
PHILIPPINE AGRICULTURAL ENGINEERING STANDARD PAES 517:2008
Slaughterhouse Equipment – Overhead Rail System for Large Ruminants –
Specifications

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 Large Ruminants” 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 preparation of this standard, the following documents/publications were considered:

Chapter 2 – Establishment and Equipment Design and Construction New Establishment Approval Process.<http://www.inspection.gc.ca/english/anima/meavia/mmopmmhv/chap2.shtml>

PAES 411:2000 Agricultural Structures – Slaughterhouse for Swine, Small and Large Animals – General Requirements

PAES 511:2007 Slaughterhouse Equipment – Overhead Rail System for Hogs – Specifications

LeFielle Product Line. http://www.lefiellco.com/co_specs/product.htm. March 25, 2008

Noise and Vibration Aspects on Railway Goods Transportation.
http://www.infra.kth.se/jvg/Rapporter/0506E_inlaga.pdf. March 31, 2008

Slaughterhouse for Cattle. <http://www.renner-schlachthaus technik.de/ne/products/rinderschlachtung.html>. March 28, 2008

Trolley and Rail Accessories. http://www.midwesternresearch.com/iw_products.m4p.pvx?;products_no_tree?company=INC?cat=19070. April 01, 2008

The Cattle Industry of the Region. http://home.websprinter.net/~dti10/products/cattle_ind1.htm. March 2008

Two Rail Conveyor System. <http://www.freepatentsonline.com/4232424.html>. March 14, 2008.

1 Scope

This standard specifies the requirements on fabrication, installation and performance for an overhead rail system for large ruminants such as cattle and carabao.

2 References

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

AWS D1.1:2000	Structural Welding Code – Steel
PAES 102:2000	Agricultural Machinery – Operator’s Manual – Content and Presentation
PAES 518:2008	Slaughterhouse Equipment – Overhead Rail System for Large Ruminants – Methods of Test

3 Definitions

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

3.1

bleeding

process of removing the blood from the animal before further handling

3.2

carcass

body of any slaughtered animal after bleeding and dressing

3.3

carcass side

separate half of the split carcass

3.4

corbel

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

3.5

dehiding

process of removing the skin of the animal

3.6

evisceration

process of removing the internal organs from the carcass

3.7

hoist

device used for lifting or lowering a load by means of a drum or lift-wheel

3.8

large ruminants

whom animal having rumen as part of its stomach such as cattle, carabao and buffalo

3.9

lowerator

motorized or hydraulic device that allows gradual descent of carcass along the rail

3.10

moving load capacity

maximum load capacity of rail expressed in kilogram per linear length

3.11

overhead rail

suspended solid steel track used to hang and/or convey carcasses in slaughtering operation

3.12

overhead rail frame

solid horizontal beam preferably metal where rail track is securely fastened through the rail hanger (Fig 1)

3.13

rail hanger

bracket

supports and holds the rail tracks suspended from the overhead rail frame (Fig 1)

3.14

rail height

distance measured from top of the rail to the finish floor line

3.15

rail spacing

center to center distance space between parallel rail tracks

3.16

rail switch

switch mechanism that allows change in direction of trolley (Fig 2)

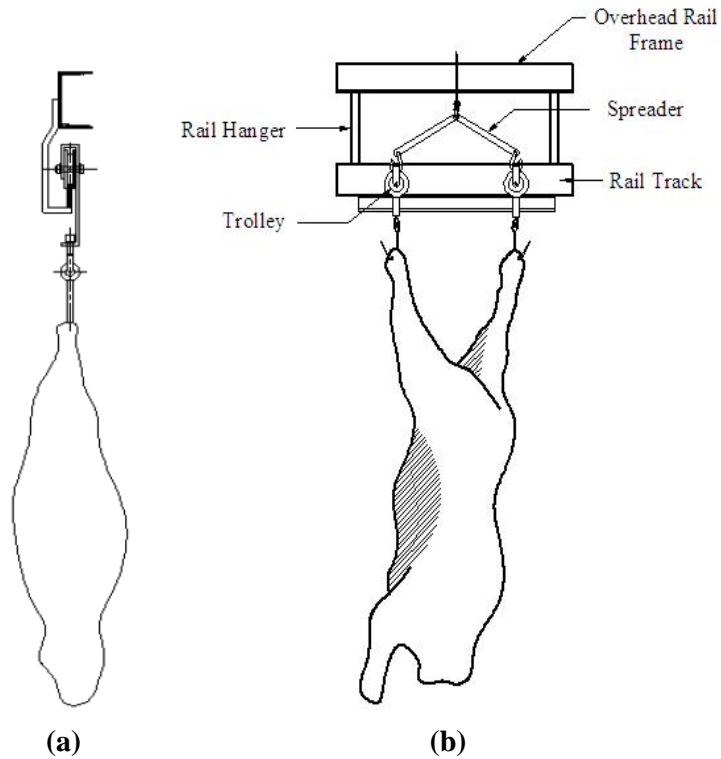


Figure 1. Parts of the overhead rail system. Side view (a) and front view (b)

3.17

rail track

rail

conveyor track where trolleys are hanged and allowed to roll (Fig. 1 and 2)

3.18

retained carcass rail

rail branch where suspected carcass is diverted for further inspection

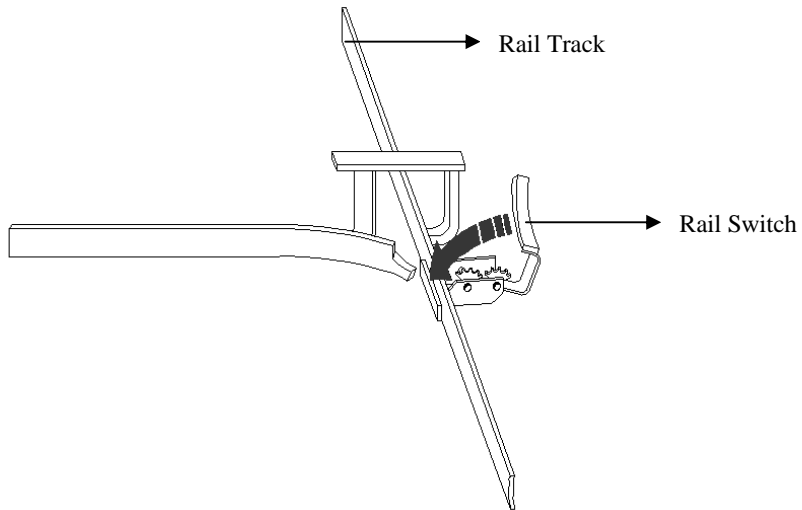


Figure 2. Rail switch of the overhead rail system

3.19

shackle chain

shackle

solid metal chain used to hold and hoist the animal through the hind leg

3.20

splitting

cutting or dividing the carcass into half through its backbone

3.21

spreader

horizontal supporting bar used for separating the hind legs of hung animal to a distance suitable for evisceration and splitting processes (Fig.1)

3.22

stopper

auxiliary part of the overhead rail system used to halt the trolley to slide on the rail tracks during operations.

3.23

suspected carcass

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

3.24

track scale

electronic weighing device integrated to an overhead rail system

3.25

track size

track diameter

specified dimensions of rail track, expressed in millimeters

3.26

trolley

suspended metal carrier assembly with one (1) or two (2) wheels and a hook used to carry or transport carcass (Fig. 3)

3.27

trolley frame

flat bar of non-corrosive materials that holds the trolley wheel, swivel and hook together (Fig. 3)

3.28

trolley hook

round stainless steel bar shaped into hook where the carcass is hung (Fig. 3)

3.29

trolley pin

shafting or a spindle that holds the trolley wheel in its frame (Fig. 3)

3.30

trolley swivel

round stainless steel bar hook attached at the lower end of the trolley frame that allows rotation of the suspended carcass (Fig. 3)

3.31

trolley wheel

steel pulley-like part of the trolley that rolls freely on the rail (Fig. 3)

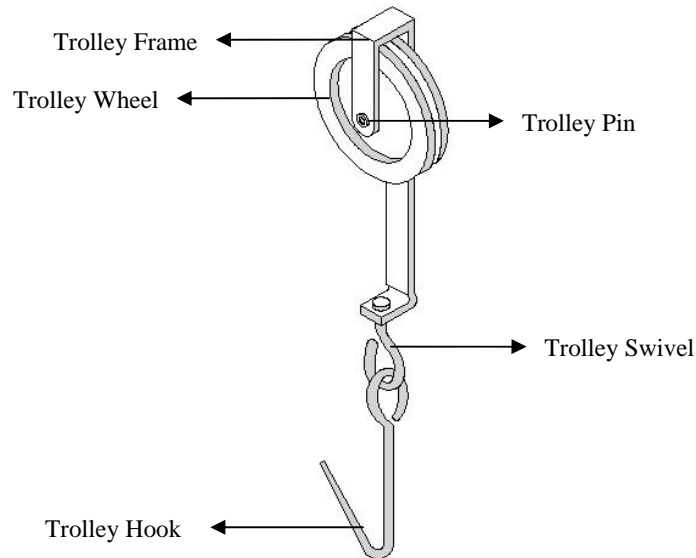


Figure 3. Parts of the trolley

4 Classification

Classification of the overhead raitling shall be based according to:

4.1 Power Source

Movement of carcass on trolley along the rail shall depend on the power drive.

4.1.1 Manually operated

Slight manually pushing/pulling animal/carcass on the trolley to move on the overhead rail system.

4.1.2 Semi-mechanized

Mechanized operations are only applied on selected portion of the slaughtering process (i.e. elevator and lowerator).

4.1.3 Mechanized

Fully-mechanized overhead railing system that operates continuously at a constant speed of travel.

4.2 Number of Tracks

One or two tracks are present in the system.

4.2.1 Monorail Track

Overhead railing that consists of one-rail track. (Fig. 4a)

4.2.2 Double-Rail Track

Two-rail track (normally, I-beam) are provided for two wheel trolley. (Fig 4b)

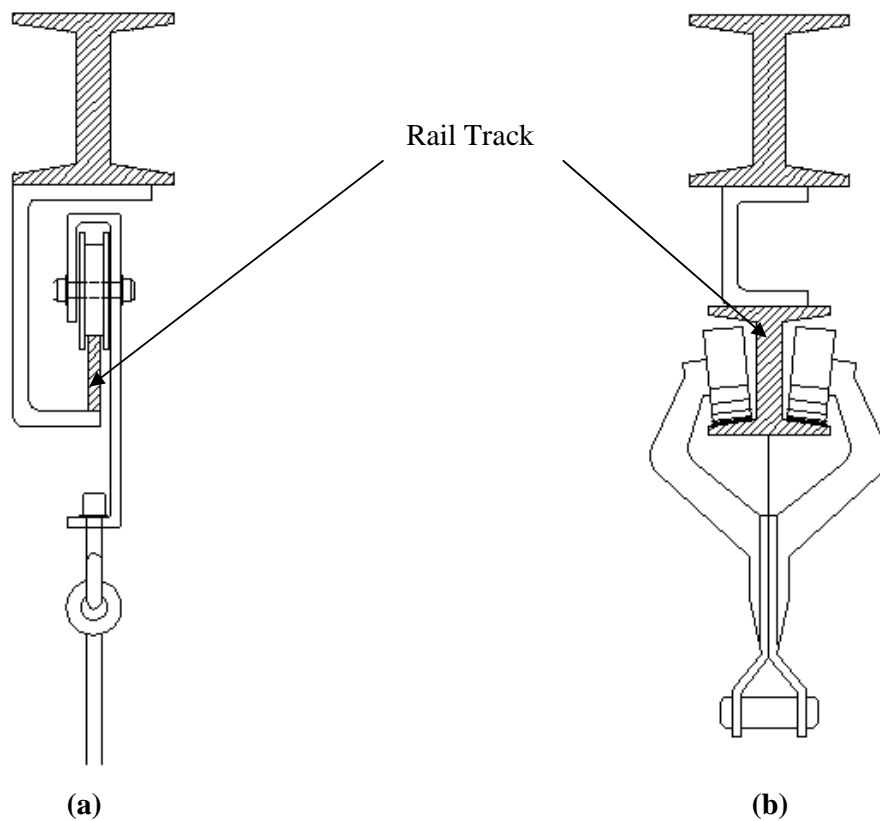


Figure 4 Monorail (a) and double-rail (b) type of track

4.3 Rail Shape

Shapes of rail track shall be based on:

4.3.1 Rectangular Rail

A rail using rectangular bar for its track. (Fig. 5a)

4.3.2 Cylindrical Rail

A rail using tubular or round bar material for its track. (Fig. 5b)

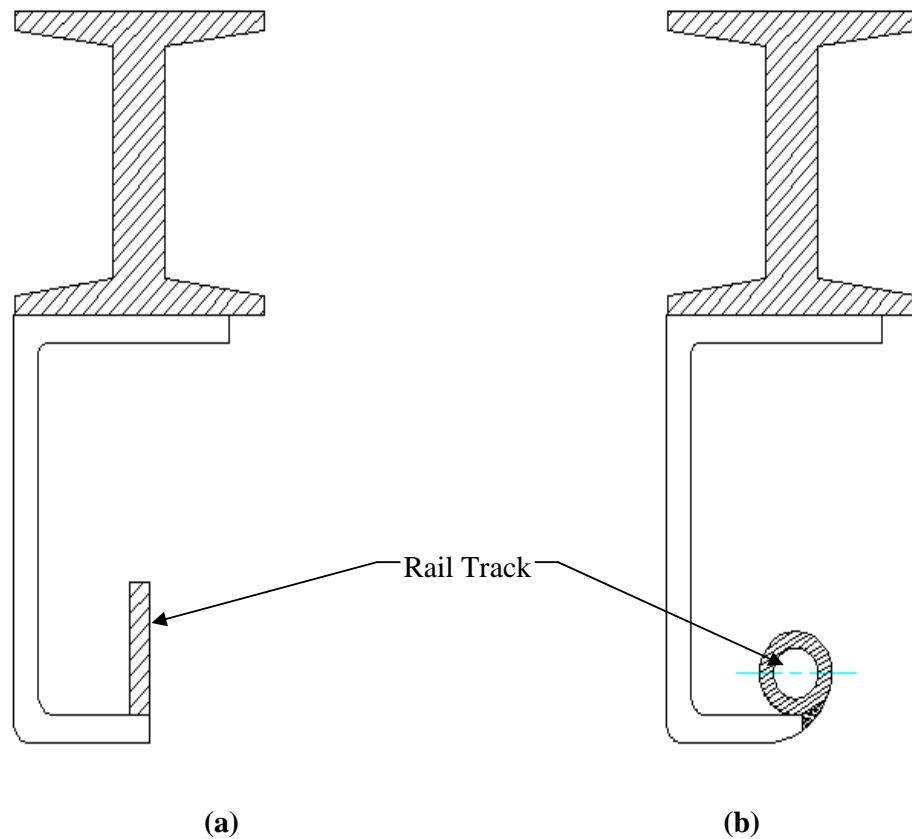


Figure 5. Rectangular (a) and cylindrical (b) shaped rail track

5 Principle of Operation

The overhead rail system is used in slaughtering large ruminants to ensure hygienic procedure and ease in the operation. (Fig. 6a and 6b)

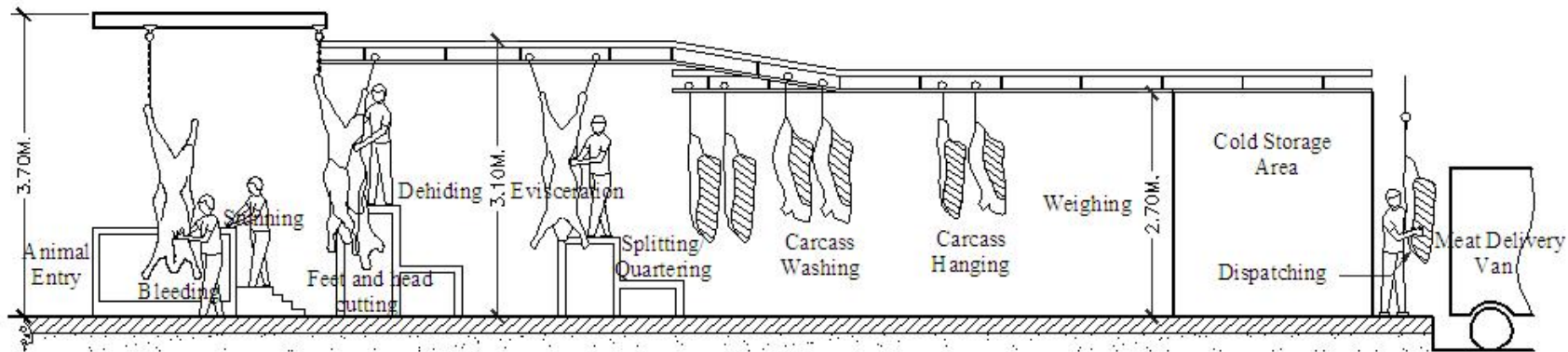


Figure 6a. Process flow diagram for manual type of overhead rail system for large ruminants

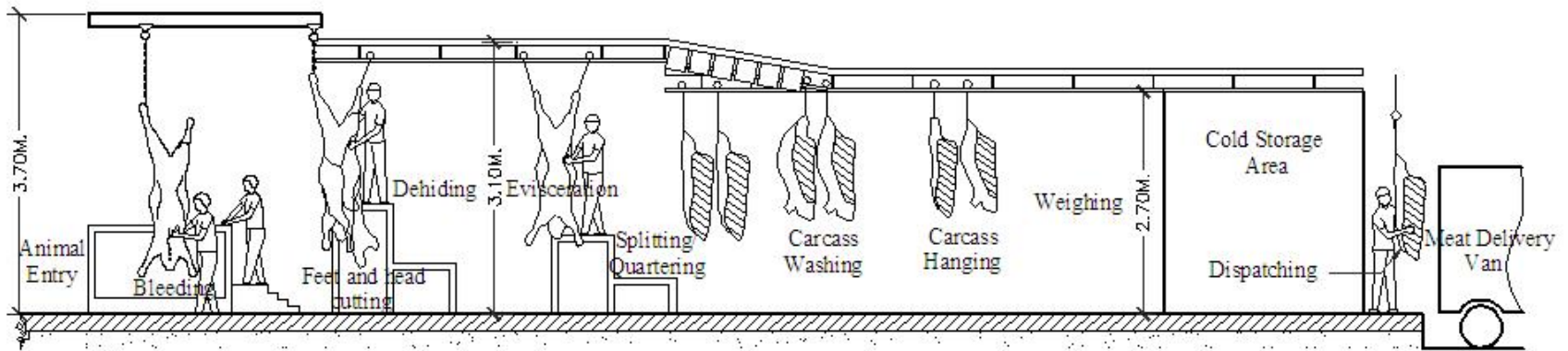


Figure 6b. Process flow diagram for semi-mechanized type of overhead rail system for large ruminants

5.1 Manually Operated

- 5.1.1** After stunning and bleeding, animal is hung using electric hoist and shackled to overhead rail.
- 5.1.2** The slope of 2%-3% of the rail track allows the animal to move downward to the dehidng/flaying area.
- 5.1.3** After dehidng, carcass is further move along the rail to the evisceration, splitting and inspection up to dispatch areas.
- 5.1.4** Rail switches are used to change rail track or destination of the trolley with carcass.
- 5.1.5** Rail is equipped with stopper to facilitate gradual descent movement of the carcass.

5.2 Semi-mechanized

- 5.2.1** After stunning, animal is shackled and hoisted using an electric hoist and then, bled on rail.
- 5.2.2** The slope of 2%-3% of the rail track allows the hoisted animal to move downward to the dehidng area.
- 5.2.3** After dehidng, carcass is further moved along the rail to the evisceration, splitting and inspection up to dispatch areas.
- 5.2.4** A lowerator is used to adjust the desired dispatch height while approaching the dispatch area.
- 5.2.5** Rail switches are used to change the rail track or the destination of the trolley with carcass

5.3 Mechanized

- 5.3.1** After stunning, animal is shackled and hoisted to the conveyORIZED rail.
- 5.3.2** The same process flow with semi-mechanized overhead rail system is used in slaughtering process
- 5.3.3** Suspected carcass is diverted to the retained rail.

6 Fabrication Requirements

- 6.1** Generally, the overhead rail system shall compensate with a moving load of two (2) tons per linear meter. The parts of the overhead rail system shall be made of steel and readily serviceable.

- 6.2 The main frame shall be made of I-steel beam with at least 152 mm x 152 mm x 24.5 kg/m (6" x 6" x 20 lb/in). This shall be properly coated for protection against corrosion.
- 6.3 The rail track when rectangular should shall have no sharp edges to avoid flaking off unto product and grinding down the inside groove of wheels. The rail track should be fully welded flat bar (e.g. 12.7 mm (1/2 inch) or 15.9 mm (5/8 inch) x 76 mm (3 inches)) or circular track (e.g. 48 mm (1 3/4 inches) diameter schedule 40 GI pipe). (Fig. 7)

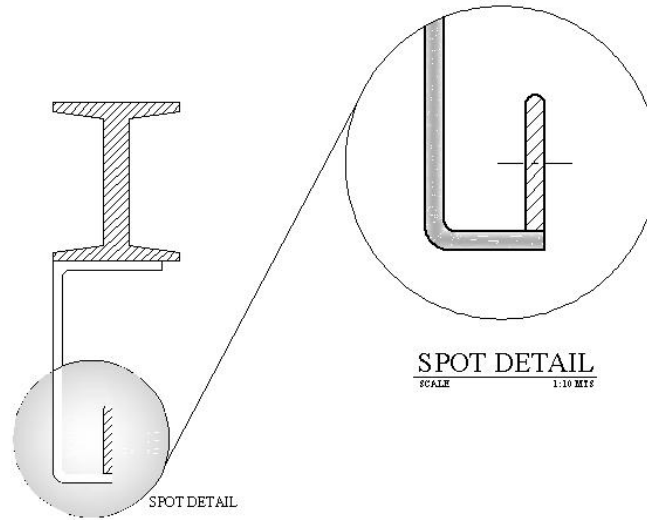


Figure 7. Round edges rectangular rail track

- 6.4 Rail hanger/bracket shall be made of flat bar. Materials used and distance between rail hangers shall be designed for the purpose of avoiding and eliminating vibration and sagging (e.g. 5 mm x 102 mm (3/16" x 4") with distance between hangers of not more than 600 mm (24 inches).
- 6.5 Trolleys of the overhead railing shall be made of at least 127 mm (5 inches) diameter stainless steel wheel, 16 mm x 178 mm (5/8" x 7") stainless steel grade 304 hook and 9.5 mm x 44.5 mm (3/8" x 1-3/4") black or stainless steel frame. Top of the rail to frame vertical distance shall be at least 137 mm (5-3/8") and top of the rail to hook vertical distance shall be at least 368 mm (14-1/2").
- 6.6 Spreader shall be at least 900 mm (3 feet) length and at least 13 mm (1/2 inch) thick stainless steel grade 304.
- 6.7 Rail track switches shall be constructed to withstand minimum capacity of 1500 kg.
- 6.8 The stopper shall have the ability to prevent the trolley to slide on the rail tracks during operations (dehiding, evisceration and splitting).

- 6.9 The rail system shall provide at least one (1) meter retained rail for suspected carcass.
- 6.10 Moving or sliding contacts shall not be painted.
- 6.11 Semi-mechanized and mechanized operated rail system should have lowerator, rail switch, track scale and retained rail. Leg transfer hoist shall be used in lieu of lowerator
- 6.12 Mechanized operated system shall be equipped with pusher or a chain type motorized conveyor.

7 Installation Requirements

- 7.1 The carcass shall be at least one (1) meter away from the walls, columns 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. (Fig. 8)

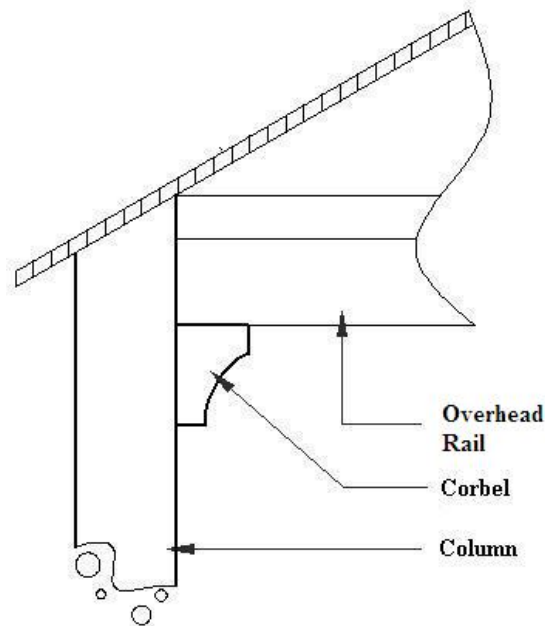


Figure 8. Overhead rail system attached on corbel

- 7.3 Columns shall withstand the maximum load requirements to support the roof, dead loads and live loads derived from the animals and carcasses. For corbels, it shall support the maximum cantilever load developed by the main rail frame and load of the suspended carcass.
- 7.4 There shall be stoppers integrated in the rail system for manually operated type.

- 7.5 Rail height shall be sufficient to prevent suspended carcass from contacting the floor.
 - 7.5.1 The minimum distance from the top of the rail is 3.7 meters (145.7 inches) to the finish floor line for sticking and bleeding area.
 - 7.5.2 The minimum distance from the top of the rail is 3.1 meters (122 inches) to the finish floor line for evisceration area.
 - 7.5.3 The minimum distance from the top of the rail is 2.7 meters (107 inches) to the finish floor line for cold storage area.
- 7.6 For optimized use of mechanized type of overhead rail system, the designed rated capacity should be at least 50 heads per hour.
- 7.7 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 at least 600 mm (24 inches) shall be provided to accommodate rail hangers, hanger support beams, and air circulation.
- 7.8 For manually operated type, the minimum radius of curvature for a 90° bend of rail shall be 400 mm.
- 7.9 The minimum rail spacing for hanging area and cold storage rooms for parallel rails shall be 900 millimeters (35.4 inches).

8 Performance Requirements

- 8.1 Overhead rail system shall support a maximum moving load of two (2) tons per meter.
- 8.2 Track scale shall have a length of at least 203 mm (8 inches) that is designed to weigh one (1) trolley at a time. It shall be accurate and made of corrosion resistant material. It shall be calibrated with a capacity of 2000 kg at 0.1 kg accuracy.
- 8.3 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 Grease points shall be integrated in switches, chains, etc. for lubrication of mechanical parts.
- 9.3 The overhead railings and its accessories shall be free from sharp edges and surfaces.

9.4 Sealed type bearings should be used for protection against water and foreign materials. 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.

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 fabrication 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 An operator's manual which conforms to PAES 102, shall be provided for mechanized type of overhead rail system.

11.2 Each overhead rail system shall be provided with a set of fabricator's standard tools required for maintenance for mechanized type of overhead rail system.

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 Testing

Testing of the overhead rail system shall be conducted on-site during commissioning. The overhead rail system shall be tested for performance in accordance with PAES 518.

13 Marking and Labelling

13.1 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:

13.1.1 Month and year installed

13.1.2 Model and/or Serial Number

13.1.3 Load Capacity, kg/m

- 13.1.4** Power requirement, kW (if mechanized)
- 13.1.5** Name of the manufacturer
- 13.1.6** Country of manufacturer (if imported) / “Made in the Philippines” (if manufactured in the Philippines)
- 13.1.7** Name and address of the importer, if imported.
- 13.2** Safety/precaution 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.
- 13.3** The markings shall have a durable bond with the base surface material and shall be heat and water resistant and under normal cleaning procedures, it shall not fade, discolor, crack or blister and shall remain legible.