

## **Foreword**

The formulation of this national standard was initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) under the project entitled “Development of Standards for Slaughterhouse Equipment (for hogs)” which was funded by the Department of Agriculture - National Meat Inspection Services (DA-NMIS).

This standard has been technically prepared in accordance with BPS Directives Part 3:2003 – Rules for the Structure and Drafting of International Standards.

The word “shall” is used to indicate mandatory requirements to conform to the standard.

The word “should” is used to indicate that among several possibilities one is recommended as particularly suitable without mentioning or excluding others.

In the preparation of this standard, the following documents/publications were considered:

Global Spec: The Engineering Search Engine. GlobalSpec.com > Materials, Chemicals and Adhesives > Metals and Alloys > Stainless Steel Alloys. <http://materials.globalspec.com> (June 15, 2007).

Marks’ Standard Handbook for Mechanical Engineers. 8<sup>th</sup> ed. 1978. McGraw-Hill Book Company. New York.

Meat Inspection Code of the Philippines (Republic Act 9296) and its Implementing Rules and Regulations. Department of Agriculture. October 2005. Quezon City.

National Meat Inspection Commission. Guidelines on Meat Hygiene, Inspection and Preservation and Meat Inspection Regulations. January 1977.

Ninemsn Encarta Premium. <http://au.encarta.msn.com/>

PAES 407:2005 Agricultural Structures – Slaughterhouse for Swine, Small and Large Animals-General Requirements

Oberg, E. and F. D. Jones. Machinery’s Handbook. 9<sup>th</sup> ed. 1971. Industrial Press, Inc. New York.

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**Slaughterhouse Equipment – Dehairing Machine – Specifications**

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**1 Scope**

This standard specifies the requirements for dehairing machine used in the slaughtering of hog.

**2 References**

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this National Standard:

PAES 102:2000 Agricultural Machinery – Operator’s Manual – Content and Presentation

PAES 305:2000 Engineering Materials – Shafts for Agricultural Machines – Specifications and Applications

PAES 508:2007 Slaughterhouse Equipment – Dehairing Machine - Methods of Test

PAES 505:2007 Slaughterhouse Equipment – Hog Scalding - Specifications

**3 Definitions**

For the purpose of this standard the following definitions shall apply:

**3.1****carcass**

body of any slaughtered animal after bleeding and dressing

**3.2****dehairing**

removal of hair from the skin of an animal after scalding as part of the process of preparing its meat for food

**3.3****dehairing capability**

maximum weight of hog a machine is capable of dehairing per loading, expressed in kilograms

**3.4****dehairing efficiency**

ratio of amount of hair removed and the total amount of hair, expressed in percent

**3.5**  
**dehairing machine**  
**dehaier**

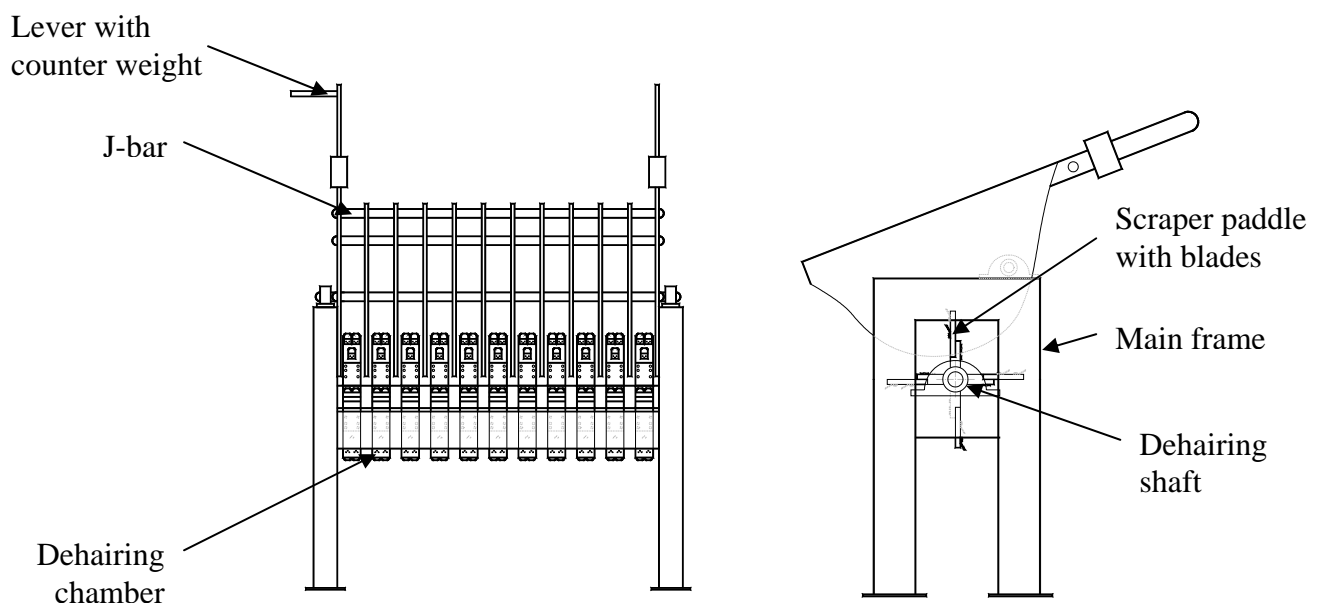
mechanical assembly equipped with rotating flexible paddles used in removing hair from animal carcass after scalding (Figure 1)

**3.6**  
**dehairing shaft**

high-grade solid steel shaft where scraper paddles are rigidly fastened

**3.7**  
**dehairing wheel**  
**star wheels**

circular bar with radial arms where scraper paddles are attached



**Figure 1 – Dehairing Machine and its components**

**3.8**  
**gambrelling table**

table used to receive and prepare dehaired carcass before suspending

**3.9**  
**“J” - bar**

ribbed mechanism that resembles a “J”- shaped structure that serves as support of the carcass during dehairing and also used in unloading dehaired hog

**3.10**  
**scalding**

subjecting animal into steam or hot water to prepare skin for dehairing

### 3.11

#### scraper blade

slightly bent steel material attach to the scraper paddle that is used to directly remove the hair

### 3.12

#### scraper paddle

resilient flexible rectangular block-shaped rubber which serves as a base material for the scraper blade

### 3.13

#### scraper paddle assembly

composed of three (3) or more paddles with blades attached altogether

## 4. Classification

Dehairing machine shall be classified as to

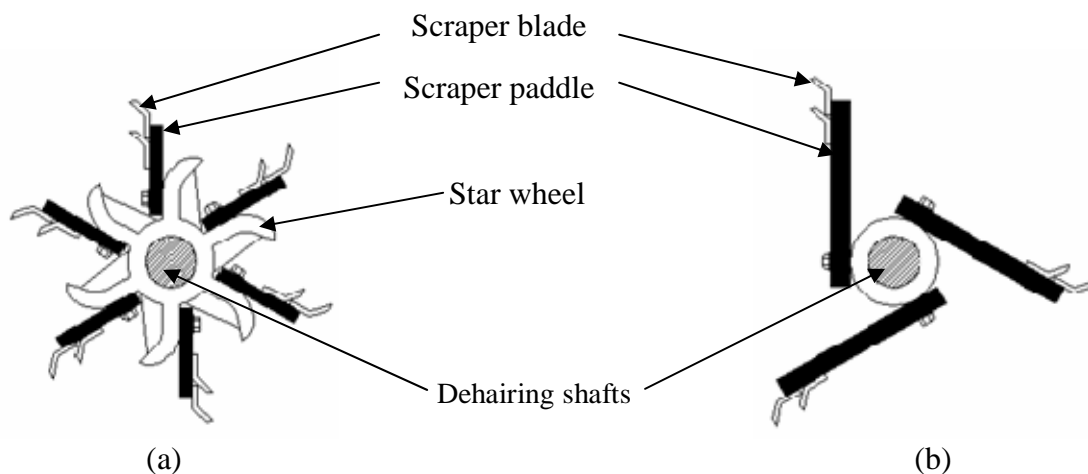
### 4.1. Presence of dehairing wheel.

#### 4.1.1. With dehairing wheel

Star wheels are present in the dehairing shaft where three to ten scraper paddles can be mounted (see figure 2a).

#### 4.1.2. Without dehairing wheel

Dehairing paddles are directly mounted to the dehairing shaft (see figure 2b).



**Figure 2. Dehairing shafts (a) with and (b) without dehairing wheel.**

## 4.2. Orientation of dehairing shafts

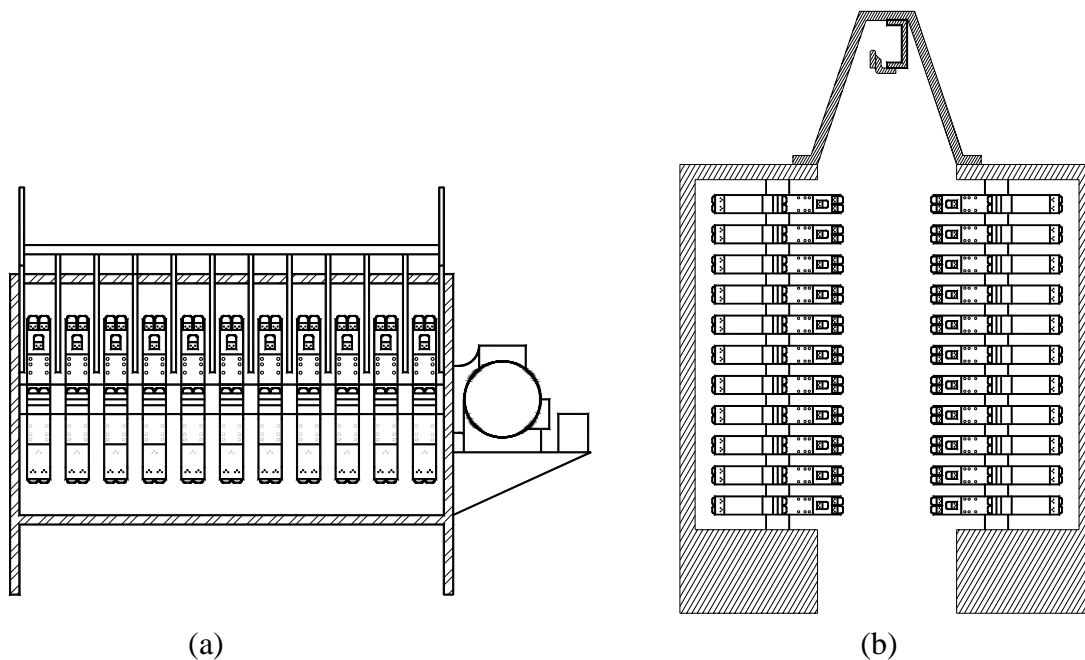
Classification of dehairing machine as to

### 4.2.1. Horizontal

Dehairing shaft is oriented horizontally where dehairing paddles are attached radially (Figure 3a).

### 4.2.2. Vertical

Dehairing shaft is oriented vertically where suspended hogs enter the dehairing chamber (see Figure 3b).



**Figure 3. (a) Horizontal and (b) vertical dehairing machine showing shafts' orientation.**

## 5 Principle of Operation

- 5.1 Proper scalding of the hog in accordance to PAES 505 must be attained before dehairing process will be done.
- 5.2 Dehairing machine is turned on and prepared for loading.
- 5.3 Immediately after scalding, the hog is unloaded from the scalding bath using the unloading cradle.
- 5.4 The “J”- bar assembly receives the hog by tilting the assembly using the lever with counter weight located at the side of the machine.

- 5.5** After receiving the hog, lever is released allowing the hog to enter the dehairing chamber for twelve (12) to fifteen (15) seconds until at least 95% of the hair is removed.
- 5.6** Hog is unloaded from the dehairing chamber through the J-bar to the front side of the machine where gambrelling table is located.

## **6 Fabrication Requirements**

- 6.1** Generally, the parts of the dehairing machine shall be readily serviceable. Stainless steel (i.e. Grade – 304 or higher series), heat resistant, non- corrosive or food grade used for the manufacture of the different components of the dehairing machine.
- 6.2** The main frame of the dehairing machine shall be made of non-corrosive material (e.g. stainless steel, minimum grade - 304). For square channel or I-beam not less than 5mm thickness and be able to withstand vibration during operation.
- 6.3** Scraper paddle shall be made of natural rubber material.
- 6.4** The scraper blade and shaft shall be made of stainless steel with high strength, corrosion resistance and hardness ASTM/ASME – A-182, A-276, A-479, A-564, 2300, 2303, 5629, 5643 and 5659 or its equivalent ISO standard.
- 6.5** Total number scraper paddle assembly installed in the dehairing shaft shall be at least twelve (12) for capacity not more than 80 kg or at least sixteen (16) for above 80 kg capacity. Scraper paddle assembly shall consist of at least three (3) paddles.
- 6.6** Minimum scraper blade installed in each scraper paddle shall be three (3).
- 6.7** Fasteners used for each scraper blade shall be three (3) one-half (½”) inch diameter, for paddles shall be three (3) – three fourths (¾”) of bolts and nuts.
- 6.8** The dehairing shaft shall be made of non-corrosive high-grade steel (e.g. stainless steel of designation 304 or 316 or its equivalent) and the minimum dehairing shafts diameter shall be within the safe torsional limit in accordance to the PAES 305.
- 6.9** The J-bar shall be made of ½”x2” stainless steel grade 304 flat bar.
- 6.10** Spacers between bars shall be made of ½” thick stainless steel (grade 306 or 316) bushing.
- 6.11** The power requirement of the motor shall not be lower than 2.24 kW (3 Hp).
- 6.12** The mode of transmission from the main driving device to the dehairing shaft shall either be in gears, chain and sprocket or belt-pulley, or its combinations.
- 6.13** Speed reduction from the main drive unit to dehairing shaft shall not be less than 1:100.

## **7 Performance Requirements**

The dehairing machine when tested in accordance with PAES 508 shall conform to the following requirements:

- 7.1** The minimum dehairing efficiency shall be 95%, considering good scalding operation has been observed.
- 7.2** The noise emitted by the dehairing machine measured 50 mm away from the operator's ear level shall not be more than 96 db (A)<sup>1</sup>.
- 7.3** The J-bar shall have a frame assembly for counterweight to guide and control motion.
- 7.4** Moving parts of the dehairer such as the dehairing shaft and J-bar assembly shall have grease points for lubrication.
- 7.5** The peripheral shaving speed of the machine shall be from 0.5 m/s – 0.7 m/s.

## **8 Safety, Workmanship and Finish**

- 8.1** All moving components shall be dynamically balanced for stable running with low noise levels.
- 8.2** Hubs and spacing collars shall have matching diameters and faces to afford a tight fit and to eliminate the formation of shoulders.
- 8.3** Spacing between cradle bars and ribbings shall be uniform and equal all throughout the assembly.
- 8.4** Dehairing paddles and blades shall be securely fastened with no movement from its base.
- 8.5** Surface of the dehairing machine shall not be painted.
- 8.6** The dehairing machine shall be free from unnecessary sharp edges and surfaces that may injure the operator and cause damage to the carcass.
- 8.7** Sealed type bearings should be used for protection against water and foreign material. There shall be provision for lubrication of non-sealed type bearings and bushings.
- 8.8** All welded parts shall be water- tight and/or air- tight and smoothly polished and it shall pass the visual inspection criteria (AWS D1.1:2000) for discontinuity of material.
  - 8.6.1** There shall be no crack on welded area.

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<sup>1</sup> Allowable noise level for four (4) hours of continuous exposure based on Occupational Safety and Health Standards, Ministry of Labor, Philippines, 1983.

- 8.6.2 There shall be fusion between adjacent layers of weld metal and between weld metal and base metal.
- 8.6.3 All craters shall be filled to provide the specified weld size, except for the end of intermittent fillet welds outside of their effective length.
- 8.6.4 Weld profiles shall be in its acceptable form.
- 8.6.5 Welded joints shall not be less than 4mm site fillet weld.
- 8.6.6 Undercut shall not exceed 2mm (1/16 inch) for any length of weld.
- 8.9 Cover or guard for pulley and/or belt mechanism shall be provided.
- 8.10 The scraper paddle and blade shall be easy-to-clean.

## **9 Warranty for Construction and Durability**

- 9.1 Warranty against defective materials and workmanship shall be provided for parts and services except for normal wear and tear of consumable maintenance parts such as belts and scraper paddle within one (1) year from the purchase of the dehairing machine.
- 9.2 The construction shall be rigid and durable without breakdown of its major components (i.e. dehairing assembly, etc) for at least one (1) year from original purchase.

## **10 Maintenance and Operation**

- 10.1 Each dehairing unit shall be provided with a set of fabricator's standard tools required for maintenance.
- 10.2 An operator's manual, which conforms to PAES 102, shall be provided.
- 10.3 Grease points for lubrication of axles shall be provided.
- 10.4 Water and corrosion resistant food grade grease shall be used.

## **11 Marking and Labelling**

11.1 Each dehairing machine shall be marked in English with the following information by directly punching in a plate and shall be positioned at the most conspicuous place:

- 11.1.1 Registered trademark of the fabricator
- 11.1.2 Brand
- 11.1.3 Model



**11.1.4** Serial number

**11.1.5** Input capacity, hogs/h (based on hogs input)

**11.1.6** Power requirement, kW

**11.1.7** Name and address of the fabricator

**11.1.8** Dehairing capability, kg

**11.1.9** Country of manufacture (if imported) / “Made in the Philippines” (if manufactured in the Philippines)

**11.2** Safety/precautionary markings shall be provided when appropriate. Marking shall be stated in English and Filipino and shall be printed in red color with a white background.

**11.3** The markings shall have a durable bond with the base surface material and shall be water resistant and under normal cleaning procedures, it shall not fade, discolor, crack or blister and shall remain legible.