

STANDARDS GOVERNING THE SALE OF NORTH AMERICAN CATTLE HIDES

LEATHER AND HIDE
COUNCIL OF AMERICA

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I. Foreword

This guide was prepared by the Leather and Hide Council of America (LHCA) to fill a need for an up-to-date compilation of terms and practices used in the industry for the sale, take-up and delivery of North American cattle hides.

It is offered in the hope that a common understanding of terms and practices will benefit producers and users of hides alike.

The standards and definitions contained in this booklet reflect recommended practices endorsed by members of the LHCA. Each member of the Association has agreed to adopt these standards as guidelines in the selling, preparation and the shipping of hides to customers around the world.

The purpose of these standards is to provide buyers with the confidence that transactions concluded with Association members are delivered to agreed-upon best practices in the hide industry.

Non-LHCA members are encouraged to adhere to these standards.

Note to this revision:

These Standards were published by the United States Hide, Skin and Leather Association, the Leather and Hide Council of America predecessor organization, in August 2014.

This version, republished in July 2026, has been edited for formatting without substantive changes by the Leather and Hide Council of America.

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General Conditions

I. Elements of the Transaction

A. Sales Contract

- i) Sales of cattle hides should be subject to the terms of a written contract between the buyer and seller, which should be signed by both parties.
- ii) A contract may be either a private contract issued by the seller or buyer or the *International Contract # 6 - Hide and Skin*, as issued by the International Council of Tanners, of London, England, and by the International Council of Hides, Skins, and Leather Traders Associations, of Hong Kong, and recognized by LHCA. Where conflicts occur between these Standards and the *International Contract # 6 - Hide and Skin*, these Standards shall prevail.
- iii) Written communication between buyer and seller should follow the recommended methods prescribed in this document and should be confirmed at time of transaction.
- iv) Within the Sales Contract, the following could be included:
 - (1) Product Selection
 - (2) Quantity
 - (3) Weight
 - (a) Range
 - (b) Average
 - (4) Transaction Type
 - (a) Priced by Weight
 - (b) Priced by Hide Piece
 - (5) Delivery Point
 - (6) Shipping Dates
 - (7) Franchise
 - (8) Payment terms
 - (9) Inspection Details
 - (a) Method
 - (b) Place
 - (10) Recourse
 - (a) Claims Procedure
 - (b) Mediation
 - (11) Governing Language and Law. Unless otherwise stated, the governing language and law of the transaction is as stated in these standards.

B. Supporting Documentation

- i. Invoices - Shall show separately total gross weight, tare and net weight and the number of pieces
- ii. Bills of Lading
- iii. Weight sheets/Packing list
- iv. Health certificate (Where Required)
- v. Certificate of Origin
- vi. Heat Treatment Certifications (Where Required)

C. Hides can be sold either by weight or by hide piece

- i. Hides Sold by Weight
 1. Seller will invoice the Buyer based on the net shipped weights of the product after deducting for appropriate tare.
 2. Arrival weights should comply with the commercial terms after deducting the agreed upon in-transit weight franchise.
- ii. Hides Sold by Hide Piece
 1. Seller will contract for an average weight, based on an estimated forecast typically with a 2-4 pound (lbs.) spread. For example, in the case of a heavy selection, the contract would state "60/62 lbs." indicating the average weight and spread of the product.
 2. Arrival quantities of pieces (hides) together with the arrival weight are the determining factor in calculating average weights.

D. Average Weight Information

Unless otherwise specified, weights refer to average net shipping weights. In the case of minimum average shipping weights, the actual shipping weight should be not less than specified, nor should it exceed the specified average by more than 15%, unless otherwise agreed by the parties.

E. Inspection by Buyer's Representative or Agent

In the case of hides being inspected and weighed at origin prior to shipment by buyer's representative or agent, such inspection in writing is final and both hide quality and weights are considered approved by the buyer, with the exception of latent defects.

II. Standards for Delivery

The following conditions shall apply to mechanically flayed packer or processor-packer hides.

a. Weights

i. Weights and Ranges

1. Weights are to be published in pounds (lbs.) unless otherwise agreed upon between the Buyer and Seller.
2. Weight ranges are determined at the time of "take-up."
3. Actual weights for invoicing purposes are determined at the time of shipment.

ii. Weight Sheets shall include:

1. Details of hide weights reflecting gross, tare and net weights.
2. Description of the type of tare.
3. Break-down by individual package – namely pallet, bag, tub or combo.

b. Trim

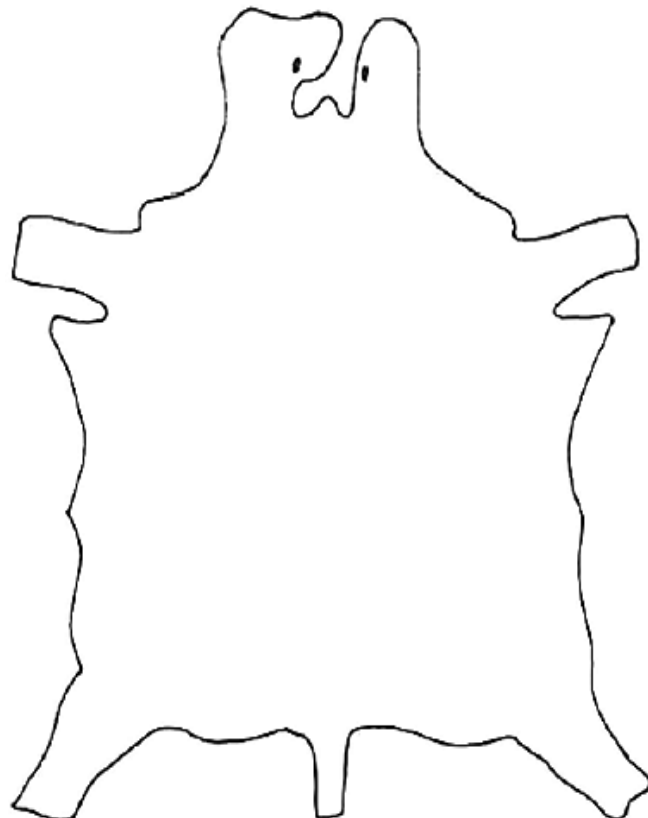
Shall be either:

i. Conventional (un-fleshed hides) (*Figure 1*).

1. The parts which are to be removed before salting or curing the hides are as follows: horns, snouts, lips, ears, tail bone, sinews, tendons.
2. Excessive meat and fat should be removed.

Figure 1:

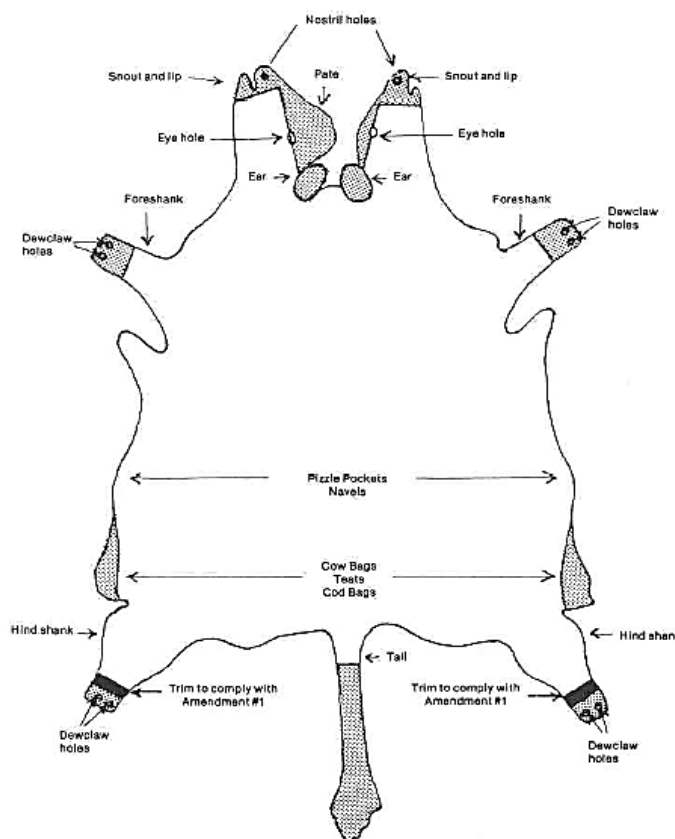
Standard or Conventional Hide Trim



ii. Modern Trim for Fleshed Hides (*Figure 2*).

1. Hide should be machine fleshed to remove most fat and meat.
2. Fleshed hides as delivered by the original supplier should not contain excess stringy or loose tissue and along the backs the fleshing should be deep enough to open but not remove the veins. During the winter season, the hides must be trimmed to conform to packer standards, and the hides must be processed through a fleshing machine. It is acceptable to reduce the fleshing factor in order to avoid causing manure damage to the hide.
3. Face pates, horns, snouts, lips, ears, tail bone, sinews, tendons should be removed.
4. Cow bags should always be removed, but navels should be left intact. Where possible teats and cod bags can be left on Steers and Heifers.
5. Maximum tail length should be 6 inches, cured and measured from the root.
6. In all cases kosher heads should be removed by cutting across the top of the kosher cut.
7. Fore shanks should be trimmed straight across either through the center of the knee, or just above the knee. Hind shanks should be trimmed straight across above the dewclaw holes.
8. Provided it is mutually agreed in writing by Buyer and Seller, an alternative trim pattern can be utilized.

Figure 2:
Modern Trim Pattern



c. Grades of Hides

Unless otherwise stated and agreed to by Buyer and Seller, the standard delivery for mechanically flayed packer or processor-packer hides should contain 80% #1s (firsts) and 20% #2s (seconds) as defined by the descriptions below.

In the case of hand flayed packer or processor-packer hides and small packer or casualty/renderer hides, a standard delivery should contain 70% #1s (firsts) and 30% #2s (seconds) based on the following descriptions:

- i. **#1 Hide.** A hide free from holes, cuts, deep scores or gouges more than half way through the hide, mechanical grain defects (as defined) and having a correct pattern. Exceptions: Brands and rear shanks containing one hole, regardless of the size within the confines of a brand, or cut below the hock that measures less than 1 inch in length and holes less than 4 inches from the edge of the hide which can be trimmed without spoiling the pattern of the hide shall not result in a downgrade.
- ii. **#2 Hide.** A hide that contains either:
 - a. One to four holes, cuts, deep scores or gouges in an area located inside a straight line drawn through the break in the hair of the fore and hind shanks.
 - b. A grain defect no larger than 1 square foot.
 - c. See also section D.1. Patterns for off-pattern #2 hides.
- iii. **#3 Hide.** A hide that contains either:
 - a. Five or more holes, cuts, deep scores or gouges in an area located inside a straight line drawn through the break in the hair of the fore and hind shanks.
 - b. One hole or cut over 6 inches in length.
 - c. An area of warts or open grub holes larger than 1 square foot.
 - d. See also Section D.2. Patterns for off-pattern #3 hides.

Additional Terms for #3 Hides

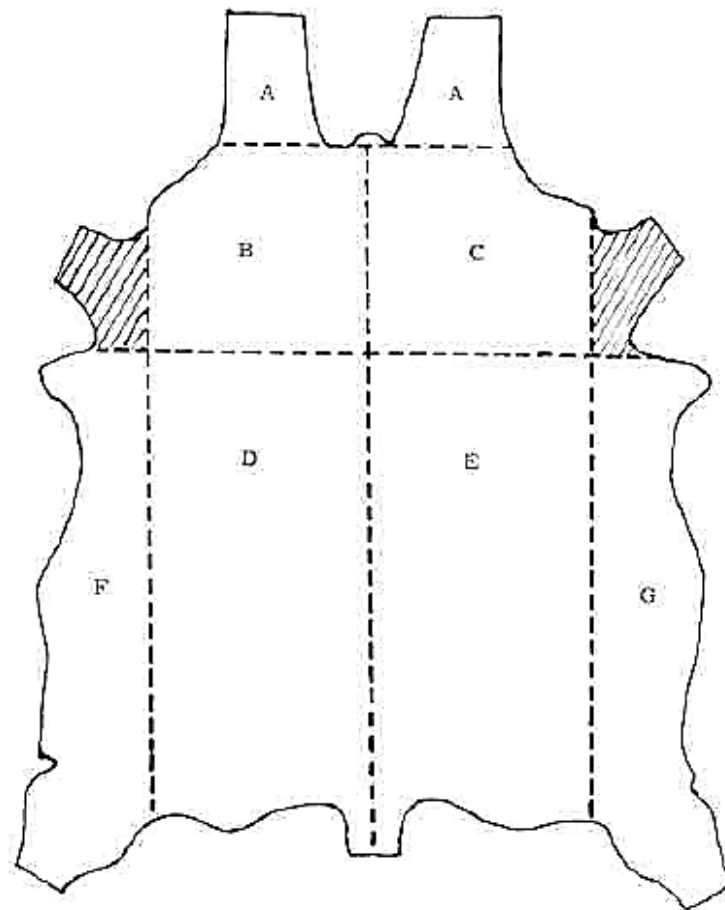
- e. A machine damaged hide will be considered a #3 hide if at least 50% of the surface area of the hide is present and usable for leather manufacture. If less than 50% is present the hide will be considered un-tannable.
- f. Hair-slip hides cannot be delivered without consent of the buyer before shipment.
- g. Seller should not deliver #3 hides without consent of the buyer.
- h. Renderer #3 hides will contain hair-slip hides.

d. Pattern

- i. **#2 Off Pattern Hide.** A hide will be considered to be an off-pattern #2 hide if any of the shaded areas are missing, or if in areas F or G (see Figure 3), a hind shank is partially missing, at a point below the narrowing of the shank. In the shaded tail-root area, if the hide is ripped out less than 12 inches into the butt of the hide, the hide will still be considered a #2 hide.
- ii. **#3 Off Pattern Hide.** A hide will be considered to be off-pattern #3 hide if any portion of the areas B,C,D or E are missing, or in the areas F or G, (see Figure 3), a hind shank is missing part a point above the narrowing of the shank. In addition, if the shaded tail-root is ripped out more than 12 inches, the hide is considered a #3 off-pattern hide.

Figure 3:

Subdivisions of a Hide



HEAD.....	A	CROP.....	A+B+D or
SHOULDER.....	B+C		A+C+E
BEND.....	D or E	BACK.....	B+D or C+E
BELLY.....	F or G	CROUPON.....	D+E
SIDE.....	A+B+D+F or	DOSSET.....	B+C+D+E+A or A
	A+C+E+G	CULATTA.....	D+E+F+G

F and G includes shaded area except for culatta

e. Additionally, the following shall apply:

- i. No allowance for excess manure will be granted if the difference between the allowance deducted in shippers invoice and buyer's findings at the place of destination does not exceed 10%. Hand Flayed, Processor-Packer, Small Packer, and Casualty/Renderer Hides
- ii. The following conditions should be addressed in confirmations between Buyer and Seller for hand flayed packer or processor packer hides and small packer hides or casualty/renderer hides:
 - i. Weights
 - ii. Trim
 - iii. Grades

f. Damage Assessment

- i. In determining the extent of damage on an individual hide an area based on one square foot (1Ft²) will be utilized.
- ii. Hides exhibiting controllable defects will be assessed based on this measurement in terms of aggregated instances per hide. For example damage evident on both sides would be combined to determine if the area exceeded the standard one square foot (1Ft²).
- iii. Exception to the above would be defects that crack, break or mark the grain provided they were inherent in the living animal.

III. Receiving

a. Inspection - General:

A thorough inspection of all incoming product is the buyer's responsibility, and must be performed in a timely manner to insure fairness to both the buyer and seller.

b. Inspection Timeline for Quality:

Inspections for quality issues must be completed within 30 days of the last date of discharge at the ocean port of arrival. Buyer must give seller 5 days notification of a pending inspection via e-mail.

c. Waiver of Right to Make Claim:

Failure to inspect and notify within these time periods shall mean that the buyer has waived the right to make a claim.

d. Carrier/Container Seal Numbers:

Carrier and/or Container seals and numbers should be checked against all documents and this information should be provided to the seller upon request.

e. Container Inspection for Integrity:

Truck and/or Container should be inspected at time of receiving to ensure the integrity of the shipment before unloading.

f. Hide Inspections and Further Processing:

Hides must be inspected in the condition in which they were shipped, that is no further or partial processing must be attempted, without the express written consent of the seller, and at least 80% of the shipment shall be held in the original condition as received for the seller's inspection in the event of a discrepancy.

This condition could be waived if the buyer can demonstrate traceability back to the incoming hides having utilized an approved and certified system, for example the traceability protocols established by the LWG (Leather Working Group).

g. Seller's Inspection:

The seller shall have a period of 10 business days after the receipt of the notification from the buyer to either personally inspect the shipment or designate a representative to inspect on behalf of the seller.

The buyer will do everything reasonably necessary to assist in this inspection. If the seller or his designated representative does not inspect within this period, the seller has waived the right to inspect.

h. Brands:

In the delivery of native hides a 5% tolerance is permitted for brands. In the delivery of butt-branded hides, a 5% tolerance is permitted for side branded hides, based on hair inspection.

i. Latent Defects:

Defects caused by fleshing or hide processing attributable to a controllable defect after the hide has been removed.

Damage of this type includes:

1. Puller or clamp damage.
2. Other mechanical damage including specifically chatter and manure ball suck-out damage to the grain side of the hide, which cannot be seen in the hair state but is discovered after hair removal.

Damage needs to exceed in aggregate total 1 square foot (1Ft²) to classify the hide as a number 2. Damage exceeding in aggregate total of 3 square feet (3Ft²) will classify the hide as a No. 3. Damage exceeding 50% of the hide surface will classify the hide as un-tannable.

Buyer's remedy for damage attributed to hide removal and processing can be warranted provided timely notification has been given for evidencing this damage. Buyers shall have recourse when latent defects are discovered and authenticated by a mutually acceptable independent body, person or company provided they have been caused by a mechanical device post slaughter.

Defects which are inherent to the live animal and in the hide when removed from the live animal at the time of slaughter, including, but not limited to, grain scratches, insect bites, mange, sunburn, healed grub holes, mud and manure damage existing already at the time of slaughter are not latent defects and the seller is not responsible.

j. Weight Loss:

With the exception of points K & L below, hides are sold with a 5% weight franchise on both per piece and per pound (lbs.) sales. To establish weight loss, hides must be weighed on arrival using a properly certified official scale, capable of weighing the entire shipping container or truck at one time.

The container (or truck) should be weighed before and after unloading, and with the same conditions or same pulling device, driver weight or any other factor that could affect the weighing process.

Once gross arrival weight has been established a tare weight based on up to 10% of the load must be established.

Biffing the hide is allowed to remove excess salt and moisture. In case of weighing after 8 days from arrival in port, or 12 days if weighing is being done at an inland point, extra tare will be allowed as follows:

- i. 0.20% for each day in the first week
- ii. 0.10% for each additional day

When selling per piece or by hide, all weight loss variations and corresponding calculations are to be based on the minimum average weight sold/contracted.

k. Domestic Sales:

Hides are sold domestically with a 3% weight franchise on both per piece and per pound (lbs.) sales. To establish weight loss hides must be weighed upon arrival using a properly certified official scale, capable of weighing the entire shipping container or truck at one time.

The container (or truck) should be weighed before and after unloading, and with the same conditions or same pulling device, driver weight or any other factor that could affect the weighing process.

l. NAFTA Sales:

Hides are sold in the NAFTA market with a 3% weight franchise on both per piece and per pound (lbs.) sales. To establish weight loss, hides must be weighed on arrival at first port of entry, using a properly certified official scale, capable of weighing the entire shipping container or truck at one time.

The container (or truck) should be weighed before and after unloading, and with the same conditions or same pulling device, driver weight or any other factor that could affect the weighing process.

m. Piece Counts:

When hides are sold, the count tolerance is +/- 1% and no adjustment to the invoice count will be made, provided that other contract conditions are within contract terms.

IV. Hide Selections (See Reference Table on final page)

Hide Selections (unless otherwise stipulated):

1. Heavy Native Selection: Free of brands and will only contain Steer and Heifer hides, free of Cows.
2. Butt Branded Selection: Branded one or more times back of the break in flank and will only contain Steer and Heifer hides, free of Cows.
3. Colorado Branded Selection: Branded one or more times forward of break in flank and will only contain Steer and Heifer hides, free of Cows.
4. Heavy Texas Selection: Production from slaughter houses located in the greater Texas Panhandle area, and will only contain Steer and Heifer hides, free of Cows.
5. Branded Selection: Branded one or more times and will only contain Steer and Heifer hides, free of Cows.
6. Light Native Heifer: Steer and heifer hides within the agreed weight range, free of brands and free of cows
7. Light Branded Heifer: Steer and heifer hides within the agreed weight range, branded and free of cows.
8. Plump Native Cows: Hides from beef breeds cows that have calved, within the agreed weight range, free of brands.
9. Plump Branded Cows: Hides from beef breeds cows that have calved, within the agreed weight range, and branded.
10. Native Dairy Cows: Hides from milk breed cows that have calved, within the agreed weight range and free of brands.
11. Branded Dairy Cows: Hides from milk breed cows that have calved, within the agreed weight range and branded.
12. Native Bulls: Hides from heavy uncastrated males within the agreed weight range and unbranded.
13. Branded Bulls: Hides from heavy uncastrated males within the agreed weight range and branded.

V. Cure Information

Hide curing must be promptly attained by the utilization of curing salt or saturated brine solutions by appropriate commercial procedures. Inadequate curing, resulting from excessive delay prior to curing, is detected by the staling test. Thoroughness of cure is determined by analyses of the lot sample for moisture and ash (equivalent to salt).

Properly cured hides will show no attack on the gelatin film and receive a zero (0) rating, indicating acceptable cure quality. A film rating of one (1) after an hour of testing demonstrates some hide damage which can be detected by histological examination. Ratings of two (2) or three (3) in thirty minutes or in one hour indicate progressive damage which can result in poor leather quality.

A well-cured green-salted or a well cured brined hide will have a moisture content between 40 and 48 percent. The brine saturation in the lot at the time of sampling shall be equal to or greater than 85%.

Brine saturation below 85%, in and of itself, shall not constitute grounds for a claim or rejection. In such cases the buyer should notify the supplier within seven days to determine what course of action to follow.

Brine saturation to be calculated per the following formula

$$\frac{\text{Total Ash to Moisture ratio} \times 100}{35.9}$$

35.9 is the grams of salt soluble in 100 grams of water. The moisture content should not be over 48% or under 40%. The percentages mentioned above apply to the thickest part of the hide used in producing leather.

Salt: The salt used in curing hides should be low in impurities and its size not in excess of 3/8" in diameter. Solar salt should not be used because it is high in minerals. If it is used the hides should not be stored for long periods.

Staling: Takes place when a green hide is delayed from going into cure and is subject to high proteolytic enzyme activity. The activity can be checked by applying the Staling Test on hide samples.

Note: See Appendix for recommended test methods.

VI. Definitions

- **Average Weight:** Calculation arrived by taking the total weight of the hides shipped and divided by the number of hides contained on a specific shipment. Where a contract covers multiple shipments then the overall average should comply with the agreed upon contracted average weight.
- **Belly:** Area of the hide up to the hair-break that runs from the front to rear shank – see (F) & (G) in Figure 3.
- **Bend:** Area of the hide below the shoulder and between the belly and the backbone – see (D) or (E) in Figure 3.
- **Brand:** Permanent mark applied to the hair/grain side either by a hot or freezing iron type device, location determines hide classification. Brand is not considered a grain defect.
- **Brine cure:** The process of hide preservation utilizing a device, vessel or bath that allows the hide to be immersed for a specified period of time to achieve adequate preservation.
- **Bull:** A male hide that originates from cattle retained primarily for breeding purposes.
- **Chatter damage:** A series of parallel gouges which occurs during the fleshing operation.
- **Clamp Damage:** Grain breaks in the hide caused by slippage of the hide within the clamp.
- **Croupon:** Double bend – see (D) & (E) in Figure 3.
- **Conventional:** An un-fleshed hide.
- **Cow:** A female hide that originates from cattle bred for milking or breeding.
- **Culatta:** Area of the hide excluding the shoulder and head –see (D,E,F,G) in Figure 3.
- **Cured hide:** A green salted or brine hide should have an ash to moisture content of between 40% and 48% and a brine saturation of 85% or better.
- **Dealer:** Company that will purchase, sell, warehouse and distribute hides.
- **Dosset:** Area of the hide excluding bellies – see (A,B,C,D,E) in Figure 3.
- **Face pate:** Center of the face, and to be removed in both conventional and fleshed hides.
- **Fleshing or Fleshed:** The removal of extraneous flesh, fat and meat from the flesh side of the hide. Deliveries of fleshed hides should not contain excess stringy or loose tissue and along the back the fleshing should be deep enough to open but not remove the veins.
- **Grades:** Category of hide determined by the number of defects, as outlined in the Standards.
- **Grain break:** Any hide having a mechanically derived defect on the hair side causing the grain to be broken 1 inch or more in length or diameter, or having two or more such defective spots which in aggregate total 1 inch or more in length or diameter.
- **Grubby hides:** Hide containing five or more grub hole. A Pepper Box is a hide in which the concentrated grub area covers one square foot or more. It is graded as a #3 hide.
- **Hair slipped hides:** Hide that has been allowed to degenerate to the extent that the hair and epidermis is loosened and can easily be removed. Epidermal tissue may be observed still attached to the ends on the tufts of removed hair.

- **Hand Flay:** The removal of a hide with knives and without assistance from a mechanical device.
- **Heifer:** Hide derived from a younger female that does not exhibit the same characteristics as a cow-hide and originates from cattle bred primarily for its meat.
- **Latent Defects:** Defects not visible in a hair inspection.
- **Manure Damage:** Mechanically caused damage to the hide caused by excessive manure on the hide. The damage can be in the form of “suck-outs” on the hair side or “chatter” on the flesh side.
- **Mechanical Flay:** The removal of a hide from the carcass assisted by a machine and limited use of knives.
- **Modern Trim:** Properly trimmed hide as per the Standards. See Figure2.
- **Packer:** Slaughterhouse where hides are removed from the carcass.
- **Pattern:** The shape of the hide after trimming. See Figure2.
- **Processor:** Hide operation where hides are received and handled.
- **Puller Damage:** Grain breaks in the hide caused by excessive pressure of the pulling device.
- **Range:** The upper and lower limits of weight that hides in a shipment should fall into at time of take-up.
- **Selection:** Describes the type of hide being sold and shipped.
- **Shank:** The area of the hide that covered each leg. See Figure2.
- **Shipment:** Delivery of the hides transported from the point of origin to the contracted destination. Shipment can reflect a single or multiple number of containers, trucks or vehicles utilized to transport the hides.
- **Shoulder:** Area above the croupon.
- **Side:** Area of the hide on either side of the back-bone. See (A,B,D,F) or (A,C,E,G) Figure 3.
- **Stains:** discoloration due to contamination.
- **Steer:** A hide from a castrated animal.
- **Suck-out:** Area of damage typically caused at fleshing and attributable to manure/mud balls.
- **Take up:** The method by which hides are removed from cure and packaged.
- **Trader:** Company and/or individual who acts as the principal in a transaction.
- **Trim:** Method by which the hide has been shaped – see Figure 2 to conform to the “Modern Trim Pattern” or Figure 1 for “Standard Hide Pattern” applicable to conventional hides.
- **Wet Salt:** The process of hide preservation by (directly) applying salt to both the flesh and hair side of the raw hide.

VII. Other General Conditions

a. Language.

The English language text of this standards document is definitive for purposes of interpretation.

b. Communication between Parties.

The English language communications between parties alone are definitive for purposes of interpretation. Communications must be in written form to be applicable, including electronic mail, facsimile, or post mail. Verbal communications and SMS (or text messaging) shall not be applicable communications for purposes of interpretation.

c. Applicable Law and Venue.

Unless otherwise specified in writing, the validity and performance of the contract shall be governed by the laws of the state or jurisdiction in the United States of America where the Seller resides or is incorporated. The venue shall be a court of competent jurisdiction located in that same state. Parties may agree, in writing, to alternative forms of dispute resolution, including international arbitration or mediation.

Appendix

I. Standard Test Method for Cure Evaluation of Salt Preserved Hides

a. Scope:

This method covers the estimation of degree of saturation of the brine content of salt-preserved hides and evaluation of the cure of the hides from the estimated brine solution and the moisture content.

b. Summary of method:

The moisture (volatile matter) and ash content of a composite specimen representative of a commercial lot of hide is determined. For purposes of calculation the ash is assumed to be equivalent to sodium chloride and the moisture (volatile matter) is assumed to be equivalent to water. The percent ratio of ash to moisture is calculated.

This ratio is divided by 35.9 (which is the percent of salt to moisture ratio in a saturated sodium chloride brine solution at 20°C) to estimate the percent of saturation in the brine solution of hides.

c. Significance:

The method is intended to evaluate whether sufficient salt has been retained by the hides to keep them from deterioration until they are permanently preserved by a tanning process and to provide a commercial standard for salt-preserved hides.

d. Terminology:

Terms used can be understood by reference to ASTM D1517. Standard definitions of terms relating to leather.

e. Apparatus and materials:

- a. Die to cut circular specimens 7/8 inch (22 mm) in diameter from hide samples.
- b. Clipping tools: scissors or clippers and/or razor blade for removing hair from hide specimen.
- c. Crucible, 30 to 50 ml, high form, platinum or porcelain.
- d. Oven
 - i. Vacuum Oven, capable of maintaining a temperature of 80°C $\pm$ 2°C, or

- ii. Circulating air oven, capable of maintaining a temperature of $100^{\circ}\text{C} \pm 2^{\circ}\text{C}$.
 - e. Phosphorus Pentoxide (for use with oven)
 - f. Electric muffle furnace with controller or rheostat and pyrometer, capable of maintaining a temperature of $600^{\circ} \pm 25^{\circ}\text{C}$.
- f. **Sampling and Test Specimens:**
 - a. Samples:
 - i. Lot sample – At least five (5) hides shall be randomly selected from the commercial lot. Each hide shall be sampled by removal of a plug at least two (2) inches in diameter. These plugs shall be located about two (2) inches away from the backbone and at least seven (7) inches inward from the root of the tail.
 - ii. The five (5) or more specimens shall immediately be hair-clipped and fleshed closely. The prepared specimens shall then immediately be place into a water-vapor impermeable plastic bag for transferal to the laboratory for analyses. Water absorptive identification tags shall not be placed within the sealed bags.
 - b. Test Specimens: A test specimen shall be made consisting of a circular cutting 7/8 inch (22 mm) in diameter. One test specimen shall be made from each hide plug in the sealed bag.
 - c. Test Specimens Composites: From the test specimens, test specimen composites shall be prepared using equal amounts from the test specimens.
- g. **Procedure:**
 - a. Cut test specimens from hide. Remove hair from specimen with scissors or clippers and/or razor blade. Some of this preparation may have already been done under sampling. Make test composites as described in 6.c. Dice the pieces of the composite into ¼ inch (6 mm) cubes. Weigh accurately (to 1mg) into a tared crucible 2 to 5 grams of test specimen composite. The entire procedure should be carried out with a minimum of moisture loss.
 - b. If using a vacuum oven (5.d.i) place crucible and specimen in vacuum oven. Put about 5 to 10 grams of phosphorus pentoxide in a glass petri dish and place in vacuum oven. Apply vacuum to oven, raise temperature of oven to $80^{\circ}\text{C} \pm 2^{\circ}\text{C}$. After 16 hours $\pm \frac{1}{2}$ hour remove crucible and test specimen, weigh and record to nearest $\pm .001$ gram.

- c. If using circulating air over (5.d.ii) place crucible and specimen in oven at $100^{\circ}\text{C} \pm 2^{\circ}\text{C}$. After 16 hours $\pm \frac{1}{2}$ hour remove crucible and test specimen, weigh and record to nearest $\pm .001$ gram.
- d. After the dried weight has been obtained by either method, the specimen may be pre-carbonized before being placed in the hot furnace. The specimen shall be placed in the hot furnace at $600^{\circ}\text{C} \pm 25^{\circ}\text{C}$ until constant weight is obtained (± 0.01 gram) Weigh and record weight.

h. Calculation:

- a. Calculate moisture (volatile matter) as follows:
 - i. A = original weight of test composite used and crucible
 - ii. B = weight of dried test composite and crucible
 - iii. C = weight of crucible
 - iv. $D = \text{moisture (Volatile matter)} = \frac{A-B}{A-C} \times 100$
- b. Calculate ash as follows
 - i. A and C as in 8.i
 - ii. E = weight of ash and crucible
 - iii. $F = \text{ash} = \frac{E-C}{A-C} \times 100$
- c. Calculate ash/moisture ratio in percent
 - i. $G = \text{ash/moisture ratio} = \frac{F}{d} \times 100$
- d. Calculate brine saturation
- e. $H = \text{brine saturation} = \frac{G}{35.9} \times 100$

i. Interpretation of results:

- a. Hide moisture contents below 40 indicate excessive hide dryness and will result in impaired leather quality caused by protein denaturation.

 Low moisture levels also can reflect inadequate curing resulting from inadequate bring (Tancous, Journal of American Leather Chemists Association, 67 1972, 488-508). An indication of this inadequate brining on hides whose moisture content is below 40 percent can be determined by the conversion procedure given by Tancous.
- b. Hide moistures over 48 percent in the sample indicate excess wetness of the hide and inadequate cure. Brine saturation of 85 percent may be inadequate for maintenance of hide quality during storage on these wet hides.

j. Report:

- a. The report shall state whether the vacuum oven or the circulating air oven was used in the tests. The brine solution and moisture values reported shall be the average of duplicate tests.

k. Precision and Accuracy:

- a. Deasy (Rf.1) found that the population standard deviation of the ash content of brine cured cattle hide was 0.5 Kallenberger and Lollar (Rf.2) found that the population standard deviation of the moisture of brine cured cattle hides by the vacuum oven method was 3.48. Utilizing a randomly selected lot sample of 5 hides, the standard deviation of the means would be
 - i. Ash $= 0.22$
 - ii. Moisture $= 1.56$
- b. Utilizing normal frequency distribution assumptions (which the data analyzed by Lollar (Rf.3) indicates), 95.5 percent of all means should be within these limits of the true mean
 - i. Ash ± 0.44
 - ii. Moisture ± 3.12
- c. The following table presents data which confirms these analyses and shows the resultant variability of the calculated brine solution.

l. Representative Variability Data

Hide Lot	% Moisture Duplicate Samples		% Ash Duplicate Samples		% Brine Saturation
1	42.76		14.80		
	40.20	41.49	14.81	14.66	98
	38.52		14.45		
	40.62	39.58	14.09	14.27	100
2	42.05		14.80		
	42.01	42.03	14.08	14.44	96
	42.37		15.09		
	39.75	41.06	16.02	15.56	106
3	46.90		12.07		
	46.54	46.72	12.21	12.14	72
	44.55		12.25		
	44.26	44.40	12.02	12.13	76
4	42.71		13.44		
	43.03	42.88	13.57	13.51	88
	45.08		13.50		
	44.81	44.95	13.67	13.59	84
5	46.86		11.10		
	45.58	46.21	11.01	11.06	67
	46.70		11.09		
	47.06	46.89	11.16	11.13	66

m. References:

- Deasy, D., JALCA, Vol. 51, 271-282 (1956).
- Kallenberger, W.E., and Lollar, R.M., JALCA, Vol. 74, 454-468 (1979).
- Lollar, R.M., Leather Manufacturer, Vol. 101, No 1, 14-15 (1983).

II. Method of Testing Salt Preserved Hides by Microwave Oven**a. Scope**

- a. These methods cover the testing of cured hides by microwave oven. The methods permit more rapid analyses of commercial hide lots than the Standard Method for Cure Evaluation.
- b. The test procedure appear in the following order:

	Sections
i. Moisture	4 to 6
ii. Chlorides (as NaCl)	7 to 10

b. Applicable Documents

- a. Journal of the American Leather Chemists Association, Vol. 74, 454, 1979.
- b. Journal of the American Leather Chemists Association, Vol. 76, 143, 1981.

c. Purity of Reagents

- a. Reagent grade chemicals shall be used in all tests
- b. Unless otherwise indicated, references to water shall be understood to mean distilled water.

MOISTURE**d. Scope**

- a. This method covers the determination of volatile matter (moisture) in all types of salt preserved hides.
- b. The test specimen composites shall be prepared as Section 6.b of the standard method.

e. Procedure

- a. Weigh sample dish to the nearest 0.01 g and record weight
- b. Transfer 5 ± 1 g of cured hide to dish and weigh. Record to the nearest 0.01g
- c. Microwave on full power (Amana RC-14, 1400 watt oven was used) for consecutive intervals of 20,40,40 and 40 seconds, allowing one to two minutes between intervals in ventilated space for evaporation. Microwave oven should be warmed briefly before first sample.
- d. Insert dish and hide in a mechanical convection oven at 100°C for 1 hour.
- e. Cool sample to room temperature and weigh. Record to nearest 0.01g

f. Calculations

- a. Calculate the percent volatile matter (moisture) as follows:

$$\text{i. Moisture, \%} = \frac{S-D}{S-B} \times 100\%$$

Where:

S= weight, of original specimen plus dish, g

B = weight of empty dish, g

D = weight of dried samples plus dish, g

CHLORIDES – AS NaCl**g. Scope**

- a. This method covers the determination of the total percentage of sodium chloride in cured hides. The sample is dispersed and the salt concentration measured with a Dicromat Salt Analyzer

h. Significance and Use

- a. The Dicromat Salt Analyzer measures solution conductivity. As a consequence, samples must only be cured with sodium chloride, with no other electrolytes added.
- b. Silver nitrate titration of chlorides can be used in place of the Dicromat Salt Analyzer, if precautions are observed to prevent complexation of silver nitrates.

i. Procedure

- a. Dice approximately 5g of cured hide into pieces no more than ¼ inch square.
- b. Weigh a 5 ± 1 gram sample of chopped hide and record. Transfer the sample to a 500 ml Erlenmeyer flask.
- c. Add 200 ml water to the flask
- d. Tightly cover the mouth of the flask with plastic wrap and make a single, tiny hole in the covering to allow pressure release.
- e. Initially microwave on full power for 90 seconds, followed by 3 minutes on low power. (Amana RC-14, 1400 watts full power and 700 watts low power)
- f. Cool samples for two hours at room temperature. Occasional agitation is desirable.
- g. Adjust sample volume to 200 ml by adding water. Allow the sample to remain in this measured volume.

- h. Prepare standard sodium chloride solutions by adding 0.25g, 0.50g , and 1.00 g of NaCl to 100ml volumetric flask and diluting to mark with distilled water. Run standard solution through the Dicromat Salt Analyzer and record readings. Plot readings versus salt concentration (g/100ml)
- i. Determine salt concentration with Dicromat Salt Analyzer by comparison to prepared standard sodium chloride solutions.

j. Calculations

- a. Calculate the percentage of salt as NaCl as follows:

$$\text{i. Chlorides, \%} = \frac{(A \times 2)}{B} \times 100\%$$

Where:

A =salt concentration, g/100 ml from plot

B = weight, of cured hide, g

k. Precision and Accuracy

- a. Section 2. Applicable documents present the data comparing results from these methods in comparison to the Standard Method.

- i. Moisture

	Vacuum Oven	Microwave
Population Mean	48.33	48.02
Population Standard Deviation	3.48	3.6

- ii. Ash

Six Samples	Standard Method	Microwave
Average	15.4	15.5
Average Range	14.3 – 16.8	15.0 – 16.1

- iii. These preliminary data indicate the two microwave methods for moisture and ash give equivalent results to the standard method. If the microwave methods are used this fact shall be stated.

III. Standard Test Method for Gelatin Film Rating on Salt Preserved Hides

a. Scope

- a. This method covers testing for the action of proteolytic enzymes in the juice pressed from hide onto the gelatin of photographic film.

b. Summary of Method

- a. Hair, manure and loose salt are removed from the hide sample. Liquid is pressed from the hide. The pH of the pressed liquid is adjusted to a pH between 7.0 and 7.6. Several drops of the pH adjusted juice are placed on a wetter gelatin film strip. The juice acts on the film strip for a fixed time and temperature (1 hour at 35°-39°C). The juice is rinsed off and the test film is rated for this action of the juice in removing layers of gelatin.

c. Significance

- a. Delayed cured hides (hides which have not been put directly into effective salt preservation immediately after flaying) contain higher concentrations of enzymes can be detected even after curing and storage by gelatin film test (Ref. 1 and 2). Enzymes from salt tolerant (halophilic) bacteria even on hides that have been properly processed may also attach gelatin and give positive film tests (Ref. 3).

d. Apparatus and Materials

- a. Clipping tools: Scissors to remove hair and manure from the hide samples
- b. Press: A press or vise to squeeze juice from the hide samples
- c. Petri dishes: 100mm diameter by 15mm high. One needed for each composite sample
- d. Short range pH paper: Short range pH paper which includes the range of 7.0 to 7.6
- e. Sodium hydroxide solution (1 percent): Dissolve 1 gram of sodium hydroxide in 100 ml of water
- f. Gelatin film strip: A ½ inch strip of 35mm photographic film. All films are not satisfactory. Kodak PX-135 is one film which has been found to be satisfactory
- g. Plastic tray with cover: A suitable size to fit incubator and hold desired number of tests
- h. Incubator: Incubator capable of setting to 35° - 39°C ± 2°C with thermoregulator system capable of holding incubator to ± 2°C of set point

e. Sampling**a. Samples**

- i. Lot sample – At least five (5) hides shall be randomly selected from the commercial lot. Each hide shall be sampled by removal of a plug at least two inches in diameter. These plugs shall be located about two (2) inches away from the backbone and at least seven (7) inches inward from the root of the tail.
 - ii. The five (5) or more specimens shall immediately be hair-clipped and fleshed closely. The prepared specimens shall then immediately be placed into a water-vapor impermeable plastic bag for transferal to the laboratory for analyses. Water absorptive identification tags shall not be placed within the sealed bags.
- b. Juice composites: The juice composites prepared from the five or more hide plugs shall consist as far as possible of equal amounts of juice from each hide plug.

f. Procedure

- a. Clip off the hair and manure from hide samples with scissors and knock excess salt off the area to be squeezed for juice. Some of this preparation may have already been done under the sampling.
- b. Squeeze hide samples with press or vise until a juice composite of 20 drops has been collected in a petri dish. Check pH of juice with indicator paper.
- c. If the initial pH is below 7.0 to 7.6 adjust pH to 7.0 to 7.6 with 1% sodium hydroxide solution. If the pH goes above 7.6 discard juice and start over.
- d. Place a few drops of water on each film strip to be used, allow it to remain 30 seconds and then shake off.
- e. Add 3 or 4 drops of hide juice composite which is adjusted to pH 7.0 to 7.6 onto film strip. Repeat for duplicate sample. Make control strip using water in place of hide juice.
- f. Place film strips in plastic tray. Cover to prevent excessive evaporation. Keep tray and film strips in incubator at 35°-39°C for 1 hour. Remove film strips and rinse gently. Examine the film strips while still wet for gelatin removal and compare with control strip.
- g. Grade film strips on a rating scale of 0 – 3 The rating scale is
 - i. 0 – The gelatin is intact
 - ii. 1 – The upper layer of gelatin film is removed where it was in contact with the hide juice. The film is hazy in this area when held against the light

- iii. 2 – Both upper and lower layers are partially removed where the film was in contact with the hide juice. Hazy and clear areas appear when the film is held against the light.
- iv. 3 – The gelatin film is completely removed where it was in contact with the hide juice. The whole area of the film is clear when the film is held against the light.
- h. A set of typical film strips for each rating may be prepared for comparison in rating future tests. The appearance of such a set is illustrated on page 579 of reference 1.

g. Interpretation of results

- a. A rating of 1 is an indication that some damage to the hide has occurred.
- b. A rating of 2 or 3 indicates that a greater damage to the hide has occurred.

h. Report

- a. The report shall state the number of hides used in making the juice composite and a rating value secured from each juice composite.

i. References

- a. (1) "A Test Method to Detect Delayed Cure in Hides." Rolf R Schmitt and Clara Deasy, Journal of American Leather Chemists Association, Vol. 58, 577 – 587 (1963).
- b. (2) "Additional Notes on a Test Method to Detect Delayed Cured in Hides." Rolf R. Schmitt and Clara Deasy, Journal of American Leather Chemists Association, Vol. 59, 361 – 364 (1964).
- c. (3) "Halophilic Bacteria Thrive in Season Cycles." Waldo E. Kallenberger and Robert M. Lollar, Journal of American Leather Chemists Association, Vol. 81, 248 – 264, (1986).

Hide Selections Reference Table

Guide to Packer Hide Selections
Estimated WeightsNet Weight Range
Pounds (LBS.) Cure

Selection	Type	Description	Trimmed & Fleshed
Extra Heavy Native	Steers & Heifers	Free of Brands	64 up
Heavy Native			47 up
Extra Heavy Butt-branded	Steers & Heifers	Branded one or more times back of break in flank	64 up
Butt branded			47 up
Extra Heavy Colorado (Side branded)	Steers & Heifers	Branded one or more times forward of break in flank	64 up
Colorado branded			47 up
Extra heavy branded	Steers & Heifers	Branded one or more times	64 up
Branded			47 up
Extra Heavy Texas	Steers & Heifers	Texas Panhandle Area Origin	64 up
Heavy Texas			47 up
Native – Light	Steers & Heifers	Free of Brands	55 down
Texas – Light	Steers & Heifers	Mix of Texas	55 down
Branded - Light	Steers & Heifers	Branded one or more times	55 down
Heavy Native Cows (Dairy)	Milk breed cows	Free of Brands	45 up
Native Cows (Dairy) light			45 down
Heavy Native Cows (Beef)	Beef breed cows	Free of Brands	45 up
Native Cows (Beef) Light			45 down
Heavy Branded Cows (Beef)	Beef breed cows	Branded one or more times	45 up
Branded Cows Light (Beef)			45 down
Selection	Type	Description	Cured Conventional
Native Bull	Males	Free of Brands	85 up
Branded Bull	Males	Branded one or more times	85 up

A stylized graphic of the American flag, featuring a dark blue field with white stars and red and white stripes, positioned on the right side of the page.

LEATHER AND HIDE

COUNCIL OF AMERICA

+1 (202) 587 4250

info@USLeather.org

4201 Wilson Boulevard, Suite 0604,
VA 22203, Arlington, Virginia, United States

USLeather.org