

## **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 Service (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:

Chapter 2 -Establishment and Equipment Design and Construction New Establishment Approval Process. Canadian Food Inspection Agency. <http://www.inspection.gc.ca>. August 13, 2007

Chapter 8 - Noise and Vibration Aspects on Rail Road Goods Transportation. [http://www.infra.kth.se/jvg/Rapporter/0506E\\_inlaga.pdf](http://www.infra.kth.se/jvg/Rapporter/0506E_inlaga.pdf). August 30, 2007.

Guidelines for slaughtering meat cutting and further processing. “Techniques and hygiene practices in slaughtering and meat handling”. FAO Corporate Document Repository. Department of Agriculture. <http://www.fao.org/docrep>. May 22, 2007

<http://en.wikipedia.org>

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. Guidelining on Meat Hygiene, Inspection and Preservation and Meat Inspection Regulations. January 1977.

## **1 Scope**

This standard specifies the requirements for an overhead rail system for hogs.

## **2 References**

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

- PAES 102: 2000**      Agricultural Machinery – Operator’s Manual – Content and Presentation
- PAES 407: 2001**    Agricultural Structures – Slaughterhouse for Swine, Small and Large Animals – General Requirements
- PAES 512: 2007**    Slaughterhouse Equipment – Overhead Rail System for Hogs – Methods of Test

## **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**

#### **corbel**

horizontal protruding rectangular block from the column of the building that gives support to the main rail frame

### **3.3**

#### **gambrel**

horizontal supporting bar where carcass is attached through incision in the hind feet

### **3.4**

#### **hog side**

separate half of the split hog

### **3.5**

#### **hog trolley frame**

yolk-like flat steel bar where trolley wheel is mounted

### **3.6**

#### **hoist**

device used for lifting or lowering a load by means of a drum or lift-wheel around which rope or chain wraps

### **3.7**

#### **moving load capacity**

maximum load capacity of a rail track in a 1000 mm distance, expressed in kg

### **3.8**

#### **overhead rail**

suspended solid steel track used to hang and/or convey carcasses (see Figure 1)

### **3.9**

#### **overhead rail frame**

solid horizontal metal beam where rail track is securely fastened

### **3.10**

#### **rail hanger/bracket**

steel material that supports and holds the rail track suspended from the overhead rail frame

### **3.11**

#### **rail height**

height of rail measured from top of the rail to the floor

### **3.12**

#### **rail scale**

electronic weighing device integrated to an overhead rail system

### **3.13**

#### **rail spacing**

center to center distance or spacing between railings measured horizontally

### **3.14**

#### **rail switch**

mechanical retracting rail that allows change in direction of trolley

### **3.15**

#### **rail track**

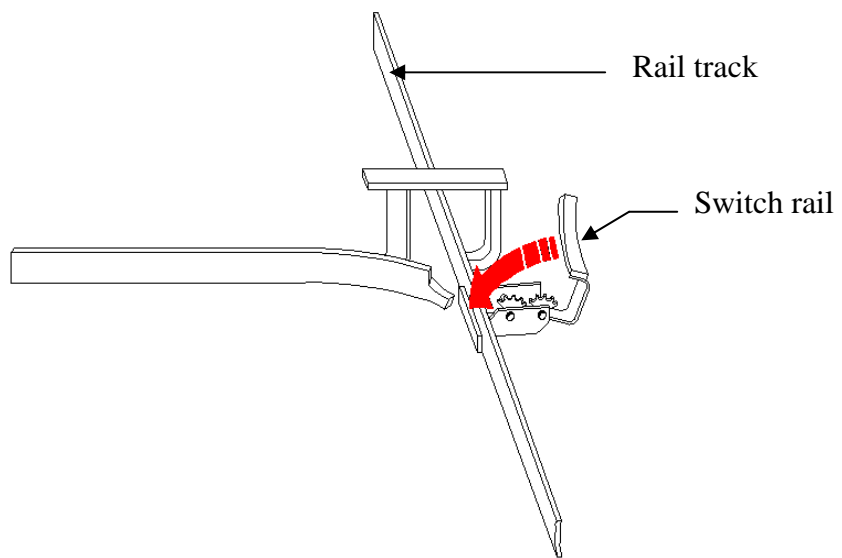
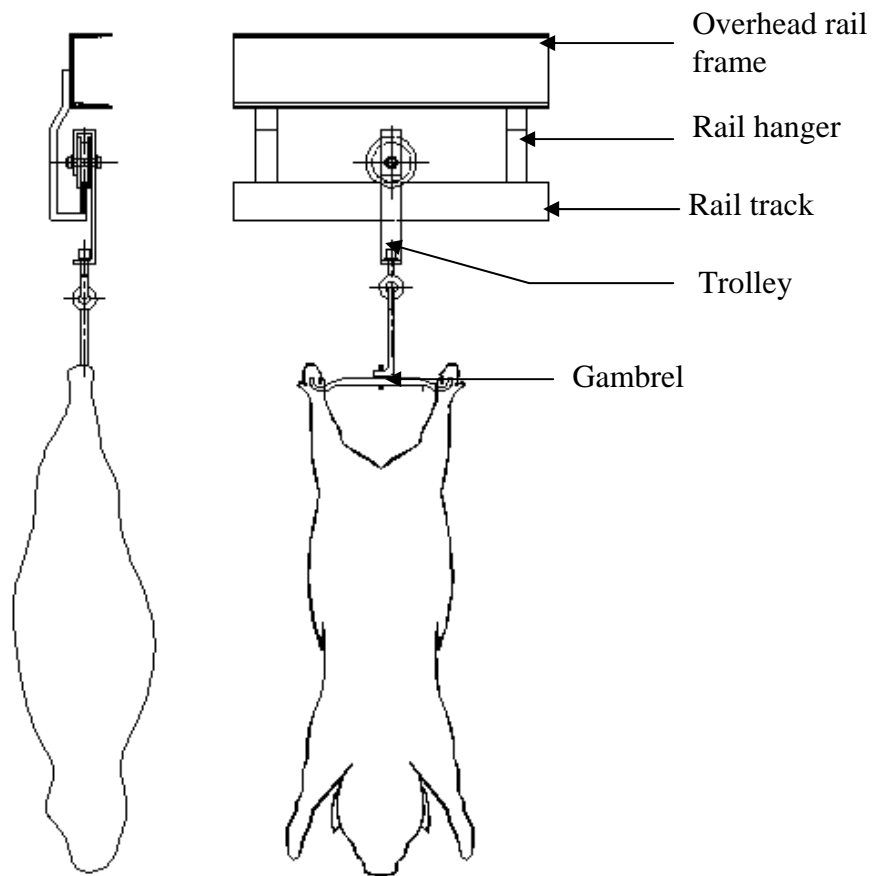
#### **rail**

conveyor track where trolleys are hanged and allowed to roll

### **3.16**

#### **retained rail**

rail branch where suspected carcass is diverted for further inspection



**Figure 1. Parts of overhead rail with trolley**

**3.17**

**shackle chain**

**shackle**

solid metal chain used to tie or hold the hog through the feet for lifting

### **3.18**

#### **suspected carcass**

condition wherein the final judgment of the carcass cannot be ascertained and would therefore require further inspection and/or examination

### **3.19**

#### **track size/diameter**

specified dimensions of track rail, expressed in millimeters

### **3.20**

#### **trolley**

suspended metal carrier assembly with one (1) or two (2) wheels and a hook used to carry or transport carcass

### **3.21**

#### **trolley pin**

a shafting or a spindle that holds the trolley wheel in its frame

### **3.22**

#### **trolley swivel**

circular steel bar hook attached at the lower end of the trolley that allows rotation of the suspended hogs

### **3.23**

#### **trolley wheel**

circular pulley-like steel material that rolls freely on the rail

## **4 Classification**

Classification of overhead riling will be based according to:

### **4.1 Power Source**

Movement of trolleys along the rail shall depend on the power drive.

#### **4.1.1 Manually operated**

Manual pushing/pulling or gravitational force allows the trolley to slide on the overhead rail, which usually start in the gambrelling point.

#### **4.1.2 Semi-mechanized**

Operation of the riling system is not continuous such that only selected portion of the slaughtering process is mechanized (i.e. elevator and lowerator).

#### **4.1.3 Mechanized**

Operation of the riling system is continuous at a constant speed of travel.

## 4.2 Number of Track

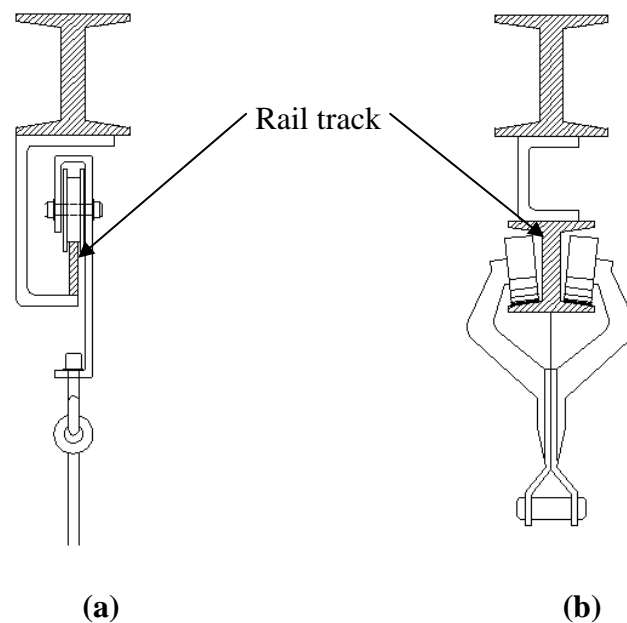
One or two rail tracks are present in the system.

### 4.2.1 Monorail Track

Overhead railing consists of one-rail track for trolleys (see Figure 2a).

### 4.2.2 Double-Rail Track

Two-rail tracks are provided for each trolley. Normally, an I-shaped beam is used for this type of rail (see Figure 2b).



**Figure 2. Monorail (a) and double-rail (b) track type**

## 4.3 Rail Shape

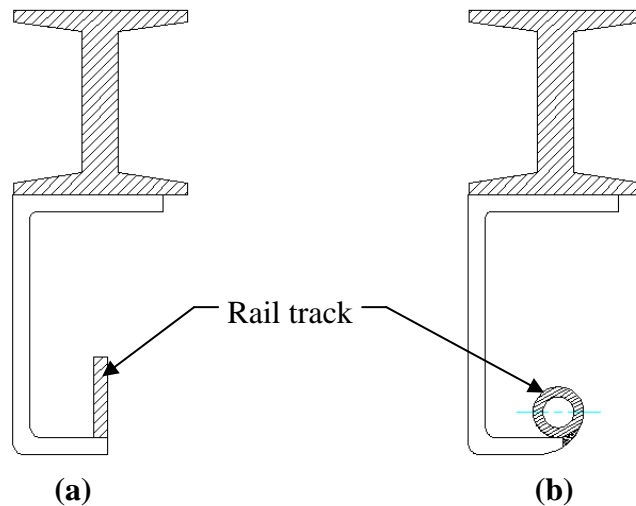
Shapes of rail track shall be based on:

### 4.3.1 Rectangular-Rail

A rectangular-shaped track, using rectangular bar (see Figure 3a).

### 4.3.2 Cylindrical-Rail

A cylindrical-rail track using round bar or tubular material (see Figure 3b).



**Figure 3. Rectangular (a) and cylindrical (b) rail track**

## **5 Principle of Operation**

The overhead rail system is used in slaughtering hog to ensure hygienic procedure.

### **5.1 Manually operated**

- 5.1.1** After dehairing, hog is hanged and gambrelled to overhead rail.
- 5.1.2** Once hanged, hog is carefully moved along the rail down to different area to complete the process (evisceration, splitting, and inspection and dispatch areas).
- 5.1.3** To change rail track or destination of the trolley with carcass, rail switches are used.

### **5.2 Semi-mechanized**

- 5.2.1** After stunning, hog is shackled and then hoisted using an elevator.
- 5.2.2** The downward slope of the rail track allows the hoisted carcass to freely move downward.
- 5.2.3** Before reaching the scalding vat, the lowerator ensures that the carcass will be released to the scalding vat at the desired weight.
- 5.2.4** After dehairing, carcass is again hanged to the overhead rail either manually or using a mechanical gambrelling mechanism.
- 5.2.5** Carcass is carefully moved along the rail down to the different areas to complete the process (evisceration, splitting, and inspection and dispatch areas).
- 5.2.6** While approaching the dispatch area, a lowerator is used to attain the desired dispatch height.

**5.2.7** To change the track rail or the destination of the trolley with carcass, rail switches are used.

### **5.3 Mechanized**

**5.3.1** Immediately after stunning, hog is shackled and then hoisted to moving rail equipped with motorized conveyor with pusher or a chain type conveyor.

**5.3.2** While moving, hog is stick and allowed to bleed on rail until it reaches another station where it is now ready to be scalded either, using a horizontal or a vertical scalding. Vertical scalding requires a more or less even or lower slope than using a horizontal scalding process where in the latter has an abrupt change in rail slope while carcass is slowly being submerged to the scalding vat until it is completely submerged. After complete submersion, the steep upward slope of the rail allows the carcass to be lifted from the scalding vat.

**5.3.3** Suspected carcass is detoured to the retained rail by switching the switch rail manually.

**5.3.4** Inspected and passed meat is then allowed to enter the hanging hall before dispatching or entering the chilling room.

## **6 Fabrication Requirements**

**6.1** Generally, the parts of the overhead rail system shall be readily serviceable. Mild steel shall be used for the manufacture of the different components of the overhead rail system.

**6.2** Primer coated mild steel or fully galvanized iron steel shall be used for beam or main frame. The main frame shall be made of I-channel steel beam with at least 152 mm x 152 mm x 24.5 kg/m (6" x 6" x 20 lb/in).

**6.3** The rail shall be a flat bar 12.7 mm (1/2 inch) or 15.9 mm (5/8 inch) X 63.5 mm (2 1/2 inches) welded or bolted. In case a circular track is used, 48 mm (1 3/4 inches) diameter schedule 40 GI pipe shall be used.

**6.4** A 19 mm (3/4 inch) diameter suspension rod shall be used to attach the main frame trolley to the building structure or on independent one.

**6.5** Rail hanger/bracket shall be made of a flat bar steel with distance between hangers not be more than 600 mm (24 inches) to avoid vibration and eliminate sagging.

**6.6** Rail switches shall be constructed of high carbon plow steel for toughness and durability. Rail switches shall be available for use with 12 mm x 76 mm (1/2" x 2.5") or 16 mm x 76 mm (5/8" x 2.5") track. Minimum capacity shall be 1500 kg.

**6.7** Grease points shall be integrated in switches, chains, etc. for lubrication of mechanical parts when necessary.



**6.8** The rail system shall provide at least 1 meter retained rail for suspected carcass.

**6.9** Moving or sliding contacts shall not be painted.

#### **6.9.1 Manually operated**

**6.9.1.1** The overhead rail system shall consist of the overhead main frame, overhead rail and rail hanger/bracket.

**6.9.1.2** The main frame shall satisfy the moving load requirement of 1000 kg.

#### **6.9.2 Semi-mechanized**

**6.9.2.1** The overhead rail system shall consist of the overhead main frame, rail track, rail switch, rail hanger/bracket, elevator, lowerator, rail scale and retained rail.

**6.9.2.2** The main frame shall satisfy the moving load requirement of 1000 kg

#### **6.9.3 Mechanized**

**6.9.3.1** The overhead rail system shall consist of the overhead main frame, rail track, motorized conveyor with pusher or chain, rail switch, rail hanger/bracket, elevator, lowerator, rail scale and retained rail.

**6.9.3.2** The main frame shall satisfy the moving load requirement of 2000 kg

### **7 Installation Requirement**

**7.1** The carcass hanging system shall be one (1) meter away from the walls, columns, air conditioners and other equipment or facilities that may contaminate the carcasses.

**7.2** Overhead rail shall be attached to columns or its corbel to avoid failure.

**7.3** Columns shall withstand the maximum load requirement for supporting the roof and dead loads derived from the live load and hogs carcass. For corbels, it shall support the maximum cantilever load developed by the main rail frame and load of the suspended hogs.

**7.4** The minimum rail spacing for hanging area and cold storage rooms for parallel rails shall be 1m.

**7.5** There shall be stoppers integrated in the rail system for manually operated type.

**7.6** Rail heights shall be sufficient to prevent suspended carcass from contacting the floor.

- 7.7 The minimum distance from top of the rail is 2700 mm to the finish floor line provided that the trolley hook is 450 mm for sticking and bleeding area.
- 7.8 The minimum distance from top of the rail is 3100 to the floor for dressing area.
- 7.9 The minimum distance from top of the rail is 2400 mm (without head) or 2700 mm (with head) to the floor for cold storage.
- 7.10 The designed speed of travel of trolley shall be 250 heads per hour for without load while 200 heads per hour for with load.
- 7.11 There shall be an adequate space between the top of the overhead rails and the ceiling to improve air circulation throughout the cooler. A vertical distance of about 600 mm (24 inches) shall be provided to accommodate rail hangers, hanger support beams, and air circulation.
- 7.12 Interlocking switches shall be provided to link rails to other rails.
- 7.13 Slope for normal hanging shall be 2 – 3 % while hog bleeding rail it shall be 5 %.
- 7.14 For manually operated type, the minimum radius of curvature for a 90° bend of rail shall be 400 mm.

## **8 Performance Requirements**

- 8.1 The overhead rail system shall support a maximum moving load of 1000 kg for manual type while 2000 kg for automatic type of rail system.
- 8.2 The minimum distance from trolley to trolley for cooling area shall be 300 mm (12 inches).
- 8.3 Rail scale to be installed shall be accurate, simple and made of corrosion resistant material. Minimum capacity shall be 500 kg at 0.1 kg accuracy.
- 8.4 Track vibration shall not be more than 20 Hz (85 g).

## **9 Safety, Workmanship and Finish**

- 9.1 Rail systems shall be securely attached on columns preferably to corbels with no movement from its base.
- 9.2 Interlocking switches shall be provided.
- 9.3 The overhead railings and its accessories shall be free from sharp edges and surfaces that may injure the operator and carcass.

**9.4** 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.

**9.5** 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.

**9.5.1** There shall be no crack on welded area.

**9.5.2** There shall be fusion between adjacent layers of weld metal and between weld metal and base metal.

**9.5.3** All craters shall be filled to provide the specified weld size, except for the end of intermittent fillet welds outside of their effective length.

**9.5.4** Weld profiles shall be in its acceptable form.

**9.5.5** Welded joints shall not be less than 4mm site fillet weld.

**9.5.6** Undercut shall not exceed 2mm (1/16 inch) for any length of weld.

## **10 Warranty of Construction and Durability**

**10.1** There shall be a one (1) year warranty for the fixed rails and six (6) months warranty for service and parts for motors and other electronic components except for normal wear and tear of consumable maintenance parts such as belts.

**10.2** The construction shall be rigid and durable without breakdown of its major components (i.e. main frame, rail, hanger/bracket, etc) for at least one (1) year from original installation.

## **11 Maintenance and Operation**

**11.1** Grease points for lubrication of trolley wheel shall be provided.

**11.2** Rails shall be coated with grease or edible oil.

**11.3** Food grade grease shall be used. For cooling area, food grade grease with very low freezing point shall be used to avoid solidification.

## **12 Marking and Labeling**

**12.1** Each overhead railing shall be marked in English with the following information by directly punching in a plate and shall be positioned at the most conspicuous place:

- 12.1.1** Month and year installed
- 12.1.2** Model and/or Serial number
- 12.1.3** Load capacity, kg/m
- 12.1.4** Power requirement, kW (if automatic)
- 12.1.5** Name of the fabricator
- 12.1.6** Country of manufacture (if imported) / “Made in the Philippines” (if manufactured in the Philippines)
- 12.2** 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.
- 12.3** 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.