Documentation: Expert judgement, Compliance with ISO 14040 to 14044, Documentation
- Life cycle inventory methods : Compliance with ISO 14040 to 14044
- LCIA results calculation : Expert judgement, Compliance with ISO 14040 to 14044
- Goal and scope definition: Expert judgement, Compliance with ISO 14040 to 14044

E. REPORTS FOR MORE INFORMATION

The following documents should be used for more information:

- Gabi Modelling Principles 2013
- General Base Impacts® documentation
- Review report, available in the metadata of each dataset

F. ADMINISTRATIVE INFORMATION

1. Commissioner

PE International.

2. Dataset modeler

PE International.

APPENDIX: DATA NEED AND DATA SELECTION

A Technical Committee on leather datasets specifications was held on 11 May 2011 to identify the leather datasets required for environmental labeling.

So far, leather datasets are required by the following Product Category Rules:

- Shoes
- Furniture

The conclusions of this Technical Committee were a synthesis of data need for leather.

The datasets identified by the Technical Committee are provided in Base Impacts®, with the following modifications:

Consultation specification	Implementation in Base Impacts®	Justification
<ul style="list-style-type: none">• Tanning process	Separated into two sub-processes: <ul style="list-style-type: none">• tanning• post-tanning	The entire tanning process can be modeled with different geographical locations between the tanning and post-tanning
<ul style="list-style-type: none">• Milling• Finishing	Grouped in a single “leather surface treatment” process	No separate data available
<ul style="list-style-type: none">• Leather enduction	Named “leather painting”	