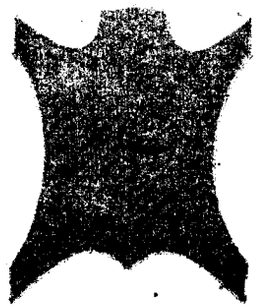
# TANNING AND
# ESSING OF E.I.LEATHERS





CENTRAL LEATHER RESEARCH INSTITUTE
ADYAR, MADRAS 20

# E.I. TANNING AND DRESSING OF E.I. LEATHERS

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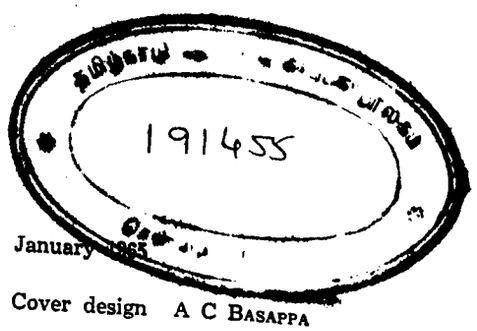


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## PREFACE

Research is not everything, but it surely helps. Research has been responsible for the progress of human thought and material prosperity of man. Research can be planned for and judged by its practical values. While the basic research opens up new frontiers, applied and industrial research would serve the immediate social needs.

The basic and applied research conducted at the Central Leather Research Institute has helped to build up the necessary store of knowledge for the 'knowwhy' and 'knowhow' for the manufacture of a variety of leathers.

This knowledge is brought to the very doors of the tanners by the 'showhow'—practically demonstrating the processes from raw to finish. This will conclusively prove to the tanner on the one side the economics and profitability of the process and to the researcher the desired confidence and satisfaction.

The details of the processes so conclusively demonstrated have been published from time to time in the monthly journal of the Institute 'LEATHER SCIENCE'. To suit the materials, skill and conditions obtained in the different regions of the country, the processes have to be modified. Some of the latest and most successful methods of manufacture of a particular variety of leathers are grouped together and brought up now as a separate publication.

It is sincerely hoped that this publication will prove of real benefit to the section of the industry engaged in this particular field and to pick and choose the basic thoughts contained herein and adapt them to their set of conditions.

CLRI, MADRAS 20
January 22, 1965

*Director*

## INTRODUCTION

*E.I. tanning*: The raw hides and skins available in India are mainly vegetable tanned and a major portion of them are tanned by 'E.I. tanning'. About Rs. 250 millions worth of E.I. tanned skins and kips are produced and exported annually from India. Hence a better understanding of the process of E.I. tanning and its economics is very essential for the better utilisation of raw hides and skins in E.I. tanning.

In the traditional E.I. tanning process, the total number of days for tanning of skins is about 30 days. In the case of E.I. tanning of kips, the duration is even longer. In the last few years, the industry has felt the need for radical changes in the processing of E.I. leathers. The rising cost of labour, the entry of the East European countries in the market in the wake of the rupee payment facilities scheme, with their demand for pickled and chrome blue skins, the E.I. tanners' willingness to adapt themselves to the changed conditions and the government's export promotional efforts are some of the more important reasons for causing this upheaval in the industry. The result is the E.I. tanner is today interested in short and quick processes involving maximal exploitation of mechanical and automatic devices.

The CLRI has anticipated the likely changes in the set up of the E.I. industry and geared itself to meet its requirements by working out a number of rapid process which are presented in this volume.

3-4 days liming in pit using sulphide, lime and soda ash, deliming and calgon pickling or buffer treatment in a day and tanning in tan liquor in 3 days in pit or one day in drum and myrobing in a day have been worked out. The E.I. tanning of kips involves short liming, tanning, without pretreatment in single bath containing wattle extract with or without tanning bark. The processes are dealt with in detail under appropriate titles.

*E.I. Dressing*: The East India tanned hides and skins are bought by the dressers abroad and into a variety of leathers that will naturally fetch higher returns. In order to improve our export earnings, it is felt that the E.I. tanner himself should dress his leathers and export them in the finished condition.

Any technologist interested in helping the E.I. tanner should have a proper understanding and appreciation of the need for a change in the E.I. tanner's approach to this problem and also the many difficulties that he will have to face in effecting this change over. Only then the technologist can work out the correct solution to the problem of providing the technical know-how to suit the peculiar needs of E.I. tanner and also see that it fits into the pattern of the developing economy of our country. There are many compelling reasons that can be advanced in favour of this change. If the presently exported crust leathers are finished and sold abroad, the export earnings will increase by 50-70% on their original value. The potential for employing more men in this industry will also be considerable. Such a change will have a stabilising influence on the price structure of E.I. leathers which is normally subject to wild fluctuations. This industry can also be geared up to produce finished leathers for the country's own requirements which are growing up rapidly. Also, this will go far in meeting shortage of upper leather both for army and civilian use in our country.

Balanced against these reasons, are the E.I. tanner's arguments in support of his reluctance to take to finishing. By and large these are based on tradition or administrative difficulties. For example, the tanner will be up against the problem of selling his finished leathers in a foreign country, in severe competition with the local dealers who enjoy advantages over the E.I. tanner in the shape of modern leather machinery and leather auxiliaries since they have a better developed chemical industry, and governmental backing in the form of heavy tariff against importation of finished leathers. Sales promotion is another important problem as the western market is more sophisticated with its constantly changing fashion-trends and tastes. As already observed, these are largely administrative and with strong governmental support, the E.I. tanner can overcome these difficulties and successfully build up a finished leather industry also. It should however be mentioned to the credit of the E.I. industry that a number of their tanners have shown an awareness of the potentialities of this changeover and a few of them have already started effecting it in stages. It is in this context that the Central Leather Research Institute feels that the greatest service that can be rendered to the E.I. industry today is to provide it with the technical information on the dressing of E.I. hides and skins, so that the tanner should not be handicapped by the lack of such knowledge.

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# E.I. TANNED HIDES AND SKINS

R. Selvarangan, I. M. S. Patel & Y. Nayudamma

E. I. tanned hides and skins valued roughly at over Rs. 250 million are annually produced in India by a traditional process. Generally the duration of the process is 35-45 days. A systematic study of the processing of this type of leather has been made. Several variations have been introduced in the liming, deliming and tanning operations, with a view to reduce the period of processing without detriment to the quality of leather. The rapid process takes about 8-15 days from soaking to finishing and involves quick liming either in pit or paddle followed by pretreatment with calgon or buffer and single bath tanning using bark and extract in a pit or extract alone in pit or in a drum in the case of kips.

## A. PROCESSING OF HIDES

### Raw materials

Wet salted cow hides weighing 7-10 kg. are taken.

### Soaking

*1st day*: The hides are weighed, soaked in water, paddled for 2 hours and given two changes of water.

### Liming and unhairing

*1st day*: A sulphide-lime paste is prepared with 1·5% sodium sulphide (fused), 1% calcium chloride, 8% slaked lime (factory lime: CaO 80% approx.) and 20% water. The hides are dipped one by one in the paste and piled on the floor, grain to grain for 2 hours. At the end of this period the hides are flooded in 200% water in a pit for about 15 minutes. They are then unhaired and put back in the same pit, 200% old lime liquor and 0·5% ammonium chloride being now added. The hides are handled twice during the day.

### Reliming

*2nd day*: The pelts are scudded and relimed in a fresh pit with 8% lime, 0·5% caustic soda and 350% water, and handled twice.

*3rd & 4th days*: The goods are handled twice daily.

*5th day*: The goods are fleshed, weighed and left in water overnight.

**Deliming**

*6th day*: The pelts are scudded, washed and delimed completely in one hour using 1% ammonium chloride and 200% water in a pit. (The deliming can also be done in a drum). They are then scudded, washed and taken for tanning.

**Tanning**

(i) *Single bark tanning*

The delimed hides are treated with 0·5% sulphuric acid, 5% common salt and 150% water for 30 minutes in a pit or a drum. The pH of the pelt is about 4·5.

*6th to 12th day*: The treated hides are tanned with 100% avaram bark given in one instalment and 40% solid wattle extract on the expected yield of leather (0·5 kg. leather expected per kg. of pelt weight). The extract is added daily from the second day of bark tanning (i.e. from the seventh day from soaking). On the ninth day of the process, the hides are worked over the beam as usual. The strength of the tan liquor is increased from 8 to 15° Bk in the tanning process and the pH is about 4·5-4·8.

*12th day*: The hides are bleached for 15 minutes with 0·5% Perfectan '0' (or any other bleaching syntan) and 0·12% oxalic acid with the minimum amount of water in a pit. The solution is then diluted and the hides are rinsed in it, beamed once and taken for myrobing on the same day.

(ii) *Calgon pretreatment and tanning with extract in pit*

The delimed hides are treated for 5 hours with 2% calgon, 1% sulphuric acid and 100% water in a pit. The pH of the bath is maintained at about 2·5-3·0 during the treatment by addition of diluted acid in instalments. The hides are washed in two changes of water and taken for tanning with extract in pit. The tanning is carried out in four days using about 55% wattle extract powder in about 300% float, the strength of the liquor being increased gradually from 10 to 25°Bk.

*7th day*: The hides are worked over the beam and the strength of the tan liquor is increased to 15°Bk.

*8th day*: Strength of the liquor is increased to 25°Bk.

*9th day*: The liquor is restrengthened to 25°Bk.

*10th day*: The hides are rinsed in plain water, worked over the beam and myrobed without bleaching.



(iii) *Pretreatment with buffer and tanning with extract in drum*

The delimed hides are handled in a pit or a drum for 15 minutes with the following buffer: 1% borax, 1% sodium sulphite, 0·5% oxalic acid and 30% water. pH of the buffer will be 7·5-8·0. Then the residual liquor and the treated pelts are transferred to a drum and 50% wattle extract powder (on the expected leather weight) dissolved in an equal amount of water is added to the drum. The drum is run (5 r.p.m.) for 7-8 hours. 0·5% oxalic acid is added at the end of 6 hours. The strength of the exhaust liquor will be about 40°Bk and pH about 4·3. The hides are taken out and piled overnight.

*7th day*: The hides are washed with 200% water for about 15 minutes, taken out, worked over the beam and myrobed.

**Myrobing**

Hides of single bark tanning are given double myrobing since the colour of the tanned hides is on the darker side. Hides of calgon pretreatment are given single myrobing in a pit. The buffer pretreated lot is given drum myrobing. In each case the required amount of crushed myrobalans (40% on the expected yield weight) is soaked overnight in hot water, the previous day and the liquor brought to 35°Bk.

(i) *Double myrobing in pit*

In the case of single-bark tanning process, the total amount of myrob is given in two equal instalments in separate baths one after the other, keeping the lot for 24 hours in each (twelfth and thirteenth days). The second myrobing is completed on the fourteenth day.

(ii) *Single myrobing in pit*

The strength of the myrob liquor is adjusted to 35°Bk and the hides calgon treated and extra tanned are dipped in this liquor and piled in another empty pit. The remaining liquor is diluted to 20°Bk and poured on top of the pile thus submerging the lot in the liquor. The hides are handled again in the evening on the same day. On the eleventh day, the hides are handled both in the morning and in the afternoon and are taken out and beamed.

(iii) *Drum myrobing*

In the case of the buffer pretreated lot, the hides are given drum myrobing on the seventh day. They are dipped in the 25°Bk myrobalan liquor and put in the drum. The remaining liquor, diluted to 20°Bk, is taken in the drum. The drum is run for 1½ hours and the goods are taken out, beamed and oiled.

**Finishing**

1% Epsom salt in the form of a 5% solution (on the expected yield weight) is applied on the grain side and the hides are piled grain to flesh for 2 hours. Then 12% pungam oil (on expected yield weight) is applied on the grain and flesh surfaces of the hides and rubbed in. The leathers are kept in pile for an hour, again rubbed well and hung up to samm.

Next day, the hides are set on the flesh side, rubbed with corn flour (0·25%) paste (on the flesh side), set twice on the grain side and dried. On the following day, the hides are weighed, trimmed and assorted.

Thus the single-bark tanning process takes 16 days, the process using calgon pretreatment 13 days and the process employing buffer pretreatment 9 days. The yield of leather in the three processes is 50, 49 and 51% (on the pelt weight) respectively.

*Note*: These processes can also be followed for heavy cow hides and buffalo calf skins.

## B. PROCESSING OF SKINS

**Raw materials**

Wet salted goat and sheep skins are used.

**Soaking**

As in the case of kips.

**Liming and unhairing**

*1st to 5th day*: The same sulphide paste used in the case of kips is employed but with less amount of water (15%). The paste is applied on the flesh side of the skins which are left piled overnight.

*2nd day*: The stock is unhaired and left in the pit containing old lime liquor and ammonium chloride as in the case of kips.

**Reliming**

*3rd day*: The pelts are scudded and relimed with 8% lime, 0·35% caustic soda and 300% water. They are handled twice during the day.

*4th day*: The goods are handled twice.

*5th day*: The pelts are fleshed, scudded and weighed.

**Deliming**

The pelts are delimed with 0·75% ammonium chloride (on the fleshed weight) for 15-20 minutes in a pit, scudded, washed and tanned.



**Tanning**

(i) *Calgon pretreatment and tanning with extract in pit*

The skins are treated with 3% calgon, 1·25% sulphuric acid and 100% water, handled for 2-3 hours and left overnight. pH must be between 2·5 and 2·8.

*6th day*: The skins are washed with water and steeped in 10°Bk liquor prepared from Kenmosa [wattle extract—Rallis India Ltd.] spray dried powder and handled twice in the day.

*7th day*: The skins are beamed and the strength of the liquor is increased to 15°Bk. Handling is done twice during the day.

*8th day*: The strength of the liquor is maintained at 15°Bk and the skins are handled twice.

*9th day*: The skins are worked over the beam and taken for myrobing. The total extract used is 50% on the expected yield weight. The pH of the tan liquor decreased from 4·6 at the start to 4·3 in the end.

(ii) *Pretreatment with buffer and tanning with extract in pit*

The buffer treatment is similar to that given in the case of kips and tanning similar to that given in the case of skins, the only change being the addition 0·5% oxalic acid on the eighth day. The pH of the liquor during tanning decreases from 6·4 to 4·7 in the end.

*9th day*: The buffer pretreated lot is bleached with 0·5% Perfectan '0' and 0·13% oxalic acid as given in the single bark tanning of kips. The pieces are beamed and taken for myrobing.

**Myrobing**

The myrobing of the skins is carried out as described for double myrobing of kips.

**Finishing**

*10th day*: The skins are treated with 3% epsom salt and 12% groundnut oil as in the case of kips and sammed.

*11th day*: The leathers are set and dried as in the case of kips.

*12th day*: The tanned pieces are weighed and the yield is noted.

They are then staked, trimmed, buffed and assorted

The yield in the case of goat skins is 44% (on the pelt weight) and sheep 30%. The pelt weight of goat skins is 77% and sheep skins 66% on the wet salted weight of the skins.

*Note:* Processing of hides and skins described herein is applicable not only to wet salted kips and skins but also to dry salted material and to heavy hides and buffalo calf skins. Pit liming can be substituted by paddle liming and pit tanning by drum tanning. Wherever possible, the various operations involved can be carried out by mechanical means.

The two-bark tanning process for skins and kips can be substituted by single-bark tanning process, whereby the duration of tanning is reduced to 14-16 days. Further reduction in the duration is achieved by calgon or buffer pretreatment and drum tanning (9 days). In the processes demonstrated a notable shortening of the duration of tanning has been achieved which incidentally leads to a reduction in the capital investment, space required, labour involved and also in the cost of production.

## E.I. TANNED GOAT AND SHEEP SKINS AND COW HIDES

T. S. KRISHNAN, M.A. RAMA IYER & Y. NAYUDAMMA

This process aims at hastening the tanning procedure by adopting suitable pretanning techniques. The basic approach however remains essentially conventional so that the tanners can readily introduce it in their tanneries.

### A. TANNING OF GOAT AND SHEEP SKINS

#### Raw materials

Wet salted goat and sheep skins are taken.

#### Soaking

The skins are weighed and soaked in plain water with flesh side up for 2-3 hours. When the skins are sufficiently soft, they are cut open and given 3-4 changes of water, trampling well between each change. The well soaked skins are then drained and weighed.

#### Liming and unhairing

A paste consisting of 1 part sodium sulphide, 16 parts lime and enough water to make it into a smooth flowing paste is prepared and applied on the flesh side of the skins. Usually for a wet salted stock of 100 lb. by weight, a paste made up of 1 lb. sodium sulphide, 16 lb. lime and enough water to make it into a smooth flowing paste will be sufficient. The painted skins are then piled flesh to flesh and covered with gunny. After 6 hours or after keeping them overnight, the painted skins are unhaired, put in a lime liquor containing half the old liquor, half the fresh water and 5% lime (on the wet salted weight) and left for two days, handling being done daily.

On the third day, they are scudded and put in a lime liquor containing fresh water, 10% lime and 2 oz.% caustic soda (on the wet salted weight). The pelts are handled daily in this liquor for three days. Next day, they are fleshed and weighed. The fleshed skins are then trampled well in water, scudded and put in plain water overnight. Next day, after trampling well, they are fleshed, scudded twice and

delimed fully with 0·5% boric acid on the fleshed weight. The cut section is tested with phenolphthalein solution. The delimed skins are scudded, washed twice and taken for the pretreatment operation.

(i) *Pretreatment with sodium acetate (commercial) and sulphuric acid*

The delimed and washed pelts are trampled in a pit containing the minimum volume (100-150%) of water to cover the goods and 2-3% sodium acetate (on the fleshed weight). 0·75-1·125% sulphuric acid on the fleshed weight is taken, diluted and added in three instalments at intervals of 30 minutes, the skins being trampled all the time. The pH of the bath is adjusted to 4·8-5·0. The pelts are left in this solution overnight keeping them well immersed in the liquor. Next morning, after trampling the stock well, the pH is again tested to see whether it is constant at pH 4·8-5·0. If not, the bath is adjusted and the stock trampled to attain an equilibrium pH of 4·8-5·0.

*Note:* (i) At no time the sulphuric acid should be added to the pit containing the goods. The goods should be first removed and sulphuric acid well diluted is added and well mixed.

(ii) Usually 0·75-1·125% sulphuric acid on the fleshed weight will be sufficient to attain equilibrium pH of 4·8-5·0 for the delimed goods.

(iii) It is essential that the pH should be adjusted to pH 4·8-5·0 in the cut section of the skins as well as in the bath.

(iv) In treating with sulphuric acid, the pH of the bath suddenly goes down but again increases as the pelts are neutralised. Repeated additions of the acid are therefore necessary to adjust the bath.

(ii) *Pretreatment with calgon and sulphuric acid*

The delimed and washed pelts are trampled in a pit containing a minimum volume (100-150%) of water to cover the goods, 2% calgon and 0·75-1·125% sulphuric acid for two hours (on the fleshed weight). Sulphuric acid is added in three instalments after diluting it well at ½ hour intervals. Otherwise, the procedure is the same as in pretreatment with sodium acetate and sulphuric acid, except that the pH in this case has to be adjusted to pH 2·3. Instructions under the note given above should be followed here also and the equilibrium pH of 2·3 obtained. The cut section of the goods pretreated with calgon should be white. The calgon pretreated goods are washed in two or three changes of water till free from acid.



Either one of the above two pretreatments may be followed. The whole operation may be carried out also in the drum, if available, for 1-1½ hours.

**Vegetable tanning**

Tanning is carried out in the traditional way using two pit system. About 2½-3 lb. avaram bark or 1¼-1½ lb. wattle extract per lb. expected yield are used and the quantity is given equally between the first and second bark operations. Different tanning materials blended in suitable proportions may also be used.

In the case of avaram, the type of bark that is good coloured i.e., having greenish tinge at the fracture is taken, seived, rinsed twice with fresh water as quickly as possible and the required quantity of the bark is soaked in a mixture of half old liquor and half fresh water in a pit or tub for about 24-48 hours before the goods are brought to the tan yard. If wattle bark or extract is used with avaram, they are also soaked along with avaram bark.

The pretreated skins are drained and immersed in this liquor. In the treatment of skins, they are drawn individually once or twice through the liquor and then piled and pressed in the pit. After 15 minutes, they are lifted and piled on the sides of the pit. The liquor is then stirred up and the skins are once again drawn through one by one, piled in the pit and well pressed. The bark is so distributed that half is at the bottom and the other half on top of the skin pile. The goods are left overnight in this condition. Next day, the pile is broken and the pelts are hauled and piled as before both morning and evening to ensure even colour. On the third day, the goods are worked over the beam on the flesh side with a blunt knife (scudding knife). This sets the grain smooth and flat and gives the skins the required shape. During beaming, care should be taken not to expose the skins for unduly long periods in order to avoid discolouration. Beaming should be so done that the goods are freed of growth marks, wrinkles, folds etc. After beaming, the skins are put back in the liquor, keeping the skins in pair grain to grain and sprinkling some of the bark between each pair. Some bark is kept at the top and some at the bottom. Sometimes, the bark is sprinkled between each skin also. The skins are well pressed inside the liquor so as to avoid air bubbles which might produce unevenness of colour in the leather. Similar handling is done on the fourth and fifth days.

On the sixth day, the skins are wrung out, beamed on the flesh side and put in second bark which is prepared just like the first bark. The goods are handled as described above and left for another five days.

The tanned skins are then wrung out and bleached in the usual manner, trampling the skins, in a bleaching syntan (Perfectan '0') for about 15 minutes. For every 100 lb. of expected leather, 1-2 lb. syntan is used. The bleached goods are rinsed in the same bath by adding more water and then beamed on the flesh side. The skins are now ready for myrobing.

**Myrobing**

*Myrob bath*: Myrob bath is given in one instalment for a total period of two days. On the whole 6 oz. good quality myrobalan per lb. of expected leather is taken and the crushed myrobalan nuts are soaked in hot water (55-60°C) at least 18 hours before use. The overnight soaked myrobalan nuts are then trampled and sufficient cold water is added to extract more tannin from them and also to bring the liquor to proper dilution (30-40°Bk).

The skins are dipped one by one in this myrob bath and piled in another empty tub nearby. When all the pieces are piled, the liquor is poured over the well pressed pile. Care is taken to avoid formation of air bubbles. The leathers are kept in this for a short period. They are then removed one by one, piled in another tub and well pressed. The liquor is again poured over them and the goods are left in this bath overnight. Next day, another handling is given in the same way. On the third day, the stock is rinsed in the same bath by adding more water, beamed on the flesh side and piled for oiling. The final working over the beam is performed carefully to obtain the best pattern and the correct moisture content.

**Oiling and setting**

The beamed skins are then piled grain up on an oiling table. Each skin is then oiled by sprinkling good quality gingelly or groundnut oil and a little amount of water if necessary. The oil is then evenly applied on the grain side of the skins. The oiled skins are kept in another pile. They are again well rubbed on the grain twice or thrice and hooked in a cool place. When the leathers are in sammed condition, they are conditioned and piled in a wooden tub and covered with a gunny or palm leaf and left overnight to equalise moisture. They are then set twice on a glass or marble table and allowed to dry in a dark cool place. The dried skins are weighed to find out their yield and piled for a day or two. They are staked, fluffed, trimmed and graded in the usual manner.

The yield is approximately 40% on the pelt weight. The physical characteristics of the tanned skins like general appearance, colour, feel, fullness, crackiness and tear strength are comparable with those of traditionally tanned E.I. skins.



B. **TANNING OF COW HIDES**

The pretanning and tanning procedure followed are the same as those described for skins except in respect of the following details.

**Liming and unhairing**

The soaked hides are put in lime liquor containing half the old liquor, half the water, 10% lime and 1% sodium sulphide (on the soaked weight), and left for three days, handling being done daily. On the fourth day, they are unhaired and put in a new lime liquor containing 10% lime and 3 oz.% caustic soda (on the soaked weight). The stock is handled for three days. Next day, the pelts are fleshed, scudded and put in plain water overnight. The following day, the hides are again fleshed, scudded and delimed fully with 0·5% boric acid on the fleshed weight. The delimed hides are scudded, washed twice by trampling and pretreated.

**Pretreatment**

One of the two pretreatments used for skins may be followed.

**Tanning**

The pretreated hides are kept in the first bark for 5 days and in the second bark for 5-6 days depending upon the thickness of the hides. For tanning of hides, tanning materials like konnam, babul, wattle bark, wattle extract blended in suitable proportions and containing 16% tannin on the fleshed weight are used and they are distributed equally between the first and second bark operation.

**Myrobing**

For myrobing, 6-8 oz. good quality myrob. per lb. of expected yield is used and the tanned hides are kept in myrob bath for 2 days after which period they are wrung out and beamed.

**Oiling and stuffing**

Before oiling, a solution of epsom salt is sprinkled on the flesh side and rubbed well and the hides are piled for oiling. About 2% epsom salt on the expected yield may be used. The hides are then oiled with pungam oil and hooked. When sammed they are set well on the grain and folded along the backbone keeping the grain side in and again dried completely. The dried hides are lightly slicked on the grain to produce a gloss. The leathers are then trimmed and sorted into grades.

# E.I. TANNED GOAT AND SHEEP SKINS BY RAPID PROCESS

I. M. S. Patel & S. N. Samayavaram

This process envisages the E.I. tanning of dried fallen skins available at cheap rates. In processing such skins, troubles in soaking and finishing are often encountered. Also oily patches are noticed in the finished leather. The process described here helps to overcome these difficulties and bring down the period of processing to 20-25 days. The use of extract along with the available materials is shown to lead to better yield and colour.

**Raw materials**

Dry salted raw stock is used.

**Soaking** (1st & 2nd days)

The raw stock is weighed and soaked in plain water containing 20% common salt for 4 hours. The skins are next cut open and left overnight in the pit. On the second day, the skins are trampled for 15 minutes, broken on the beam and washed with two changes of water. The soaked skins are then drained and weighed.

**Liming** (2nd to 9th day)

A sulphide paste is prepared 4-5 hours prior to use, with 1% sodium sulphide, 10% lime and 15% water (on the soaked weight). The paste is applied on the flesh side of the skins which are then piled flesh to flesh and covered with wet gunny. After 4-5 hours, the painted skins are unhaired and limed in 200% old lime liquor, 200% water and 5% lime (on the soaked weight).

**Reliming**

The skins are handled once a day in the liquor for 2 days. On the 4th day, they are scudded and relimed with 10% lime, 0·125% caustic soda and 400% water (on the soaked weight). They are handled once daily in the fresh lime for 5 days. On the 9th day, the skins are fleshed, trampled in plain water for 10 minutes, scudded, weighed and left overnight in plain water.



**Deliming** (10th day)

The skins are trampled well, refleshed, scudded, washed and delimed completely with 0·75-1·00% boric acid (on pelt weight). Then, they are scudded and washed.

**Pickling** (10th day)

Light pickling is given with 0·5% commercial sulphuric acid, 5% common salt and 150% water (on the pelt weight). The skins are trampled for 15-20 minutes in the pickle liquor, taken out and piled for 5-10 minutes.

**Tanning**

The amount of tanning material required is worked out on the pelt weight. With avaram bark alone, it is 100%. With avaram bark and Kenmosa spray dried powder (Ralli's India Ltd.), it works out to 50% avaram bark and 10% extract i.e., a ratio of 5:1 on weight basis and 1:1 on tannin basis.

*First bark* (10th to 15th day)

On the day prior to tanning (i.e. on the 9th day), 25% avaram bark is rinsed with plain water and soaked in old bark liquor diluted with an equal quantity of plain water. 5% Kenmosa extract is dissolved separately and is given in four equal instalments during the first 4 days so as to protect the smoothness of grain and maintaining uniform colour. The strength of the liquor is maintained at 6-8° Bk.

The pickled and drained skins are immersed in the tanliquor after adding the first instalment of extract liquor, handled to and fro one by one, piled and pressed well into the liquor. After 15-20 minutes, they are taken out; half of the bark is also taken out; the skins are replaced one by one well pressed, keeping half the bark at the bottom and replacing the removed bark at the top. Skins at the bottom are kept flesh side down whereas the skins on top are kept flesh side up; they are left overnight in the pit. On the morning of the 11th day, they are handled as before and the second instalment of the extract liquor is added. The stock is again handled in the evening. On the 12th day, the skins are beamed and the third instalment of the extract liquor is added; the skins are piled in pairs, grain to grain and the bark is sprinkled on the flesh side. They are well pressed inside the liquor. On the 13th day, the fourth instalment of the extract is added and the skins are handled; this time the bark is sprinkled in between each skin. Handling is done similarly on the 14th and 15th days.

*Second bark* (16th to 20th day)

The skins are beamed and left in the second bark liquor which is prepared just as for the first bark, with 25% avaram bark. This time, the required quantity of extract (5%) is added in two equal instalments during the first two days. The Bk strength is maintained at 8-10°. The skins are handled for 5 days in the second bark liquor.

**Bleaching and myrobing** (21st day)

The skins are taken out and beamed; they are bleached with 1·5% Perfectan '0' or any bleaching syntan (on the expected yield weight) for 20-25 minutes, with minimum water in the pit. Then the skins are rinsed in the same bath by adding more plain water, beamed and taken for myrobing. 30-35% crushed myrobalan nuts (on the expected yield wt.) are soaked in water the previous day (i.e. 20th day). The overnight soaked myrob nuts are well trampled; then enough water is added to bring the strength to 30-35° Bk. The skins are dipped one by one in the myrob liquor and piled in another adjoining pit; the liquor is further diluted to 12-15° Bk and poured over the well pressed pile of the skins. After some time, they are handled again as before. Handling is continued on the 22nd day. On the 23rd day, the skins are rinsed by adding more plain water in the same myrob bath, beamed and piled for oiling. A solution of 3% epsom salt and 2% white glucose (on the expected yield weight) dissolved in convenient volume of water is applied by hand on both sides; the skins are kept piled for 3 hours and then oiled.

**Oiling**

1½-2 parts gingelly oil (or any sweet oil) per 16 parts of expected yield are applied on the grain side of the skins. The oiled skins are piled and again rubbed twice and hooked up in a cool place. When the skins are in sammed condition, they are piled, covered with gunny and left overnight.

On the 24th day, the skins are set twice by hand on the setting table and hoked again to dry completely. Then the leathers are staked and weighed. They are usually buffed on the flesh side and trimmed.

# E.I. TANNED KIPS USING A BLEND OF KARADA AND KONNAM BARKS IN PLACE OF MIMOSA BARK AND EXTRACT

K. RAJABATHER

In tanning cow hides into E.I. kips, the tanner often runs short of tanning materials particularly imported items like wattle bark and wattle extract. In such contingencies, he can use indigenous tanning materials to produce leathers of the some quality and character. Here one such process using karada and konnam barks.

**Raw materials**

Wet salted cow hides are used.

**Soaking**

The hides are weighed after removing the excess of salt from them. They are soaked in plain water for 3 hours and then washed in four or five changes of water.

**Liming and unhairing**

20-25% slaked lime (from shell lime; 40-50% CaO) (on the wet salted weight) is added to once used straight lime liquor i.e., the liquor from which the hides of the previous lots have been taken for fleshing. Sometimes this quantity of lime may be added in two equal instalments during the period of first liming i.e., before unhairing the hides. They are then piled in the pit keeping the flesh side up except the outermost one and left for one hour. Then they are hauled, put back in the pit after stirring the lime liquor and left overnight. The hides are hauled and put back in the pit after stirring the lime liquor once every day for a period of 7 days. On the eighth day, the hides are not handled. On the ninth day, the hides are unhaired and put back in the same liquor..

**Reliming**

The unhaired hides are relimed in a fresh bath with the addition of 7-10% slaked lime on the wet salted weight. The hides are left in the new lime liquor for three days during which period they are handled daily and put back after stirring the lime liquor. But this time, all the hides are merely thrown into the pit keeping the flesh side up. On the

fourth day, the hides are taken out of the lime liquor and put in plain water overnight. Next day, they are fleshed by hand over beam with fleshing knife and weighed. Then they are fleshed a second time with a scudding knife. The hides are then washed by trampling them in water and scudded. They are trampled again in fresh water and left overnight in plain water.

**Deliming**

Next day, the hides are fleshed a third time with a scudding knife. They are then trampled in a pit containing fresh water and scudded. They are again washed and scudded twice. Finally the hides are treated with 0·25-0·5% sulphuric acid, 3-6% common salt and sufficient quantity of fresh water for a period of 15-30 minutes. The hides are washed and taken for tanning.

**Tanning**

*First bark*: Always some old bark liquor is to be used initially with the addition of fresh water bark or a mixture of bark and extract. The old bark is first removed from the pit and then the clear liquor is decanted to another pit to which fresh water is added. The calculated quantity of bark or a mixture of barks equivalent to about 9% tannins is soaked in the above liquor on the day the hides are taken for fleshing. This percentage is based on the fleshed weight of the hides and represents about 50% of the total quantity of the tannin required for the entire tanning which is about 18% on the fleshed weight. If a mixture of karada bark and konnam or babul bark is used, the barks are blended in the proportions (babul or konnam bark equivalent to 3% tannin; karada bark equivalent to 6% tannin) for the first and second barks on the fleshed weight.

*Note*: Both konnam and babul bark contain 12% tannin and karada bark contains 24% tannin.

When konnam and babul barks are used, it is advisable to cut them into small pieces if they are very big and soak them in water. Sometimes, the bark pieces if they are uncrushed, are immersed in water and taken out giving 2-3 changes of water for cleaning them from adhering dirt etc. The cleaned bark pieces are then soaked in liquor as mentioned above and the liquor is stirred twice or thrice during a period of two days.

The delimed hides are dipped in the liquor one by one moved to and fro for a few minutes and then pressed to the bottom of the pit. They are hauled up and put back again after the lapse of 5 or 10 minutes. After 15-30 minutes, they are hauled up and put back in the pit keeping half the bark at the bottom and the remaining half on top



of the hides. Next morning, the hides are hauled and put back in the liquor. If the hides appear to be pulled down to an undesirable extent when hauled, they should be paired grain to grain and piled in the liquor sprinkling the bark on the flesh side of each pair. On the third day, the hides are beamed on the flesh side and put back in the same liquor keeping bark in between each hide and left for 5-6 days. The goods are hauled and put back once daily during this period. On the last day, the hides are taken to the second bark.

*Second bark*: The quantity of bark used is equivalent to about 9% tannin on the fleshed pelt weight. The blend is made in the same proportion as for the first bark. The mixture of tanning materials should be soaked in old liquor a day or two before use. As in the case of first bark, it is advisable to cut the bark into small pieces if there are big pieces, cleanse and wash before it is soaked to prepare the tan liquor. The hides from the first bark are beamed and then wrung by twisting to remove water and piled in the second bark liquor. After 10 or 15 minutes, they are again hauled and put back one by one sprinkling bark over each hide. Next morning, hauling and piling are repeated as before. The goods are left in this liquor for 7-8 days, hauling and piling being done daily. If the hides are flaccid during this period, they should be beamed and left in the liquor with the addition of a little more bark. Otherwise, no extra bark need be added. On the last day, the hides are hauled and piled in the liquor without however keeping any bark in between the hides. But half of the bark should be kept at the bottom of the pit and the remaining half on top. Next day, the piled hides are left undisturbed.

**Bleaching**

On the last day, the hides are rinsed in water and bleached with Perfectan '0' or any other suitable bleaching syntan. Again they are rinsed in water and beamed.

**Myrobing**

*First myrobing*: On the previous day, crushed myrobalans of good quality using ¼ lb. myrobalan for every pound of expected leather yield (about 40% on the pelt weight) are soaked in hot water overnight. The myrobalan liquor is now diluted to the required barkometer strength with cold water. The beamed hides are dipped in the myrobalan liquor one by one and placed in another tub or pit which should be near to it. When all the hides are so dipped and piled, after 5-10 minutes, they are hauled up and put back in the same tub pouring the myrobalan liquor on top of the pile of hides. Next day, this opera-

tion is repeated. Now the same quantity of crushed myrobalans is soaked in water in a separate tub as before and left overnight.

*Second myrobing*: This is done exactly in the same manner as first myrobing (2 days). The hides are then rinsed either with water or with the same myrobalan liquor diluted with cold water, beamed and taken for oiling.

**Oiling and Finishing**

The leathers are piled flesh side up and swabbed with a solution containing 3-4% epsom salt (calculated on 100 lb. of expected leather weight).

The hides are left for ½ hour, oiled on the grain side with pungam oil and then piled. Now a syrup solution is prepared by mixing 1·5-2·0% corn flour and 1·5-2·0% glucose for every 100 lb. of expected leather. This solution is applied on the flesh side of each hide and then each hide is hung up to samm. When they are in a semi-dry condition, the pieces are stacked and left in pile overnight. Next day, they are set on the flesh side on wooden plank or table with a stainless steel or brass slicker. If a white flesh side is required, a solution of corn flour is applied using 1-1½ lb. cornflour for every 100 lb. of expected leather. The pasted hides are set on the grain side and hung up. They are again taken down, slicked on the flesh side and hung up. Before they dry out completely, they are once again slicked on the grain and hung up. When dry, the hides are lightly slicked on the grain to produce gloss. The kips are then trimmed and sorted into grades.

## E.I. TANNED KIPS BY SINGLE AND TWO BARK PROCESSES USING HOPEA PARVIFLORA

R. Selvarangan, I. M. S. Patel & Y. Nayudamma

E.I. tanning of kips is practised in Bangalore and other parts of South India using mainly konnam bark and wattle extract/bark. The processes followed in Bangalore tanneries for making E.I. tanned kips are briefly described here.

Wet salted kips (7-12 kg.) are washed repeatedly and soaked for 3 hours and limed for 8-9 days with old lime liquors, strengthened with 30% lime on wet salted weight. They are then unhaired, relimed in fresh lime liquor using 8% lime for 3-4 days and left in plain water overnight, fleshed and again left in plain water overnight. The pelts are delimed with 0·5% sulphuric acid (on the pelt weight) for 10-15 minutes, scudded, washed and then taken to the bark yard.

Tanning is by two bark process using 40-50% wattle extract and 50% konnam bark for 16-18 days, followed by myrobing for 4 days, using 50% myrobalan nuts (on the expected leather yield) given in two instalments. The kips are finished as usual using fixing agents like epsom salt (5-6%), glucose (1-2%) and pungam oil (10-12%) on the weight of expected leather. The total number of days required for the process is 35-40 days. The yield of leather usually varies from 42 to 46% on the pelt weight.

Hopea bark [*Hopea parviflora*, Iron wood of Malabar, Kiral bogi (Kannada)] is available in the forest of Mysore State. Detailed tanning tests were carried out successfully at CLRI introducing hopea bark in admixture with known tanning materials in the tanning of kips; the processes so worked out were demonstrated at a commercial tannery, Bangalore. In this method, the conventional process is slightly modified to improve the quality of leather produced, shorten the duration of tanning and economise cost of production; tanning is done by two different processes, one using a blend of hopea bark and wattle extract in single pit eliminating two pit system and the other using a blend of hopea bark and konnam bark by two bark tanning method eliminating the use of imported wattle extract. The duration of tanning was cut down from 40 to 20 days and the yield of leather increased from 44 to 49%.

The bark used for this work has the following composition: moisture 11·0%; tannin 20·0%; nontannin 8·4%; insoluble substance 60·6%; pH 4·1; colour (0·5% tan solution): Y 17·5 and R 6·2. Better quality hopea bark will contain tannin upto 30%. The soft and long fibred bark can be readily leached. The leather tanned with this material is full and light coloured, quite comparable to the one produced by tanning with wattle.

*PROCESS NO. 1*

**Two bark process using hopea and konnam barks**

*Beamhouse procedure*

Wet salted cow hides (7-12 kg.) are washed, soaked for 3 hours, limed for 3 days in 300% old lime liquor to which 15% lime and 0·5% sodium sulphide (on the wet salted weight) are added, unhaired, relimed with 10% lime and 0·15% soda ash and 300% water for 3 days, fleshed and left in plain water overnight. Deliming is carried out next day with 0·25% sulphuric acid on the fleshed weight; the acid is diluted before addition. The pelts are trampled in the acid solution for 45 minutes, scudded, washed twice, lightly pickled for 20 minutes using 3% common salt, 0·2% sulphuric acid, 0·15% oxalic acid and 200% water and taken to bark yard. The pH of the pelt is about 5·5.

**Tanning**

Tanning is carried in two pit system using the following materials on the expected yield of leather.

| | *Bark I* | *Bark II* | *Days* |
|---|---|---|---|
| Hopea bark .. | 100% | 100% | 7 |
| Konnam bark .. | 37·5% | 37·5% | 6 |

Myrobing is done with 37·5% myrobalan nuts in one instalment for one day.

**Finishing**

The tanned kips are then finished using 3% epsom salt, 1·5% glucose and 10% pungam oil. The percentages of materials used in tanning and finishing are based on the expected weight weight of leather. The total duration of tanning is 23 days and the yield of leather is 48%. The tanned kips are satisfactory and compare well with the E.I. kips produced by the traditional process.



*PROCESS NO. 2*

**Single bark process using hopea bark, myrobalan nuts and wattle extract**

*Beamhouse procedure*

Same as in Process No. 1.

**Tanning**

Tanning is carried out by the one bark process using 100% hopea bark, 17·5% myrobalan nuts and 25% wattle extract. The extract is dissolved in water to yield a 25% solution approximately. The tanning is started with hopea bark and myrobalan nuts; next day onwards, the wattle extract liquor is given in equal instalments in five days. The kips are handled as usual and kept for 4 more days in bark I, the strength of the tanliquor being increased from 8 to 15°Bk at the end of tanning. Myrobing is done twice using 50% myrobalan nuts in all for total period of 2 days.

**Finishing**

The tanned kips are finished as described under Process No. 1. The total duration of processing is 20 days and the yield of leather is 49%. The tanned kips are satisfactory from the commercial point of view.

*Disposal of spent bark and spent liquor*

The spent bark is soaked overnight in plain water and thrown out. The dilute tanliquor obtained as well as half of the spent tanliquor is used for soaking fresh bark and dissolving tannin extracts. The remaining spent tanliquor is diluted and used for pretreating the delimed pelt for 1-2 hours with the addition of salt and acid. This would minimise the wastage of tannin in the process as spent bark and spent tanliquor.

# NATURAL AND COLOURED LINING LEATHERS FROM E.I. HIDES AND SKINS

P. S. Venkatachalam & T. S. Krishnan

Lining leather is an essential component of high class and hand made shoes as it provides protection for uppers against the deleterious action of sweat. E.I. kip lining is justly famous for its strength and durability. Some of the more important characteristics of such leathers are (i) they should be of very uniform substance and (ii) they should possess more or less the same character as upper with regard to feel and suppleness. The process detailed here is targeted to achieve these objects.

## Raw materials

Inferior and rejection quality vegetable tanned sheep, goat and calf skins and cow hides that are too defective to be finished into any other type of leather such as shoe upper, suedes etc. are used.

## Preconditioning and shaving

Vegetable tanned kip sides are taken, weighed, drummed, with 800% water on the crust weight for 15 minutes, struck out, sammed, split and shaved to 0·9-1·0 mm. substance. The shaved stock is weighed and drummed with 400% water for 20 minutes followed by another wash for 10 minutes. The drum is drained and the sides are ready for bleaching.

## Bleaching

A bath is prepared with 0·5% oxalic acid, 0·5% calgon (ICI), 1% Basyntan FC (BASF) or any other suitable bleaching syntan, and 200% water. The sides are put into the bleaching liquor and drummed for 20-30 minutes after which period, a wash with 400% water is given for 10 minutes. The goods are taken out, horsed to drain and retanned.

## Retanning

Retanning can be done using either dhava (*Anogeissus latifolia*) leaves or myrobalan nuts. A porridge is prepared by soaking over-

## Fatliquoring

The sides are then drummed with 200% hot water (45°C) for 10 minutes and drained. They are then fatliquored with 2·25% T.R.O., 0·75% raw castor oil, 150% water at 45°C and 2% china clay.

The hot water is put in the drum and the stock introduced. The fatliquor emulsion (without the clay) is fed in two instalments at an interval of 10 minutes and the drum is run for 30 minutes; then 0·25% formic acid diluted well is added to the drum in slow feed. After drumming for 15 minutes, the clay pasted with sufficient water is added and the drumming is continued for 15 minutes more. The leathers are now taken out and horsed overnight. In case greater softness is required, the quantity of fatliquor may be increased by 1% keeping the proportion of ingredients the same.

Next day, the sides are struck out, sammed, set well by hand or machine and loosely toggled to dry. The dried leathers are kept in a pile for 3-4 days, then conditioned for moisture, staked, aired off and trimmed. They are then buffed both on flesh and grain using coarse and fine papers respectively.

## Natural linings

The sides are brushed to remove the buffing dust, measured, cold plated and dusted with french chalk on both sides.

## Coloured linings

Usually the linings are finished into pastel shades. The sides are padded on the grain side with a 4% solution of linseed mucilage, dried and cold plated.

*Pigment coat*: It is prepared with 1 part suitable pigment paste (adjusted to proper shade), 1 part synthetic resin emulsion (Primal B41 — Rohm & Haas, U.S.A.), ½ part 10% casein dispersion, ½ part

10% wax emulsion and 2 parts water. The hides are then sprayed with this pigment coat till they are covered uniformly.

Top coat: Top spraying is done with a mixture of 1 part 5% casein dispersion and one part 10% formalin. The sides are dried, measured, kissplated and assorted, if necessary.

*Note*: (i) All formulations are worked out on the shaved weight unless otherwise stated.

(ii) Goat and sheep linings are processed similarly except that they are shaved to a thickness of 0·7-0·8 mm; the fatliquor used is only 2% on the shaved weight, maintaining the same proportion of ingredients.

# SUEDES AND LINING LEATHERS FROM E.I. GOAT SKINS

P. S. VENKATACHALAM

These processes though not entirely new and are, in fact, practised by a few of our progressive tanners, have been studied and developed with a view to popularise them amongst those who are new to this field, particularly the E.I. tanners. The latter are often faced with the problem of disposing their rejection and surplus stocks and even their export-quality leathers when there is a slump in the market. In the circumstances, the tanner is forced to undersell his leathers to others who are able to dress them into finished products that find a market in our country. If, on the other hand, the E.I. tanner can himself do this finishing work, he can make reasonable profits as a result. With little by way of added equipment, he can successfully introduce these processes in his tannery. It is therefore with this object these processes have been worked out for the manufacture of black and fawn suedes for which there is a steady and increasing demand in our country and lining leathers from E.I. goat skins.

## A. MANUFACTURE OF SUEDE LEATHERS

### Raw materials

E.I. goat and sheep of the medium heavy type are suitable for suedes. Goatskins are to be preferred as they yield products of a higher strength and tougher texture. Sheep skins have a velvety nap and make ideal leather for clothing. In selecting the material, care should be taken to see that the flesh surface is clean and free from vein marks, butcher cuts and pock marks.

### *Reconditioning and soaking*

The skins are weighed, drawn through water and piled for an hour or two by which time they get sufficiently dampened for shaving. This shaving or 'necking' as it is more appropriately termed, is carried out so as to level down the area around the neck which is usually thicker than the rest of the skin. This operation is done on the grain surface of the material for obvious reasons. Shaving on the reverse side is rarely found necessary and is best avoided. After necking, the skins are soaked in 800% water and 1% Teepol (Burmah Shell & Co.) in a drum which is run for 15 minutes. The goods are left overnight in this

bath. Soaking can also be done in plain water if Teepol is not available. The drum is run for another 15 minutes next morning and drained. The skins are now ready for bleaching.

*Note*: All formulations upto the stage of dyeing are worked out on the dry weight of the skins.

**Bleaching**

A bath is prepared with 0·5% sulphuric acid, 4% salt and 300% water. The skins are entered into the bleaching liquor and drummed for ½ hour; they are then washed twice in the drum in 800% water, allowing 15 minutes for each wash. The goods are now horsed to drain.

**Chrome tanning**

10% B & C chrome extract is dissolved in 50% hot water the previous evening. The skins are entered into the drum with 200% water and half the chrome is first added followed by the other half after running the drum for 30 minutes. The goods are kept drummed for 3 hours at which stage the basifying liquor is added to the drum in small doses. Basification is done with 2% sodium bicarbonate dissolved in a suitable volume of water. After 4 hours of drumming in all, the skins are horsed. pH of the exhaust bath should be 3·5-3·7 at this stage. Next morning, a sample is cut from the neck of a skin and its shrinkage temperature determined. It should be 100°C or above.

**Neutralisation**

The skins are washed in the drum with 800% water for 15 minutes and then drummed for 45 minutes in 400% water to which 2% sodium bicarbonate is added in small dose. The pH of the cut section should be 6-7. This is followed by another wash in 800% water in the drum for 15 minutes. The goods are then removed and the drum is drained.

**Fatliquoring**

The skins are entered in the drum with 300% water at 55°C and 8% T.R.O. suitably diluted is fed in through the hollow axle in two portions, the second portion being added 15 minutes after the addition of the first half. The drum is now run for 30 minutes and 3% maida flour cooked in a suitable volume of water and mixed with 3% china clay is added to the bath. The skins are drummed for 15 more minutes, removed, piled for an hour or two to drain, struck out and hooked up to dry.

**Staking and buffing**

The dried skins are damped back by keeping them in moist sawdust for 1-2 hours, staked on the reverse side, hung up to dry and



buffed with 220 paper first followed with 320 paper. They are dusted off and weighed.

*Note*: The subsequent formulations are based on the buffed weight.

*A. BLACKS*

**Dyeing**

The skins are wetted back in 800% water for 15 minutes in the drum. The drum is drained and the skins are set afloat in 300% water at 50°C. 2% Naphthalene leather Black 12 B.S. (ICI) and 3% Nigrosine G 140 (ICI) are dissolved in a suitable quantity of boiling water, strained through cloth and added through the hollow axle in two portions, the second half being added 15 minutes after the first addition. After 45 minutes run, 2·5% formic acid diluted at least with ten times its weight of water is added in a steady stream through the axle. After running for 15 more minutes, the goods are removed, piled to drain and hooked up to dry.

**Top buffing and dyeing**

The skins are conditioned, staked, aired off and buffed with 500 paper and redyed. The stock is first wetted back in 400% cold water in the drum for 5 minutes. They are removed and the drum is drained. 4% Basic black (CLRI mixture) is pasted with 2% acetic acid and a sufficient quantity of water and added to the dye drum into which the goods have been entered with 300% water at 50°C. The addition is effected in small doses at short intervals. It is found that the dyebath is exhausted in ½ hour at the end of which period 0·25% T.R.O. emulsified in a suitable volume of water is added. The drum is run for another 10 minutes and drained. The skins are piled to drain and loosely toggle-dried.

**Finishing**

When dry, the flesh side of the skins is sprayed liberally with a solution using 50 parts glycerin, 5 parts basic black, 5 parts acetic acid, 100 parts spirit and 840 parts water. The sprayed leathers are dry drummed for 2-3 hours, removed, hung up till nearly dry and redrummed till the nap is well opened (6-10 hours).

The suedes are removed, trimmed and measured, cleaned with a soft brush and sorted out.

*B. FAWNS*

The skins are first wetted back as per blacks. 0·25% Naphthalene orange G.S. (ICI) dissolved in a sufficient quantity of boiling water is

added to a bath of 300% water at 55°C in which the skins have been floated. The goods are run for ½ hour after which period 0·25% formic acid diluted with ten times its weight of water is added, through the axle in a slow stream. After running for 15 more minutes, the skins are piled to drain and toggled-dried loosely.

When dry, the skins are conditioned, staked and dry drummed till the nap is well opened up.

*Note*: If it is possible to assort the skins for fawn shade in the E.I. tanned crust stage, the bleaching can be carried out with 0·5% oxalic acid, 1% Basyntan F.C. (BASF), 1% calgon (ICI) and 300% water, for ½ hour in the drum. Sodium sulphite should be used in place of sodium bicarbonate for basification and neutralisation. All the other details are as for black suedes. These changes in the process will be effective in producing a light coloured fawn suede.

## B. MANUFACTURE OF LINING LEATHERS

### Raw materials

Any type of E.I. goat or sheep skin can be used for producing lining leathers, provided it is neither too thick nor papery and free from excessive grain damage.

### Preconditioning and soaking

The skins are weighed, drawn through water, piled for 1-2 hours and shaved. Shaving is done on the flesh side, generally around the neck part of the skin so as to make it level throughout. Levelling is of more importance here as the leather is to be glazed subsequently and also because lining leather has to be uniform in substance. The shaved leather is run in the drum for 15 minutes with 800% water. Next morning, the drum is run for another 15 minutes and drained.

*Note*: All formulations given below are based on the dry weight of skins.

### Bleaching, chrome tanning and neutralisation

As under Suedes.

### Fatliquoring

Fatliquoring is carried out in the drum using 400% water at 50°C, 4% T.R.O. and 0·5% Fixanol V.R. (ICI). The goods are entered into the drum with hot water and T.R.O. is added through the hollow axle in a slow stream after dilution with four times its quantity of water. After 30 minutes run, the china clay pasted with four times its volume of water is added in a continuous stream. The drum is run for another



15 minutes after which period the skins are removed, horsed to drain and toggled to dry.

### Staking and buffing

The dry skins are saw-dusted for 2 hours, staked and buffed with 240 papers on the flesh side. Grain damaged skins are snuffed on the grain side with 320 paper.

### Finishing

*Stain coat (grey)*: 1 g. Nigrosine G 140 (ICI) and 1 pint water are used.

*Stain coat (champagne)*: 1 g. Naphthalene Scarlet J. S. (ICI) and 1 pint water are used.

The stain coat is prepared by dissolving the requisite quantity of dye in a suitable volume of boiling water and diluting it further to the required concentration.

*Mucilage coat*: 2·5% linseed mucilage solution is used. The linseed mucilage is prepared by soaking overnight 5 oz. linseed in 3 pints of water and boiling it for an hour next morning. It is strained through cloth and diluted to 1 gallon.

*Season coat*: 1 lb. pigment paste (Lechinol Co., Calcutta), 12 oz. 10% casein dispersion, 4 oz. 10% shellac dispersion, 2 oz. 10% gelatin dispersion, 2 oz. T.R.O. and water to make 1 gallon are used.

Dispersion of casein is effected by soaking overnight 1 lb. casein in 4 pints of water to which 4 oz. borax dissolved in 4 pints of hot water are added next day. The mixture is then stirred and boiled till it attains a thin consistency. After cooling, it is made upto 1 gallon. ¼ oz. sodium trichlorophenate (Ahura Chemicals, Bombay) may be added to the casein dispersion as a preservative if it is desired to keep it for a few days. It is always good practice to prepare the casein dispersion and use it all up the same day. A satisfactory binding of pigment to the leather is achieved thereby.

4 oz. borax are dissolved in 6 pints of boiling water to which 1 lb. shellac flakes are added in small quantities with stirring, till the shellac is completely dissolved. The shellac dispersion is strained through cloth and diluted to 1 gallon. ⅛ oz. sodium trichlorophenate may be added as a preservative.

1 lb. gelatin is soaked overnight in a gallon of water. Slight warming the next morning will bring about the complete dispersion of the

gelatin. ¼ oz. sodium trichlorophenate may be added to prevent putrefaction of the gelatin.

*Top coat*: 1 lb. 10% casein dispersion, 1 lb. 40% formaldehyde and 1 lb. water are used. The top coat is prepared by adding 1 lb. formaldehyde (40% solution) to 1 lb. of casein solution which has already been diluted with an equal quantity of water with stirring.

In finishing the skins, a liberal coat of the stain is applied both on the grain and flesh sides followed by a coat of the mucilage on the grain. After drying it well, two pad coats of the season followed by a spray coat are applied. A top coat is sprayed on the leather which is then well dried and glazed.

The pieces are trimmed, measured and sorted, if necessary.

## GRAIN GARMENT LEATHERS FROM E.I. SHEEP SKINS

P. S. Venkatachalam & T. S. Krishnan

Grain garment leathers should be light, supple and sufficiently soft to drape well. The finish on such leathers should also be water-resistant. The E.I. red hair sheep are ideal for this work as they are superior in strength to the wool-sheep variety. They form a convenient outlet to the suede rejections.

### Raw materials

Prime quality E.I. sheep skins without grain defects are used. A weight of 2·72-3·18 kg. (6-7 lb.) per bond of 12 skins and an area of not less than 4645 sq. cm. (5 sq.ft.) per piece are preferred.

### Conditioning and shaving

The skins are weighed, drawn through water and piled for 2-3 hours or preferably overnight, the pile being covered with a tarpaulin. They are then levelled to uniform thickness (0·7-0·8 mm.) by shaving. Alternatively where lots are processed both for suedes and grain garments, levelling can be done by shaving after chrome tanning.

### Stripping

The shaved skins are washed in a drum in 800% water for 20 minutes and then stripped with 400% water and 2% borax for 20 minutes. The stripped skins are washed twice in a drum in 800% water, allowing 15 minutes for each wash. The washed skins are ready for bleaching.

### Souring

A bath is prepared with 0·5% sulphuric acid, 4% salt and 300% water. The skins are put into the bleaching liquor and drummed for 30 minutes, taken out and horsed to drain. They are now ready for retanning with chrome.

*Note*: Where extensive iron-staining has occurred during shaving, bleaching is done with 0·5% oxalic acid, 2% bleaching syntan and 300% water instead.

**Preparation of chrome liquor**

10% chrome extract (B & C Mills, Madras) ($Cr_2O_3$ content 24-25%) is dissolved in 50% boiling water the previous day to give a liquor of about 33⅓% basicity. Two-thirds of the chrome liquor is made 50% basic by adding the requisite amount of soda ash or caustic soda. The alkali is dissolved in water and added very slowly to the cooled chrome liquor stirring well all the time. The chrome liquors are left to age overnight.

**Retanning**

The skins are put into a drum containing 200% water and one-third chrome liquor (33⅓% basic) is added. After drumming for 30 minutes, the remaining two-third chrome liquor (50% basic) is added in two equal instalments at an interval of 20 minutes. After 3-3½ hours drumming, 1% sodium bicarbonate dissolved in sufficient water is added to the drum in slow feeds over a period of 30 minutes. The goods are drummed for one hour after the addition of bicarbonate and the pH of the bath is checked. It should be between 3·8 and 4·0. The skins are horsed up overnight. Next morning, a piece from the neck portion is cut and its shrinkage temperature determined. It should be not less than 100°C.

**Neutralisation**

The skins are washed in a drum twice with 800% water, allowing 15 minutes for each wash. They are then neutralised with 2% sodium bicarbonate and 300% water in a drum for 40 minutes. The bicarbonate is added in two or three instalments at intervals of 10 minutes. After drumming for 40 minutes, a piece is cut from the neck portion and the pH of the cut edge tested with bromocresol purple. The pH of the cut edge should be 6-7. The neutralised skins are washed in 800% water for 20 minutes followed by another wash in 400% water at 55°C for 10-15 minutes.

*Note*: If the lot is processed both for suedes and grain garment, the leathers are assorted at this stage. Those taken for grain clothing may be sammed and shaved to uniform thickness conveniently now.

**Dyeing and fatliquoring**

The skins are put in a drum containing 300% water at 55°C. 4% Naphthalene leather brown 2 DS (ICI) is dissolved in suitable quantity of boiling water, strained through a cloth and added through the hollow



axle in two portions at an interval of 10 minutes. After 30 minutes drumming, 10% sulphonated fish oil, 1% borax and 0·25% sodium trichlorophenate (Ahura Chemicals) emulsified with hot water, is added to the drum in two portions at an interval of 5 minutes (0·5% pine oil may be mixed with sulphonated fish oil to mask the unpleasant smell of fish oil). Drumming is continued for 45 minutes after the last addition of fatliquor and then 2% formic acid diluted with ten times its weight of water, is added in two portions at an interval of 5 minutes. After the last addition of acid, the drum is run for 15-20 minutes. The skins are taken out, rinsed and piled. Next day, they are set and hooked to dry.

The dried skins are kept in pile for a minimum period of 3 days. They are then saw-dusted for 2-3 hours after which they are staked and dry drummed for 4-5 hours. They are again staked and dry drummed for 4-5 hours. This may be repeated if the goods are not sufficiently soft. The leathers are removed, aired off, trimmed, buffed on the flesh side and the buffing dust removed.

**Finishing**

*Season coat:* Season coat is prepared with 1 part pigment paste, 1¼ parts synthetic resin (5 parts Primal B41 and 1 part Primal S Rohm & Hass, U.S.A.), ¼ part 10% carnauba wax emulsion and 3 parts water. The skins are given one pad coat of this season on the grain and dried. They are staked lightly and sprayed to cover with the same season. The skins are dried well, staked and then sprayed with two complete cross coats of EMG lacquer emulsion (BASF) diluted with an equal volume of water and aired off.

Alternatively, the leathers may be sprayed with 1 part CLRI clothing lacquer, bright or matt diluted with 2 parts CLRI or Spartan thinner (Addison Paints, Madras).

The skins are cold plated using light pressure if desired and assorted.

*Note*: The percentages given are based on the crust weight of the raw material.

# SUEDE GARMENT LEATHERS FROM E.I. SHEEP SKINS

T. S. KRISHNAN & P. S. VENKATACHALAM

Suede clothing leather is characterised by a velvety nap and good drape. The dyeing should be fast to cleaning and the leather should not shrink after treatment with solvents. E.I. sheep are still the finest raw material for this purpose.

## Raw materials

Prime quality E.I. sheep skins with a clean flesh and free from flay-cuts, vein and rib marks having a weight range of 2·72-3·18 kg. (6-7 lb.) per bond of 12 skins and an area of about 4645 sq. cm. (5 sq. ft.) per piece are preferred.

## Conditioning and shaving

The E.I. skins are weighed, drawn through water and piled for 2-3 hours or preferably overnight after covering them suitably. They are then levelled to uniform thickness by shaving on grain.

*Note*: It is better to level the skins after finishing by dry splitting, if a suitable splitting machine is available.

## Stripping

The shaved skins are washed twice in a drum in 800% water each wash being done for 15 minutes and then they are stripped with 400% water and 2% borax for 30 minutes. The stripped skins are washed twice in a drum with 800% water allowing 15 minutes for each wash.

## Souring

The washed skins are bleached in a drum for 30 minutes with 0·5% sulphuric acid, 4% salt and 300% water. The soured skins are taken out, washed with 600% water in a drum for 10 minutes, horsed to drain and are ready for retanning with chrome.

*Note*: If iron-staining is extensive after souring, 0·5% oxalic acid and 2% bleaching syntan may be advantageously substituted for the sulphuric acid and salt in the souring treatment.

## Preparation of chrome liquor

10% B & C chrome extract (24-25% $Cr_2O_3$) is dissolved in 50% boiling water the previous day to give a chrome liquor of about 33⅓% basicity. Two-thirds of the chrome liquor is made 50% basic by adding the requisite amount of soda ash or caustic soda. The alkali is dissolved in water and added very slowly to the cooled chrome liquor stirring well all the time. The chrome liquors are left to age overnight.

## Retanning with chrome

The skins are put in a drum containing 200% water and the chrome liquor portion of 33⅓% basicity is added. After drumming for 30 minutes the remaining 2/3 chrome liquor (50% basic) is added in two equal instalments at an interval of 20 minutes. After 3-4 hours drumming, 1% sodium bicarbonate dissolved in sufficient water is added to the drum in slow feeds over a period of 30 minutes. The goods are drummed for ½-1 hour after the addition of bicarbonate and the pH of the bath is checked. It should be between 3·8 and 4·0. The skins are horsed up overnight. Next morning, a piece from the neck portion is cut and its shrinkage temperature determined. It should be 100°C or above.

## Neutralisation

The skins are washed in a drum twice with 800% water, allowing 15 minutes for each wash. They are then neutralised with 2% sodium bicarbonate and 400% water in a drum for 40 minutes. The bicarbonate solution is added in 2 or 3 instalments at intervals of 10 minutes. After drumming for 40 minutes a piece is cut from the neck portion and the pH of the cut edge tested with bromocresol purple. The pH of the cut section should be 6-7. The neutralised skins are washed in 800% water for 20 minutes followed by another wash in 400-600% water at 55°C for 10-15 minutes.

## Fatliquoring

The skins are put in a drum containing 400% water at 55°C. 10% CLRI FATBASE F and 0·1% ALMASK (May & Baker) well emulsified with hot water is added to the drum in two portions at an interval of 10 minutes. Drumming is done for 1¼-1½ hours after which the bath is exhausted by adding 1-2% acetic acid. The acetic acid is diluted with twenty times its weight of water and added in slow feeds over a period of ½ hour. The skins are taken out and piled over a horse. Next day, they are struck out and hooked to dry.

When dry, the leathers are crusted for 2 or 3 days and then they are conditioned by keeping them in moist saw-dust for 2-3 hours. They are next staked, aired off, trimmed and buffed first with coarse and then finer emery papers. They are dusted off and weighed. Levelling if necessary may be done at this stage by dry shaving the grain before buffing the flesh.

**Dyeing**

The skins are drummed with 800% water for 1-2 hours and left overnight in the bath. Next day, they are drummed for ½ hour and given two washes with 800% water, each wash being done for 15-20 minutes. When the skins are completely wetted, they are set afloat in 400% water at 60°C. 3% Ultralan orange (ICI) is dissolved in a suitable quantity of boiling water, strained through a cloth and added through the hollow axle in 2 instalments at an interval of 15 minutes. After drumming for 45 minutes, a piece from the neck is cut and tested for penetration. When penetration is complete, 1·5% formic acid diluted at least with 20 times its weight of water is added in 2 or 3 instalments at intervals of 10 minutes. After running for 15-20 minutes after the last addition, the goods are taken out, rinsed and horsed up.

Next day, they are washed for 15 minutes in 500% water twice, horsed to drain, struck out and hooked to dry. When dry, they are conditioned for moisture in saw-dust, dry drummed for 1 or 2 hours, staked in pairs on the grain side and are again dry drummed for 6-8 hours.

They are then taken out, dried off, measured, brushed and sorted.

**Shower-proofing**

The skins are drained well after the dyeing treatment and floated in 400% water at 50°C in a drum to which is added 3-5% CLRI WATPROGENT after diluting it with twice its volume of water. The drum is run for 15 minutes after which period the skins are removed, horsed to drain, struck out and hooked to dry. They are then finished in the usual manner.

*Note*: (i) All percentages (except those for wetting, dyeing and subsequent treatments) are calculated on dry crust weight unless otherwise stated.

(ii) Wetting, dyeing and subsequent treatments, if any, are based on the buffed weight.



(iii) The goods can be shower-proofed, if necessary, as described above.

(iv) Washing after dyeing helps in the removal of unfixed dye and produce leathers faster to dry-cleaning.

(v) Sometimes the shower-proofing treatment can be substituted with cationic fat topping treatment. For this, 1-2% Lipman Liquor O (BASF) or Catalix G.S. (Sandoz India Ltd.) is used in place of the chrome shower-proofing compound. Other details of procedure are as for the shower-proofing treatment. This topping with cationic fat improves considerably the velvety and smooth appearance of the nap.

(vi) The shower-proofing treatment leads to a definite darkening of the shade particularly in the case of pastel dyeing.

(vii) A few preliminary experiments may be necessary to find out the optimum concentration of fat that has to be given as liberal fatliquoring followed by shower-proofing leads to a greasy and tacky nap. Where shower-proofing treatment is to be given, the quantity of fatliquor used may be advantageously cut down by 10-20%.

# N. C. MOROCCOS FROM E.I. GOAT SKINS

P. T. Mallesam, T. S. Krishnan & P. S. Venkatachalam

A good proportion of E.I. tanned goat skins [averaging 3·2-4·5 kg. (7-10 lb.) in weight per dozen] bought by overseas tanners are processed for making nitrocellulose finished morocco leathers. Such leathers are chiefly used for making many types of leather goods like purses, wallets, folio and document cases, jewellery and toilet sets, key and shaver cases, diary and memo pad covers etc. which have good sales value. The leathers are extremely durable and hard wearing and they retain their shape and smart appearance in wear. The use of nitrocellulose lacquer of glazable type in morcco finishing, produces a very fine and bold grain throughout, the finish being fast to dry and wet rubbing which is not the case where protein finishes are used. Of late, there is quite a good demand abroad for N.C. moroccos and if such leathers are produced and exported, our industry's earnings will be greater. Apart from the economic advantages, such practice will help to foster the finishing and the leather goods industries.

**Raw materials**

E.I. tanned (vegetable tanned) goat skins of weight 3·6-3·8 kg. (8-8½ lb.) per dozen with fine grain and free from major grain defects are used.

**Preconditioning, shaving and retanning**

The skins are trimmed, weighed, drawn through water and piled for conditioning. They are shaved uniformly on the flesh to the required thickness (0·6-0·7 mm.) taking care to avoid extensive iron-staining. The shaved skins are washed in drum in a float of 400% water for 20 minutes and retanned for 2 hours, with 10% quebracho extract and 200% water (cutch extract 1 or 2 can also be used in place of quebracho extract). Retanning is done to make the leathers firmer and also to make the grain tighter. The retanned skins are rinsed in water and piled overnight or immediately taken for dyeing.

**Dyeing**

Dyeing is done with 300% water at 45°C, 2% Nigrosine G 140 (ICI), 1% Direct black E Extra (Atul) and 0·05% Lissamine green V.S. (ICI). The dyes are dissolved in hot water (1 : 30), filtered and added in 2 feeds at an interval of 10 minutes. Along with the second feed, 0·2% sodium trichlorophenate (Ahura Chemicals) is added as a preservative. After 30 minutes, 1·5-2·0% formic acid diluted with water (12: 20) is added in 3 feeds at intervals of 5 minutes through the hollow axles. The drum is run for 15 minutes after the final addition of acid. The dyed goods are rinsed in water, struck out, sammed, set and nailed on boards for drying. Care is taken to see that as much of stretch is removed as possible during the nailing operation. The dried skins are trimmed and taken for finishing.

**Finishing**

*Coloured lacquer coat*: The skins are sprayed on the grain with a mixture of CLRI black glazing lacquer—1 part, and CLRI thinner or any proprietory lacquer thinner—2½ parts; usually 4 cross coats are sufficient to cover the skins. The sprayed skins are dried well and glazed in glazing machine.

The glazed skins are dipped in water, piled for 1-2 hours to dampen them thoroughly and uniformly and are then hand-boarded in eight directions. They are dried quickly in a hot room at 40-50°C and are damped again by spraying with water, reboarded and dried in the hot room. Finally the edges of the skins where the grain has not been lifted properly, are worked over again if necessary before they are backboarded. Quick drying helps in fixing firmly the worked up grain.

*Sizing*: The flesh side of the skins is sponged with any one of the following sizing compounds and dried: (i) 5% solution of carboxymethyl cellulose (Cellofas B; I.C.I.); (ii) 20% solution of linseed mucilage and 10% shellac solution.

*Clear lacquer coat*: The skins are sprayed on the grain with a mixture of CLRI clear glazing lacquer—1 part, and CLRI thinner or any proprietory lacquer thinner—2½ parts, and 1-2 cross coats will be sufficient to give a good gloss and also make the finish fast to dry and wet rubbing. The finished skins are measured and sorted if necessary.

*Note*: (i) All formulations upto dyeing are based on trimmed crust weight.
(ii) Dyeing is done to match the final shade and basic dyes are avoided for dyeing of N.C. morocco leathers.
(iii) As considerable skill is required in hand-boarding, practice and experience are quite necessary in boarding.
(iv) If required, smooth kiss plating can also be done finally at a temperature of 100°F at a pressure of 100 lb./sq. inch.

# DRESSED E.I. KIPS, GOAT AND SHEEP SKINS IN FANCY COLOURS BY SEMI-CHROME TANNING

J. C. Deb

The semi-chrome tanning process—retanning the vegetable tanned leathers with chrome—is well known. Most of the E.I. tanned leathers exported to the continent and U.K. are thus retanned and finished into a wide variety of leathers. E.I. leathers worth about Rs. 250 million are exported annually from India. If all these leathers could be finished and sold, the value may be doubled. While export of E.I. vegetable tanned leathers of good quality fetching better prices may be continued, the poorer and rejection quality kips and skins may be utilised for semi-chroming and finishing in India. The E.I. tanner is gradually taking to the modern methods of tanning and finishing. To help these tanners and to kindle interest in the other E.I. tanners, the process outlined below for dressing the rejection quality E.I. kips and skins into finished leathers of various fancy colours for varied uses such as upholstery, leather goods and footwear, is presented.

**Raw materials**

Rejection quality—especially those that have damaged grain—cow hides, goat skins and sheep skins are taken.

**Soaking, splitting and shaving**

The kips, goats and sheep are wetted back in water and dry drummed for one hour to condition them, for splitting and shaving. The hides are then split to 1·8-2·5 mm. thickness and shaved to a final uniform 1·5-2·2 mm. substance. The goat and sheep skins are shaved to a uniform substance of 0·75-1·0 mm. The shaved weights of kips, goats and sheep are recorded individually.

**Stripping**

The stripping bath is prepared with 2·0-2·5% borax and 250-300% water (on the shaved weight). The goods are put in the stripping bath in the drum and drummed for 30-45 minutes and then washed twice with a good float allowing 10-15 minutes for each wash. The stock is now ready for bleaching.

**Bleaching**

The bleaching is done with 0·75-1·00% oxalic and 250-300% water (on the shaved weight). The leathers are put in the bleach liquor, drummed for 30-45 minutes and washed twice with sufficient float of water giving 10-15 minutes for each wash. They are now ready for semi-chroming.

**Semi-chroming**

6-8% chrome extract powder (B & C Mills, Madras) is dissolved in 50% hot water (on the shaved weight) the previous day. The pieces are entered in the drum with 200% water and half the quantity of previously dissolved chrome liquor is first added followed by the other half after 30 minutes running of the drum. The goods are drummed for 2½-3 hours more. Then the basification is done with 0·5-1·0% soda ash dissolved in a small quantity of water. The drum is run for one more hour and the pieces are horsed up.

**Neutralisation**

The stock is washed in a drum with sufficient float of water for 10-15 minutes drained. A fresh bath of water with 200-250% by volume to which 0·75-1·00% soda bicarbonate has been added is made and the chrome tanned leathers are drummed in this bath for 30-45 minutes. This is followed by another wash with a good float for 10-15 minutes. They are now ready for fatliquoring.

**Fatliquoring**

The leathers are fatliquored in a drum with 0·75-1·00% Clri Fatbase F, 0·25-0·5% T.R.O. and 200-250% water (on the shaved weight), for 30-45 minutes at 55°C. After fatliquoring, the hides and skins are removed and horsed up.

**Striking out, oiling off, sammying and setting**

Next day, they are struck out on the flesh and grain sides. A mixture of 2 parts neatsfoot oil and one part kid finishing oil is applied on the grain side and the leathers are hung up in the shade for sammying. The sammed leathers are then set out and hung up in the shade for complete drying.

*Note*: Lower percentage of fatliquoring materials is used for light skins and higher for the heavy hides.

**Saw dusting, staking, nailing, trimming, buffing and snuffing**

The skins are now left for 3-4 hours and heavy leathers, overnight, in moist saw-dust to condition them for staking. The conditioned pieces

are then staked with heavy pressure on a Slocomb staking machine. They are then nailed on boards for complete drying, trimmed, buffed on the flesh side with 80 grit emery paper and snuffed on the grain side with 320 grit emery paper. The leathers are now ready for seasoning.

**Finishing**

The leathers are finished as follows:

1. PLAIN COLOURS

*Bottom season*: The bottom season is composed of 1 part pigment paste to match shade, 1 part resin emulsion and 2 parts water. The coat is applied twice by pad on the grain side of the leather and dried. The dried leathers are then smooth plated at 150°F with medium pressure. Then they are sprayed to obtain good coverage and dried.

*Fixing coat*: The fixing coat prepared with 1 part 10% casein solution, 1 part formaldehyde (40% strength) and 4 parts water is applied by spray and dried. The dried leathers are then embossed with any suitable grain, measured and assorted.

*Top clear lacquer coat*: Instead of the fixing coat, the leathers can also be given one spray coat of the clear lacquer thereby making the finished goods completely fast to dry and wet rubbing. The clear coat is made up of 1 part Spartan clear lacquer and 3 parts Spartan thinner (Addison Paints, Madras).

2. PRINTING AND PRODUCING TWO-TONE EFFECT

The leathers are padded and sprayed with any suitable coloured season followed by the fixing coat as already described. They are now sprayed with a darker coloured top season, using twice the volume of water for dilution without incorporating any resin emulsion in the formulation.

The leathers are then printed into the desired grain and the dark topping is rubbed off using a piece of cloth dampered with a 5% ammonia solution thus producing the two-tone effect. Care should be taken to keep the cloth just damp and not wet and to effect rubbing uniformly. The leathers are then dried.

*Top clear lacquer coat*: The clear coat is prepared with 1 part clear lacquer and 3 parts thinner. The leathers are then given the clear coat by spray thereby making the finished leather completely fast to dry and wet rubbing. Plain plating may also be done before topping with lacquer to produce an ecrase effect.



3. GLAZE FINISH BLACK

*Stain coat*: The stain coat is composed of 7 g. methic leather black, 7 g. acetic acid, 4 oz. 10% linseed mucilage and water to make one pint. One brush coat is given and dried.

*First bottom coat*: The bottom coat is made up of 50 parts black pigment paste, 50 parts 10% linseed mucilage, 50 parts 10% casein dispersion, 100 parts ox blood, 10 parts T.R.O., 200 parts 0·5% Nigrosine, G. 140 solution (ICI) and water to make 1000 parts. Two pad coats and one spray coat are given, dried and the leathers are glazed.

*Second bottom coat*: This coat consists of 100 parts bottom season, 100 parts egg white, 50 parts ox blood, 20 parts formaldehyde and water to make 1000 parts. One pad coat and one spray coat of this season are given and the leathers are dried.

*Fixing coat*: The fixing coat prepared with 1 part 10% casein solution, 1 part formaldehyde and 2 parts water is given by spray, dried and the leathers are glazed and smooth plated or ironed at 110°F with full pressure. The goods are now measured and assorted.

# DRESSED E.I. KIPS AND SKINS BY SEMI-ALUM TANNING

M. A. Ghani, R. Selvarangan & Y. Nayudamma

The fundamentals of the processes described here lie in the use of basic aluminium sulphate instead of basic chrome liquors for tanning and finishing E.I. and other bark-tanned leathers to yield a variety of products like uppers, linings and imitation Sambur. The advantages in using basic aluminium sulphate for retanning are that it costs less than the basic chrome salt and the leathers so tanned are lighter in colour and yield brighter dyeings.

## I. PROCESSING OF E.I. KIPS FOR UPPERS, LININGS AND SAMBUR LEATHERS

### Raw materials

Inferior quality E.I. kips averaging 8-8½ lb. in weight are used. Care is taken to select leathers of as uniform a weight as possible. The weight of each kip should not vary by more than 1 lb. to avoid wastage in splitting and shaving.

### Soaking, splitting and shaving

The full hides are cut into sides. They are then soaked in water for 5 minutes and piled overnight. The soaking can be done either in drum or vat. The sides are split to 1·6 mm. and shaved to a final thickness of 1·4 mm. Those sides that are very badly damaged on grain side are split to 1·75 mm. and shaved both on the grain side and flesh side to a uniform substance of 1·4 mm.

The weight of the shaved stock is taken jointly for the entire stock as well as separately for those shaved only on the flesh side and those shaved on both flesh and grain sides.

### Pretanning operations

The whole stock is taken in a drum and washed and fully soaked by drumming for 45 minutes in running water (drum speed 12-14 r.p.m.). The purpose of this operation is to remove most of the water soluble materials. Water is then drained out.

### Stripping

Stripping is next done by drumming the goods with 175% water and 0·25% soda ash (on the shaved weight) for 10 minutes. The stock is drained and washed in running water for five minutes in the drum.

### Souring

This is done with 125% water and 0·25% oxalic acid in the drum for 10-15 minutes.

*Note*: The main idea of this operation is to remove all the iron stains caused during splitting and shaving. The use of oxalic acid can be substituted by any bleaching syntan or syntan and oxalic acid or any other suitable combination of iron complexing agents.

Now the liquor is drained out and the stock washed for 5 minutes in running water and drained. The goods are again refloated in a bath of 125% water and 0·25% sulphuric acid and drummed for 5-10 minutes; the liquor is then drained out.

### Preparation of basic aluminium sulphate liquor

12 lb. of nonfree aluminium sulphate is dissolved in 60 lb. of boiling water and left undisturbed for one hour. 7·5 oz. commercial sodium citrate is added to the bath with stirring. 3 lb. soda ash dissolved in 12 lb. water is added now with continuous stirring in the course of about half an hour till all frothing ceases. The stock solution is made up to 10-12% aluminium sulphate or 1·75-2·00% $Al_2O_3$ content. This has a basicity of approximately 45%.

### Tanning

For tanning, 10-12% aluminium sulphate or 1·75-2·00% $Al_2O_3$ stock solution described above as calculated on the shaved stock weight is used. The leathers are entered in the drum with 25% water and the tan liquor is fed in three instalments at intervals of 20 minutes and drumming is continued for a total period of 2 hours. 3% soda ash suitably dissolved is now added to the bath in 3-4 instalments in the course of one hour. The pH of the liquor is checked at this stage. It should be 4·2-4·4. In case the pH is low, it is raised by further addition of alkali till it reaches an equilibrium value of 4·2 in the end after 30 minutes drumming. The tanned stock is then taken out and piled overnight.

### Neutralisation and fatliquoring

At this stage, leathers to be finished as uppers and linings are sorted from those that are to be dyed into sambur.

## II A. FURTHER PROCESSING FOR GRAIN LEATHERS—UPPERS AND LININGS

The leathers are washed thoroughly in drum for 5-10 minutes and the pH checked and raised to 4·5 if necessary by adding 0·12? 0·1% soda ash. This is now followed by a thorough wash in running water.

### Fatliquoring

The leathers are then fatliquored using 1·25% sulphated pungam oil, 1·0% raw pungam oil and 100% water at 50°C in the drum for 30 minutes. The stock is then removed and piled overnight. They are then set by machine and hand and hooked to dry. The leathers are conditioned in damp saw-dust overnight, staked twice next day, aired off, trimmed and fluffed with 220 paper and snuffed with 400 paper. They are then brushed well and taken for finishing.

### Finishing

The leathers are given a stain coat with dye on grain surface and finished in the normal manner using resin finishes as binders and plated under hydraulic press. (*vide* finishing in process on kip lining leathers). If required the flesh side of the leathers can be also given a stain coat with 0·25% basic dye solution. The leathers can be also dyed with 1% acid dye in the drum before the fatliquoring operation.

## II B. FURTHER PROCESSING FOR SAMBUR

### Neutralisation

Same as for upper leathers.

### Dyeing

2% Naphthalene leather brown G.R.S., 2% Naphthalene leather brown T.N.S. (on the shaved weight) and 125% float at 50°C are used in the dye combination. The stock is drummed in this bath for ½ hour after adding the dye in two feeds at an interval of 15 minutes. 2% formic acid is added at this stage after suitable dilution and drumming continued for another 15 minutes. The goods are drained and taken for top-dyeing.

### Fatliquoring

The stock is now fatliquored in a drum with 6% fatliquor composed of 4% sulphonated fish oil and 2% free pungam oil in 100% water at 50°C, for 30-45 minutes. The pieces are then removed and piled overnight.



### Drying, saw-dusting, staking, trimming and buffing

Next morning, the leathers are hung to dry. The leathers are then saw-dusted for conditioning and then heavily staked on machine; they are next buffed with 180 paper on both sides and later with 350 paper on the flesh side. The sides are now brushed to clear the buffing dust and given a 'flaming' treatment if necessary. The leathers are now given a spray coat of a solution consisting of 0·25% basic dye and 0·25% acetic acid glycerine solution on the flesh side and dry drummed for 2-3 hours. At the end of this period, they are taken out, brushed and assorted.

## III. PROCESSING OF E.I. SKINS FOR LININGS AND SUEDES

The skins can be processed in the same fashion as kips except that for suedes the skins are not degrained or buffed on the grain as in the case of sambur leather. In other respects, the processes will be exactly the same.

# SEMI-ALUM UPHOLSTERY LEATHERS

R. Selvarangan, M. A. Ghani, Y. Nayudamma & B. M. Das

Upholstery leather is used not only in cars and furniture, but of late, in making boxes, travellers' bags and folio cases also. This type of leather has to be soft, pliable, strong, nonstretchy and of fast colour. The finished surface should not crack or become brittle on ageing. Also the leather should not deteriorate in strength and appearance on exposure to air and light and after use for a reasonably long time. In Europe and America, upholstery leather is made by chrome or chrome vegetable or vegetable tannage of the grain and middle layers split from thick spready cow hides. Such hides are not available in India. Medium and small sized cow hides are available in lightly vegetable tanned condition. In order to get full and supple unholstery leather from these, it is necessary to retan them. Vegetable and chrome retannage do not give satisfactory leather and experiments carried out at CLRI have shown that upholstery leather of quite satisfactory quality could be obtained by retanning vegetable tanned hides with basic aluminium salts. A process for manufacturing two-tone upholstery leather based on the above principle is given here.

## Raw materials

Fifth quality E.I. kips weighing 4·5-5·4 kg. (10-12 lb.) per piece are used.

## Splitting

The tanned cow hides are trimmed and then soaked one by one in water for a minute and piled on a horse. They are then dry-drummed for 3 hours and split to 2·0 mm. thickness. By careful splitting, shaving is avoided. The weights of the grain splits and flesh splits are taken separately and recorded.

## Stripping and bleaching

The grain splits are washed in 200% water for 10 minutes in a drum and then stripped with 0·5% soda ash (on the split weight) using a float of 150% for 10 minutes. The goods are then washed twice first with 200% water for 10 minutes and again with 150% water for 5 minutes. Bleaching is done with 0·5% sulphuric acid and 150% water for 15 minutes. The bleached leathers are washed with water.

## Tanning

*Preparation of basic aluminium sulphate:* Basic aluminium sulphate is prepared the previous day using 70 lb. aluminium sulphate, 5 lb. sodium citrate and 17·5 lb. soda ash. The sulphate and citrate are dissolved in 15 gal. water in a tub and the soda ash is dissolved separately in 5 gal. water. The soda ash solution is added in two or three instalments in the course of an hour with good stirring. The solution is left to age overnight. The pH of the clear solution is 3·4.

## Retanning

After washing the bleached stock, 100% water is taken in the drum and the entire tanning solution equivalent to 12% aluminium sulphate (on the split weight) is added in bucketfuls with the drum running at 4 r.p.m. Drumming is continued for 45 minutes after which time 3% soda ash (on the split weight) separately dissolved in 20% water is added in three instalments within one hour and the drumming continued for another hour. Boiling test for 3 minutes is performed with a piece of tanned hide taken from the thickest portion. No shrinkage is noticed. The actual shrinkage temperature of the tanned leather is found to be 112°C. The pH of the exhaust is about 4·3. The tanned goods are then washed twice first with 200% water for 10 minutes and again with 150% water for the same duration.

## Fatliquoring

The fatliquor is prepared with 3% castor oil, 1·5% sulphated fish oil, 0·5% sulphated pungam oil, 0·25% soft soap and 0·06% borax (on the raw weight). The ingredients are mixed together and emulsified with 20% water. The stock is taken with 60% water in the drum and the entire quantity of fatliquor is added to the running drum. Drumming is continued for 30 minutes by which time the bath gets exhausted. The liquor is then drained off and the goods are dry-drummed for 30 minutes. The leathers are then taken out for setting and staking.

## Setting and staking

The leathers are set out by machine and hung for drying. Next morning a second setting is given and the leathers are again hung up for drying. They are removed while still damp and after lightly wetting the dried portions with water using a brush, they are piled for an hour and then staked.

**Buffing, snuffing and trimming**

The staked leathers are aired off. When dry, they are buffed on the flesh side using 80 grit paper and on the grain side with 320 grit paper. They are then brushed and trimmed.

**Finishing**

1. LIGHT BLUE SHADE

*Bottom coat*: Bottom coat is prepared with 10 parts white pigment paste, 3 parts blue pigment paste, 0·4 part yellow pigment, 14 parts Bedacryl 188A (ICI) and 14 parts water. It is padded twice on the snuffed side of the leathers and then allowed to dry.

*Fixing coat*: Two spray coats of the fixing season are given. The season is prepared with 1 part casein, 1 part formalin and 1 part water. The casein and formalin are mixed after the latter has been diluted with an equal volume of water.

*Bottom clear lacquer coat*: The leathers are then sprayed with two coats of the clear lacquer prepared with 1 part spartan clear lacquer and 3 parts spartan thinner. The leathers are now found fast to dry-rubbing and almost fast to wet-rubbing.

*Pigment top coat*: Top coat consists of 1 lb. black pigment, 1 lb. blue pigment and water to make 2 gal. Two coats are sprayed on to the leathers carefully and then allowed to dry.

2. PRINTING AND PRODUCING TWO-TONE EFFECT

The leathers are then printed using antique grain and the pigment topping is rubbed off using a dramp cloth, thus producing the two-tone effect. They are then dried.

*Fixing coat*: Two coats of the formaldehyde fixing season are given.

*Top clear lacquer coat*: The leathers are sprayed with clear lacquer as described above to make them fast to wet and dry rubbing. The leathers are now measured and smooth-plated to improve the appearance. The finished leathers have an average thickness of 1·5 mm. and possess all the qualities required of upholstery.

# ROLLER SKINS FROM E.I. TANNED SHEEP SKINS

T. S. Ranganathan, Y. Nayudamma & B. M. Das

Roller leather is an important item amongst the leathers required by the textile industry particularly by the spinning units. The leather should be smooth, nonstretchy and absolutely level in substance. E.I. tanned sheep skins have for long been known to be ideal raw material for preparation of such leathers.

**Raw materials**

E.I. tanned red-haired sheep skins of a fairly large size without any grain defects are best suited for this purpose.

**Retanning**

The tanned skins are uniformly shaved to a thickness of about 0·8-1·0 mm. (shaving should be carried out accurately as the roller skins should be absolutely uniform in thickness) and then buffed. The skins are weighed, immersed in water and washed in three changes of water, each washing being done for 30 minutes. (Washing may be done in a drum if available).

The washed skins are bleached with 2-3% of any bleaching syntan on the shaved weight. A good bleaching action is obtained by drumming the goods with 2% Perfectan '0' (Malang Trading Corporation, Madras) and 0·5% oxalic acid, using sufficient amount of water for 30 minutes.

The skins are taken out and then retanned with a mixture of 10% wattle extract (or preferably quebracho extract) and 3% Perfectan '0' or any other acid syntan on the shaved weight. The float should be approximately 300% on the leather weight. The skins are drummed in this liquor for about 3 hours and left in it overnight. Next day, they are drummed again for a few minutes, taken out, rinsed and worked on the beam.

**Myrobing**

The skins are then treated with myrobalan liquor of 10°Bk for 2 days in wooden tubs using myrobalans of good quality. About 4 oz. myrobalans per lb. of leather are required for making the myrobalan

liquor. The skins should be hauled up and put back in the myrobalan liquor twice daily.

**Oiling**

The myrobed goods are then rinsed, worked over on the beam and oiled with a small amount of gingelly or groundnut oil on the grain, hung to samm, set well on a glass table and allowed to dry by tacking on boards to remove stretch. After drying the skins are piled for a few days and again shaved where the thickness is not uniform and buffed well.

**Seasoning**

A season is then applied on the grain by spraying. The season is prepared with 200 ml. 10% casein solution, 200 ml. 20% linseed mucilage and 100 ml. 40% formaldehyde and the mixture is made upto 1,000 ml. by adding water. The 10% casein solution is made by dissolving 10 parts casein with 2 parts liquor ammonia heating in sufficient water until the casein is dissolved. The solution is then made upto 100 parts with water. 20% linseed mucilage is made by heating 20 parts by weight linseed (washed and cleansed) in sufficient water, straining the mucilage so formed through a piece of cloth and making it up to 100 parts with water.

**Cutting**

The leathers are now dried, cold plated and cut into the proper size by using a frame (26″ × 22″) and again cold plated. The finished goods are now ready for sale.

For the production of a cheaper variety of roller skins, the retannage with a vegetable tanning extract is avoided and the skins are treated with myrobalan liquor directly.