

Developing the „Enforcement Protocol/Ordinance for Environmental Compliance in the Leather Tannery Sector in India“

Standard setting based on the concept of Best Available Techniques for Leather Industry observations from Kanpur

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Best Available Technology for the Tanning of Hides and Skins

Definition of BAT (Best Available Technology)

Best = most effective with respect to the prevention and – where that is not practicable – the reduction of emissions and the impact **on the environment as a whole**

Available = developed on a scale which allows implementation in the relevant industrial sector, under **economically and technically viable** conditions, taking into consideration the costs and advantages, whether or not it is used in the respective Member State

Technique = includes both the technology used **and** the way in which the installation is **designed, built, maintained, operated and decommissioned**

→ A technique in itself is not environmentally friendly if it is not well maintained and operated

Preamble

The Enforcement Protocol with the „Environmental (Protection) Amendment Rules“ would be the last step of a BREF-process for the tanning industry.

Additional standards would have been already developed, under consideration of the best available techniques, with the involvement of all stakeholders. Based on that standards, an enforcement protocol will be developed.

Because of the actually high importance and sensitivity of the problems in the tanning industry mainly in Kanpur, that enforcement protocol will be already discussed and prepared as an proposal – exceptional - in advance.

Differentiation in the tanning industry

Micro, small, medium and big sized tanneries, which need to be defined by:

- finished production capacity (finished Leather, Wet-Blue, Crust production in ton/day)
- wastewater discharge concentration
- wastewater discharge load (would be the best, bad difficult to monitor)
- investment in plant & Machinery (development act 2006 MSME; not recommended)

Kind of production steps

- Raw – Tanned
- Tanned – Crust
- Crust – Finish

Differentiation in the tanning industry (II)

Kind of rawmaterial used for production

- Buffalo, Cow – with exemption of Calf hides
- Sheep/Goat
- Hair-on skins

Kind of tanning processes used

- Cr-tanning
- Vegetabil tanning
- Wet-White tanning (non vegetabile)

Kind of final leather products

- Shoe upper
- Upholstery – furniture/automotive
- Leather goods (saddle, harnish, belts etc.)

Differentiation in the tanning industry (III)

Wastewater emission standards should distinguish between indirect (into a CETP) and direct discharge (into a water body) and the kind of final usage of the effluent:

- Inland surface water
- Irrigation
- Marine coastal areas
- Public sewer (with CETP for municipal, industrial, tannery or mixed treatment plant)

Also the scale of the wastewater treatment plant (m³/day) can be taken into account for more detailed standard settings. There may be differences in monitoring (self controlling, external controlling, frequency of testing, kind of sampling, parameter for monitoring), operational diary (daily updating), reporting (yearly report with minimum required data) and in standard settings (concentrations in discharge).

- Small scale treatments < 50 m³/day
- Middle sized treatments 50 – 300 m³/day
- Big sized treatments > 300 m³/d

Possible aspects to be addressed in a BREF for Tanneries as Best Available Techniques

- Kind of process
- Health and Safety
- Emergency plans
- Housekeeping
- Environmental Management systems, Audits
- Chemical management, Restricted substances
- Waste management
- Wastewater treatment
- Air emission treatment (noise, chemical emissions)
-

BAT associated emission and consumption level

For the following aspects BAT associated emission and consumption levels should be derived:

- Wastewater discharge
- Air emission
- Noise
- Energy consumption
- Water consumption
- Chemical consumption

Available Guidelines and Standards in India for the tannery industry

In India, there are standards, charters, greenbooks, specific manuals (TGM) and guidelines available for the tanning industry

The legal requirements for wastewater effluent discharge are mainly described in:

1. Environmental Protection Amendment Rules, 2015 – No.55, published and came into force on 1st Jan. 2016: **CETP – treated effluent quality standards**, with some parameters (without limit values) mentioned for important sectors like tanneries. The State Board will prescribe Inlet Standards per design of the CETP and local needs and conditions. Tanneries attached with CETPs shall achieve that standard.
2. Environmental Protection Rules, 1986 – No 16: LEATHER TANNERIES – Effluent concentrations for Inland Surface Water, Public Sewers, Land for Irrigation, Marine Coastal areas. Different standard values due to final usage of the effluent. **Remark: For irrigation, many dangerous heavy metals are excluded and not specified as max. standard value. Only 2 x monitoring per year is necessary.**
3. Environmental Protection Amendment Rules, DRAFT 2016 – No.57, published but not yet in force, March. 2016: TANNERIES – Max. permissible effluent standards; remarks with exemptions for marine disposal for FDS; irrigation is possible. The mixing ratio with sewage shall be described by SPCB. **That standard is only applicable for tanneries with own treatment plants, not for tanneries connected to CETPs.**
4. **Tanneries with indirect discharge will not have a fixed standard.** The State Board will prescribe the Inlet Quality standards up to local needs and conditions.

General requirements in Germany/BREF regulation

India:	BREF/Germany
No requirements	<ul style="list-style-type: none">• a permit to discharge waste water into water bodies shall only be granted if the pollutant load, based on an examination of the conditions in each individual case, is kept as low as the use of water-saving procedures such as washing and cleaning operations, indirect cooling and the use of low-pollutant feedstocks and auxiliary materials permit.• The requirements must not be met by means of procedures whereby environmental pollution is transferred to other environmental media such• as air or soil, contrary to the state of the art.• Requirements specified in the form of concentration levels must not be achieved via dilution, contrary to the state of the art.• If requirements prior to blending are specified, then blending shall be permissible for the purpose of joint treatment, provided at least the same overall reduction of contaminant load per parameter is achieved as would be the case via separate compliance with the relevant requirements.

General requirements in Germany/BREF regulation

India:	BREF/Germany
No requirements	<p>With hide and pelt curing, the contaminant load should be kept as low as the following measures permit:</p> <ol style="list-style-type: none"><li data-bbox="309 471 1275 521">1. Storing the hides and pelts at low temperature<li data-bbox="309 556 888 606">2. Using non-denaturalised salt<li data-bbox="309 642 1893 756">3. Retaining brine from skin curing via suitable techniques such as dry disposal or returning to production.<li data-bbox="309 792 1816 978">4. AOX pollution of the waste water should be kept as low as possible via the selection and use of appropriate cleaning agents and disinfectants or other feedstocks and auxiliary materials.

Comparison between Indian and German standards

India:	BREF/Germany
<p data-bbox="0 362 958 525">Development Act 2006 MSME/Chapter III a/June 2016: by investment in plant and machines</p> <p data-bbox="0 548 958 605">Micro < 25 Lakh (33000 €)</p> <p data-bbox="0 619 958 676">Small >25- 5 Crore (33000-667.000 €)</p> <p data-bbox="0 691 958 748">Medium: >5-10 Crore (667000-1,3mio €)</p> <p data-bbox="0 762 958 876">Environmental (Protection) Amendment Rules 2016-Draft March 2016</p> <p data-bbox="0 976 958 1133">Remark: Investment in tanneries is not directly related to the production capacity or emissions.</p>	<p data-bbox="958 362 1916 639">The standard-values in the BREF are valid for big scale units: > 12 t finished leather per day, while the described best technologies are valid for the whole industry.</p> <p data-bbox="958 662 1916 825">Factors to recalculate the finished leather into Wet-Blue/Wet-White, if this is the final product of tannery:</p> <p data-bbox="958 848 1916 962">Shoeupper: 15 t rawhides=7,94 t WB after samming=2,94 t finished leather</p> <p data-bbox="958 976 1916 1090">Upholstery: 15 t rawhides=5,08 t WB after samming=1,48 t finished leather</p>

Comparison between Indian and German standards

India:

CPCB info (Mr. Ankush Tiwani) for tanneries:

The permitted input production capacity split the tanneries into small and big units only.

Small unit: up to 35 hides/day (and assumed 20-30 kg/hide; avg. 25 kg/hide)

Calcul. of a small unit water amount:

$35 \text{ hides} * 28 \text{ kg/hide} = 875 \text{ kg rawhide/day.}$

$28 \text{ m}^3/\text{ton} * 875 \text{ kg/day} = 25 \text{ m}^3/\text{day.}$

Remark „Per hide“ do not specify heavy/small hides, either not buffalo, calf, goats, sheep.

„per hide“ should not be used for calculation to the theoretical water consumption

BREF/Germany

When the BREF-standard, which is originally done for large units (>12 t FL/day) is converted into government law, than also the smaller units may have to use (most of) the legal standards, if no exception will be described. The technique by itself, which is described as BAT, have to be normally followed by all units, if no others is mentioned in the BREFdocument..

Waste Water Ordinance- AbwV with Appendix 25 for Tanning industry:

Exemption: If less than 100 m³/year and no sulphide, no chrome and no dyeing with copper and cr-dyestuffs is done and no water with organ.halogenated volatile solvents (AOX) is produced, than the appendix 25 is not a requirement for the tannery.

Comparison between Indian and German standards

India:	BREF/Germany
<p data-bbox="0 364 966 592">Study from CPCB, Delhi: Tannery clusters in India and waste management practices in tannery intensive states – inventory and status (2014):</p> <p data-bbox="0 592 966 664">Processing capacity salted hide/skins:</p> <p data-bbox="0 664 966 721">Large: > 5000 kg/d</p> <p data-bbox="0 721 966 778">Medium: 2000 – 5000 kg/d</p> <p data-bbox="0 778 966 835">Small: < 2000 kg/d</p>	<p data-bbox="966 364 1926 592">The BREF scale is not the same like the Small -media-big industry scale for other purposes, where it may be distinguished by employee-number or by annual turnover.</p> <p data-bbox="966 592 1926 872">For tannery’s environmental purpose, the scale should be distinguished by produced finished leather (ton/day), with calculation factors for WB-production.</p>

Example for different calculations and results

1. Kanpur/Jajmau tanneries are mainly distinguished by CPCB by definition of the production license:

< 35 hides permitted input capacity/day: 290 small tanneries with less than 875 kg/day and <25 m³/day wastewater discharge (theoretically)

>35 hides input capacity/day: 110 large tanneries with more than 875 kg/day and more than 25 m³/day

2. Kanpur/Jajmau (U.P.) tanneries: A study on behalf of CPCB based on production capacity of wet salted hides/skins (kg/day) was done. To calculate further with the theoretical max. consumption of 28 m³/ton from raw-finish does not reflect the real situation! It is only done for comparison reasons in that slide:

375 small tanneries < 2000 kg hides/day (<56 m³/d)

25 medium tanneries 2000-5000 kg hides/d (56-140 m³/d)

4 large tanneries > 5000 kg hides/day (> 140 m³/d)

3. Using the Development Act 2006 MSME (June 2006), the tanneries would be distinguished by investment in plant and machinery, which would give again another number of tanneries in different scale-units. That definition is used in the new draft for environmental (protection) amendment rules, March 2016

- Set one rule, which make sense for the India tanning industry for differentiation into m-s-l scaled units.

Kind of rawhides and specific water consumption

India:	BREF/Germany
Wastewater gen.: 28 m³/ton Rawhide	Remark: By experience, appr. 75-95% of waterconsumption is find as wastewater. The average value would be 85%.
New Draft for wastewater No.57-Tanneries:	Standard for salted bovine hides on a monthly average. Calfskins and eg. tanning may require higher water consumptions
Wastewater generation is divided in:	Water consumption:
Raw-WB: 18 m³/ton rawhide	Raw-WB/WW: 13-18 m ³ /ton
WB-Finished: 10 m³/ton rawhide	Posttanning+finishing: 6-10 m ³ /ton
Raw-Finished: 28 m³/ton rawhide	Total: 19 – 28 m ³ /ton
Avg. vaules and kind of calculation need to be fixed	Standard for Sheepskins:
	Raw-pickle: 65 – 80 l/skin
	Pickle-WB 30 - 55 l/skin
	Post tanning+finish: 15 -45 l/skin
	Total: 110 – 180 l/skin
	Monthly avg. values; wool-on sheepskins may require a higher water consumption

Kind of rawhides and specific water consumption

India:	BREF/Germany
	<p>Remark: different kind of hides/skins and different kind of production (Wet-White, Vegetabil, Cr....) need different kind of waterconsumption. The mentioned waterconsumption is the range, which can be achieved by using the recommended BVT technology (which cannot be used always for all kind of leatherproduction)</p>
<p>Remark: the measurement of freshwater is normally more reliable and easier to do like the effluent of the wastewater, because the flowmeters in discharge water are often blocked or broken in the wastewater treatment plant. Ideal, both meter readings are available.</p>	<p>„ton rawhide“ need specification to the kind of animal.</p>

Indirect discharge (inlet Quality standard) into CETP: Self monitoring and monitoring system; compliance

India:	BREF/Germany
Compliance: All discharge results must be in the standard.	<p>Compliance: 4 out of 5 rule: 4 consecutive test results (for each parameter) must comply with the standard; if 1 test shows a higher value but does not exceed the standard by more than 100%, the results will not be counted as failure. (see detail: wastewater ordinance Article 6 – compliance).</p> <p>Remark: That rule addresses cases when sometimes a problem may happen in the treatment or in production.</p> <p>The government or a government approved laboratory will visit unannounced appr. 4 x per year taking samples. They will compare the actually self-monitoring test results in the on site operational log book with the test result from the taken sample.</p> <p>In case of non compliance different measures can be taken, f.e.: warning, fine, go to court (go to prison in worst case); close the tannery in worst case, if the non compliance is going on and no measures are done by the tannery.</p>

Indirect discharge (inlet Quality standard) into CETP:

Self monitoring and monitoring system; compliance

India:	BREF/Germany
<p>Mainly online-meters should be installed for flow, pH and TSS.</p> <p>Pre-treatment discharge standards into public sewer for tanneries (attachement 16-Leather tanneries):</p> <p>TSS: 600 mg/l (different in the standard)</p> <p>Cr: 2 mg/l</p> <p>pH: 6 - 9</p>	<p>Self monitoring: Tanneries can do testing by approved methods in own laboratory on site or in certified external laboratory or by online meters.</p> <p>flow rates of discharged waste water as well as freshwater inflow must be measured continuously.</p> <p>pH in discharge must be measured continuously.</p> <p><u>Pre-treatment:</u></p> <p>Up to the size of pre-treatment, f.e. (< 10 m³/day; 10-100 m³/day; > 100 m³/day), different self monitoring programs may be fixed.</p> <p>Up to the kind of pre-treatment (precipitation, settlement, oxidation, biology...), the different test parameter may be fixed.</p> <p>The parameters for indirect discharge (before mixing) are fixed after splitflow treatment or at the site of occurrence.</p> <p>Cr-total < 1 mg/l; prior to blending</p> <p>Sulphide < 2 mg/l; prior to blending (no exemption acceptable)</p> <p>Volatile halog. solvents: <0,1 mg/l; after degreasing</p> <p>CrVI: < 0,05 mg/l; in the bath from dyeing, rinsing</p> <p>All other parameters are fixed by the receiving CETP or the WWTP, up to their requirement. For Chromium, higher values may be fixed as exemption, if the CETP/WWTP will achieve the same reduction result and if the sludge recycling or disposal is not causing any harm.</p> <p>Normally, no COD/BOD/N-total or NH4-N or P-total inflow parameters are fixed into the CETP/WWTP because they are nutrients for the biological system</p> <p>Irrigation is not allowed in Germany.</p>
<p>Remark: Very dangerous gas H₂S (hydrogen sulphide) will be formed from wastewater from liming/ deliming) water, if the pH is smaller than 9,5 pH.</p> <p>This is also a strong smell problem. Therefore, the sulphide S²⁻ must be destroyed in a splitflow treatment.</p> <p>A limit for S²⁻ should be formed in the effluent discharge, before mixing with other water (pH < 9,5) and before entering the public drainage.</p> <p>H₂S Gasous emissions are the most deadly killer in the tanneries!</p>	

Indirect discharge (inlet Quality standard) into CETP: Self monitoring and monitoring system; compliance

India:	BREF/Germany
No rule for non-compliance information	In case of non-compliance, the authority need to be informed by the tannery itself. Annual reporting to the authority.

Effluent discharge (outlet Quality standard) from tanneries own wastewater treatment

India:	BREF/Germany
<p>Treated quality standards CETP: (new Draft March 2016) Tanneries (57): (reuse, discharge and irrigation)</p>	<p>In the wastewater ordinance, Appendix 25 (Germany) and BREF: Effluent is not allowed to use it for irrigation on land (need special permit, with different limits in N, P, COD and eventually TSS).</p>
<p>Also for combined Municipal/tannery treatments:</p> <p>Large scale units may be required to adopt ZLD, by site specific conditions or in case of persistent violation.</p>	
<p>pH 6-9</p>	<p>pH 6-9</p>
<p>BOD3: 30 mg/l</p>	<p>BOD5: 25 mg/l (if inflow to bio is >1000 mg/l, 97,5 % reduction; this I not included in the updated BREF any more, but should still be used in India). It gives the tannery the possibility, to reduce water.</p>
<p>COD 250 mg/l</p>	<p>COD 250 mg/l (if inflow to bio is <2500 mg/l; if higher, < 90% reduction). It gives the tannery the possibility, to reduce water</p>
<p>TSS 100 mg/l</p>	<p>TSS 35 mg/l (only for tanneries with > 12 t finished leather/day)</p>
<p>FDS: 2100 mg/l (not for marine)</p>	<p>FDS: NA</p>
<p>Cr-tot: 2 mg/l</p>	<p>Cr-tot: 1 mg/l (splitflow treatment, indirect discharge parameter)</p>
<p>S2-: 2 mg/l</p>	<p>S2-: 2 mg/l (splitflow treatment, indirect discharge parameter)</p>
<p>NH4-N: 50 mg/l</p>	<p>NH4-N: 10 mg/l (if temp. in Bio is >12°C)</p>
<p>TKN: 50 mg/l</p>	<p>TKN: NA</p> <p>Ptot. 2</p> <p>AOX: 0,5 mg/l (there is also a additional imit for degreasing float)</p>

Effluent discharge (outlet Quality standard) from tanneries own wastewater treatment

India:	BREF/Germany
<p>Remarks:</p> <p>TKN: 50 mg/l</p> <p>FDS: 2100 mg/l (not for marine)</p> <p>No solution for reuse, recycling or disposal is available for the generated solids (salt/solid mixture)</p> <p>Energy consumption is very high for that treatment.</p> <p>In case, when no or very less water is available in an area, it still may be an option to re-use the water by using ZDL.</p> <p>In case of irrigation, it may be needed, to set a standard of 2100 mg/l. That would finally mean, that tannery is not useable for irrigation,</p>	<p>Remark:</p> <p>Because of the high nitrogen value in the tannery wastewater, the denitrification may not be completed even though BAT is used. Therefore, no standard for TKN yet.</p> <p>Because of the high content of sulphates and chlorides, which cannot be avoided despite using BAT and cannot be eliminated in the wwtp by using BAT, there is no standard for discharge into a water body (river, sea, lake..) for these parameters. Irrigation is generally not permitted in Germany.</p>

Effluent discharge (outlet Quality standard) from tanneries own wastewater treatment

India:	BREF/Germany
<p data-bbox="0 307 966 364">No reporting</p> <p data-bbox="0 449 966 564">Online measurement and online reporting to authority</p>	<p data-bbox="966 307 1928 435">Annual reporting to the authorities; Selfmonitoring</p> <p data-bbox="966 521 1928 635">In BAT, self monitoring can be done in the own laboratory on site or externally.</p> <p data-bbox="966 664 1928 992">Normally, there is no online (except pH and flow rate). The operator should know, what happens and he should take the daily sample and watch and smell the wastewater. Therefore, the manually sampling and the manually testing in laboratories on site is preferred.</p> <p data-bbox="966 1021 1928 1235">External laboratories deliver the results very late and they cannot be really used for treatment control. Therefore, the tests should be done on site immediately.</p>

Environmental Management System (effective inhouse system or ISO 14001) with an environmental policy

India:	BREF/Germany
<p data-bbox="9 385 821 492">No requirements, or requirements unknown</p> <p data-bbox="9 514 937 678">(Future BAT should require a minimum standard for EMS, to improve the environmental performance ongoing)</p>	<ul data-bbox="975 385 1903 1335" style="list-style-type: none">- Commitment of the management- Environmental policy definition- Objectives and targets setting in connection with necessary investment plannings- Procedures for training, awareness, process control, maintenance etc.- Performance checking, action plans- EMS- review procedure- Development of cleaner production rules- Impacts-Aspects procedures- Sectoral benchmarking procedure- Internal/external Audit programs- Management review procedures

Good housekeeping

India:	BREF/Germany
<p data-bbox="9 385 560 492">No requirements or requirements unknown;</p> <p data-bbox="9 585 637 806">Future BAT need to include basic rules and requirements for good housekeeping</p>	<ul data-bbox="653 456 1903 1213" style="list-style-type: none">- Chemicals handling and storage- Rawmaterial (hides) selection and storage- Waste segregation, handling, storage- Work-in-progress equipment handling- Traffic rules inside the tannery (Pedestrians, forklifts, trucks)- Maintenance of machines/equipments- Process control- Calibration of equipments used in production and laboratory- Clean and tidy working area in production and wastewater treatment- Others

Health and Safety – Part I

India:	BREF/Germany
<p data-bbox="34 301 484 458">No requirements or requirements unknown</p> <p data-bbox="34 562 556 776">Future BAT need to implement the basic requirements and standards in tanneries</p>	<p data-bbox="566 234 1831 362">No special requirements in the BAT, but there are specific standards, which are followed by the tanneries. Examples (without special machines and building requirements):</p> <p data-bbox="566 434 1151 469">i) PPE (personal protective equipment)</p> <ul data-bbox="566 476 1769 558" style="list-style-type: none">- provide the necessary PPE for all staff. The staff <u>have</u> to wear all PPE due to requirements in different areas <p data-bbox="629 565 1856 601">Examples for PPE: (not complete, may differ in different sections and tanneries):</p> <ul data-bbox="658 608 1846 1222" style="list-style-type: none">-earplugs (f.e. buffing, shaving,staking)-gloves (wet processes, chemical handling, padding, hot plate areas)-safety goggles (all areas where chemicals are used)-protective masks (chemical storage and handling, dusty aera like buffing,org. solvents uhandling areas in finishing (spraymachines, rollercoaters, handspray booth, PU-coating, padding), degreasing areas; areas with spraying wastewater like wastewater treatment or sludge dewatering; waste handling (mainly hazardous waste)-shoes (principally no barfooth working in a tannery; to avoid accidents, closed shoes are necessary. Especially in all wet-areas and chemicals areas, incl. all people who are handling chemicals, waste and wastewater, salt shaking area from rawhides)- prons (mainly in soaking/liming/fleshing incl. handling of fleshings)

Health and Safety – Part II

India:	BREF/Germany
	<ul style="list-style-type: none">ii) provide clear labels for necessary PPE visible on the machines or for certain rooms or areas (f.e. buffing room, milling room, color kitchen)iii) electrical control boards need closed doors and have to be clean, dry and if necessary equipped with fans to cool the equipmentiv) electrical wires have to be dry and safe installed;v) no tape-repair by wrapping for all electrical wires, pipelines and other installationsv) drainages and pits on the floor need to be closed safe without gapsvi) platforms and stairs have handrailsvii) Install Safety protections on motor cooling impellers and belt driven motorsviii) Install safety barriers (doors, chains, light barriers) in front of rotating drums

Health and Safety – Part III

India:	BREF/Germany
	<ul style="list-style-type: none">vix) close the gap between drums and platforms during manual loading of the drums/sample taking or chemical adding.x) protect rotating mixer shafts mainly in color kitchen for wrapping hairs or clothes of operators around the shaftsxi) safety showers and eye showers are provided in the areas, where chemicals are stored and handledxii) risk assessment is done in beamhouse (liming and deliming areas), for the drainage areas inside/outside the tanneries until the treatment, where acid/sulphide water is mixed or can be mixed in case of accident.xiii) risk assessment is done for H₂S in wastewater treatment and sludge treatment assessment in all dangerous areasxiv) risk assessment is done for H₂S in chemical storage areas where Na₂S and NaHS is stored and handledxiv) monitoring of H₂S in dangerous areas (minimum mobile H₂S meters; online H₂S meters for big tanneries)xv) racks storage for chemicals is done in that way, that liquids are not stored on top of powdersxvi) racks are clearly labelled with maximum load permit informationsxvii) fire fighting equipment in different areas for different purpose is providedxviii) safety trainig (external/internal), emergency training and exerices, first aid training is provided regulary, at least 4 x per year, for different staff in different areas - or for all staff – is providedxix) emergency exits and emergency meeting points are clearly marked and accessable

Chemical storage and handling, Restricted substances (RS)

Part I

India:	BREF/Germany
<p data-bbox="19 314 946 414">No or very less awareness, understanding and management of chemicals is available.</p> <p data-bbox="19 485 946 585">Minimum chemical handling and storage standards should be included as BAT.</p> <p data-bbox="19 656 946 813">The following suggestions (BREF/GERMANY) are not completed and may differ, up to the chemicals which are used</p>	<p data-bbox="985 314 1835 471">1 a written chemicals management policy is prepared. Safety data sheets are available in local language for all chemicals</p> <p data-bbox="1159 485 1506 528">score attained</p> <p data-bbox="985 542 1835 699">2 the chemical management policy has been communicated effectively to the facility staff and to suppliers</p> <p data-bbox="985 714 1835 928">3 all of the process chemicals, which are used and stored within the tannery are listed in an inventory list, hazardous and flammable chemicals are marked</p> <p data-bbox="985 942 1835 1099">4 chemical suppliers are registered with compliance declarations that no restricted substances are in their products</p> <p data-bbox="985 1113 1835 1213">5 a formal set of procedures, addressing chemical emergencies, is available</p>

Chemical storage and handling, Restricted substances (RS)

Part II

India:	BREF/Germany
	<p>6. incoming part processed raw material (wet-blue, wet-white, crust) is obtained from tanneries that have documented commitments to RSL compliance,</p> <p>7. a risk assessment of incoming chemicals is done to identify potential contamination prior to storage</p> <p>8. a written chemical safe handling/storage plan is available, to ensure that storage and conditions are appropriate for the chemical hazard class</p> <p>9. storage is done due to safety rules, for example: no acid beside an alkali; no Na₂S or NaHS beside or below any acid chemicals; no storage of flammable chemicals with hazardous in the same room; flammable chemicals should be stored in a separate safe room (fan, explosive protection light); special firefighting equipment etc.</p> <p>10. safety training for all employees, who store and handle chemicals, is given from external consultants or from chemical suppliers</p>

Management of Chromium VI – Part I

Avoid the formation of Cr (VI) on leathers after ageing

India:	BREF/Germany
<p>No or very less awareness, understanding and management, to avoid Cr VI, is available.</p>	<p>The avoidance of Cr (VI) formation in leathers exposed to heat and /or UV radiation is a global concept rather than a one stop remedy. All measures during the post-tanning operations have to be considered together and the overall process has to be controlled in order to achieve satisfactory results.</p>
<p>Minimum standards and rules should be included as BAT.</p>	<p>Incoming Chemicals:</p> <ul style="list-style-type: none">- ensure that all relevant incoming chromium containing chemicals (chrome tanning salts, dyes and pigments) contain less than 10 ppm CrVI (chemical industry standard of ISO 19071:2016)Some pigments, mainly yellow, orange and red colors, may contain CrVI.
<p>The following suggestions (BREF/GERMANY) are not completed and may differ for different tanneries</p>	<p>Incoming WB:</p> <ul style="list-style-type: none">-verify (test) that chrome VI is not present in incoming chrome tanned material WB or Crust (current industry standard of <3ppm).-natural fat is at levels that are unlikely to contribute to the formation of CrVI. The specification for fat content in incoming wet blue is <3% w/w.

Management of Chromium VI – Part II

Avoid the formation of Cr (VI) on leathers after ageing

India:	BREF/Germany
BAT for CrVI	<p>Inhouse tanning and preparation processes:</p> <ul style="list-style-type: none">- strong oxidising agents such as peroxides and permanganates (if used) are unlikely to contribute to the formation of CrVI (Simple tests for oxidising agents are starch-iodide papers and ferrous chloride solution)-pH at the end of the inhouse chrome tanning process is below pH 4.5-If oxidising agents are used prior to application of chrome tanning agents: they must be reduced prior to addition of chrome tanning agents. <p>Retanning:</p> <ul style="list-style-type: none">- Avoid <u>free</u> Cr (III) by avoiding chrome retanning if possible.- If chrome retanning is needed: wash the retanned leather with a suitable complex active surfactant. Remark: hydrophobic leather production presents a problem by using surfactants. After fixation of the special hydrophobing fatliquor, the recommended pH being 4.0-4.2- Homogeneous neutralisation to pH levels not higher than 5 is recommended. Using a 'reductive' neutralisation agent will also reduce Cr (VI) formation

Management of Chromium VI – Part III

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	<ul style="list-style-type: none">- protected fatliquors 'free radical capturing' are suitable to reduce the potential of the oxidation reaction. This is independent of their composition. Avoid especially unprotected sulfited fish oils-pH never exceeds 6.5 at any part of the process following chrome tanning (retanning)-use scavenging agents (anti-oxidants; veg.retanning agent) as a precautionary measure to prevent the formation of CrVI : At least 2% pyrogallic based mimosa or tara (based on the shaved weight, 45 min. Remark: Garment or upholstery leathers such an addition adversely influences the final characteristics of the finished leather. This can be worse for doubleface production.-A final washing with reducing salts, especially with $\text{Na}_2\text{S}_2\text{O}_5$ or Na_2SO_3 , decreases the likelihood of Cr (VI) formation, but have a limited reduction potential in case they are washed out too much. Use 2% $\text{Na}_2\text{S}_2\text{O}_5$ / 30 min. just after the acid fixation. <p>Finishing:</p> <ul style="list-style-type: none">-monitor/control temperature at key stages (embossing, plating, drying tunnes, vaccuum driers) to ensure excessive heat is not a contributory factor to possible CrVI formation

Emergency plans

India:	BREF/Germany
<p data-bbox="9 314 357 414">No requirements mentioned.</p> <p data-bbox="9 485 579 813">Remark relating BREF-Gemany: BAT includes aMinimum requirements for prevention and handling of emergency situations .</p> <p data-bbox="9 828 511 1099">The following suggetions are not completed and should only be used as examples specific for tanneries</p>	<ul data-bbox="589 314 1922 928" style="list-style-type: none">- formal fire and environmental protection plan addressing all kind of emergencies and evacuation procedures- Emergency contacts- Provisionof spill-kits- Personal protective equipment- First aid measures, key personnel- training for emergency response team members- emergency practice drills- induction programme for new employees- Exit signs and exit areas clearly marked and accessible.- Evacuation routes and destinations clearly marked

Waste management

India:	BREF/Germany
<p>No or less requirements in the tanneries for handling, storage, reuse, recycling and disposal of waste.</p> <p>Remark: Should be part of BAT (see BREF/Germany)</p> <p>The following suggestions are not completed and should only be used as examples specific for tanneries</p>	<ul style="list-style-type: none">▪ Re-use - recycling – disposal of waste▪ guidelines regarding the identification, collection, storage and disposal of hazardous and non-hazardous waste▪ yearly records of the type and quantity of hazardous, non-hazardous waste, by-product and part-product for collection and disposal▪ Manifests/receipts of collection, transport, disposal of waste▪ Cr-containing waste not incinerated on site▪ on-site storage arrangements for waste:<ul style="list-style-type: none">➤ Correctly marked,➤ adequately segregated➤ bounded and soil-protected locations of storage areas,➤ Good condition sealed containers, no spillage

Air emissions: VOC, dust, others

India:	BREF/Germany
<p>No specific requirements on site and very less knowledge in the tanneries:</p> <p>Remark (see BREF/Germany) Minimum requirements for prevention and handling of air emission management should be required for BAT</p> <p>The following suggestions are not completed and should only be used as examples specific for tanneries</p>	<ul style="list-style-type: none">▪ air emissions control devices functioning and regular preventive maintenance:▪ Boiler dust emission (wood, coal fired)▪ spraymachine (waterwash and/or activated carbon treatment with regular maintenance)▪ Spraymachine: protection glass in spraynozzle area is (nearly) closed to prevent the staff of VOC• Chemical list for liquid finishing chemicals with % of organic solvents (VOC) of each chemical is available• Hand spray cabinet equipped with waterwash or activated carbon system or equal▪ Weighting of powder dyestuff on a scale with exhaust system▪ Buffing/Dedusting machines with dust exhausting, dust bag filters and a dust press