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ICS 67.120

EAST AFRICAN STANDARD

Basic requirements for an abattoir

EAST AFRICAN COMMUNITY

Draft for comments only — Not to be cited as East African Standard

Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in East Africa. It is envisaged that through harmonized standardization, trade barriers which are encountered when goods and services are exchanged within the Community will be removed.

In order to meet the above objectives, the EAC Partner States have enacted an East African Standardization, Quality Assurance, Metrology and Test Act, 2006 (EAC SQMT Act, 2006) to make provisions for ensuring standardization, quality assurance, metrology and testing of products produced or originating in a third country and traded in the Community in order to facilitate industrial development and trade as well as helping to protect the health and safety of society and the environment in the Community.

East African Standards are formulated in accordance with the procedures established by the East African Standards Committee. The East African Standards Committee is established under the provisions of Article 4 of the EAC SQMT Act, 2006. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

Article 15(1) of the EAC SQMT Act, 2006 provides that "Within six months of the declaration of an East African Standard, the Partner States shall adopt, without deviation from the approved text of the standard, the East African Standard as a national standard and withdraw any existing national standard with similar scope and purpose".

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

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Introduction

Though millions of animals like sheep, goats, pigs and large animals are slaughtered every year, the conditions of abattoirs where these animals are slaughtered are far from satisfactory. These abattoirs have not been constructed on modern lines and they do not fulfill the requirements of hygiene, sanitation, public health and of the prevention of cruelty to animals. This standard has been formulated to help in improving the present conditions of abattoirs and in guiding the construction of new abattoirs on modern lines specially with a view to having greater utilization of slaughter-house by-products.

In the preparation of this East African Standard, the following sources were consulted extensively:

IS 4393:1979(R2005), *Basic Requirements for an Abattoir*

Codex Alimentarius website: http://www.codexalimentarius.net/mrls/pestdes/jsp/pest_q-e.jsp

USDA Foreign Agricultural Service website: <http://www.mrlatabase.com>

USDA Agricultural Marketing Service website: <http://www.ams.usda.gov/AMSV1.0/Standards>

USDA Plant Inspectorate Service website: http://www.aphis.usda.gov/import_export/plants

European Union: http://ec.europa.eu/sanco_pesticides/public

Assistance derived from these sources is hereby acknowledged.

Contents

| | | |
|------|--|----|
| 1 | Scope | 1 |
| 2 | Normative references | 1 |
| 3 | Definitions..... | 3 |
| 4 | Location and layout plan..... | 3 |
| 4.1 | Location..... | 3 |
| 4.2 | Layout plan..... | 3 |
| 4.3 | Separation of clean and unclean sections | 10 |
| 5 | Units in an abattoir..... | 12 |
| 6 | Rails for carcasses | 14 |
| 7 | Civil construction | 15 |
| 7.1 | Ante-mortem and pen area..... | 15 |
| 7.2 | Plant building..... | 15 |
| 7.3 | Vehicular areas for trucks | 16 |
| 7.4 | Drainage..... | 16 |
| 8 | Lighting and ventilation | 17 |
| 9 | Supply of water..... | 17 |
| 10 | Equipment construction | 17 |
| 10.1 | General..... | 17 |
| 10.2 | Accessibility for cleaning and maintenance | 18 |
| 10.3 | Non-acceptable materials..... | 18 |
| 11 | Installation | 19 |
| 12 | Plant waste water disposal | 19 |
| 12.1 | Disposal of waste | 19 |
| 12.2 | Catch basin for grease recovery | 19 |
| 12.3 | Manure removal..... | 20 |
| 13 | Safety requirement | 20 |

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Basic requirements for an abattoir

1 Scope

This standard covers the typical layout plan, hygienic and sanitary, and basic requirements for an abattoir for carrying out slaughter of sheep, goats, pigs and large animals.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CAC/RCP 1, *Recommended international code of practice — General principles of food hygiene*

CD-K-670:2010, *Bovine (beef) meat — Carcasses and cuts*

CD-K-671:2010, *Caprine (goat) meat — Carcasses and cuts*

CD-K-672:2010, *Ovine (sheep) meat — Carcasses and cuts*

CD-K-673:2010, *Porcine (pig) meat — Carcasses and cuts*

CD-K-692:2010, *Mutton and goat meat canned in brine — Specification*

CD-K-675:2010, *Edible meat co-products*

CD-K-683:2010, *Smoked bacon — Specification*

CD-K-692:2010, *Mutton and goat meat canned in brine — Specification*

CD-K-693:2010, *Animal casings — Specification*

CD-K-697:2010, *Code of hygienic practice for meat*

CD-K-699:2010, *Veterinary drugs residues in foods — Maximum residue limits*

CD/K/700:2010, *Ante-mortem and post-mortem inspection of meat animals — Code of practice*

EAS 5, *Refined white sugar — Specification*

EAS 12, *Drinking (potable water) — Specification*

EAS 35, *Edible salt — Specification*

EAS 38, *Labelling of prepackaged foods — Specification*

EAS 39, *Hygiene in the food and drink manufacturing industry — Code of practice*

EAS 41, *Fruits, vegetables and derived products — Sampling and methods of test*

EAS 103, *Schedule for permitted food additives*

EAS 123, *Distilled water — Specification*

ISO 936, *Meat and meat products — Determination of total ash*

- ISO 937, *Meat and meat products — Determination of nitrogen content (Reference method)*
- ISO 1442, *Meat and meat products — Determination of moisture content (Reference method)*
- ISO 1443, *Meat and meat products — Determination of total fat content*
- ISO 1444, *Meat and meat products — Determination of free fat content*
- ISO 1841-1, *Meat and meat products — Determination of chloride content — Part 1: Volhard method*
- ISO 1841-2, *Meat and meat products — Determination of chloride content — Part 2: Potentiometric method*
- ISO 2294, *Meat and meat products — Determination of total phosphorus content (Reference method)*
- ISO 2917, *Meat and meat products — Measurement of pH — Reference method*
- ISO 2918, *Meat and meat products — Determination of nitrite content (Reference method)*
- ISO 3091, *Meat and meat products — Determination of nitrate content (Reference method)*
- ISO 3496, *Meat and meat products — Determination of hydroxyproline content*
- ISO 4134, *Meat and meat products — Determination of L-(+)- glutamic acid content — Reference method*
- ISO 4831, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of coliforms — Most probable number technique*
- ISO 4832, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coliforms — Colony-count technique*
- ISO 4833, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of microorganisms — Colony-count technique at 30 degrees C*
- ISO 5554, *Meat products — Determination of starch content (Reference method)*
- ISO 5985, *Animal feeding stuffs — Determination of ash insoluble in hydrochloric acid*
- ISO 6491, *Animal feeding stuffs — Determination of phosphorus content — Spectrometric method*
- ISO 6579, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection of Salmonella spp.*
- ISO 7251, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of presumptive Escherichia coli — Most probable number technique*
- ISO 13493, *Meat and meat products — Determination of chloramphenicol content — Method using liquid chromatography*
- ISO 13496, *Meat and meat products — Detection of colouring agents — Method using thin-layer chromatography*
- ISO 13730, *Meat and meat products — Determination of total phosphorus content — Spectrometric method*
- ISO 13965, *Meat and meat products — Determination of starch and glucose contents — Enzymatic method*

ISO 21527-1, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of yeasts and moulds — Part 1: Colony count technique in products with water activity greater than 0.95*

ISO 21527-2, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of yeasts and moulds — Part 2: Colony count technique in products with water activity less than or equal to 0.95*

3 Definitions

For the purpose of this standard the definitions given in CD/K/700:2010 shall apply.

4 Location and layout plan

4.1 Location

Abattoirs may be located outside or on the periphery of a city or town and shall be away from an airport. Care should, however, be taken to see that these are easily accessible to the patrons and do not adversely affect the transport of meat to the market place. Main services, such as potable water, electricity and proper hygienic sewage disposal facilities, are a prerequisite and should be provided.

NOTE In case the construction is within the municipal limits, plan for construction shall follow the relevant bye-laws prescribed by the municipal authorities of the place.

4.2 Layout plan

4.2.1 The abattoirs shall have the following essential facilities:

- a) Resting place for animals before slaughter;
- b) Adequate facilities for ante-mortem inspection;
- c) Carrying out humane slaughter;
- d) Flaying, dressing and washing of the carcasses;
- e) Hanging carcasses and edible offal;
- f) Handling by-products;
- g) Inspection of meat and disposal of meat unfit for human consumption;
- h) Laboratory;
- j) Staff welfare;
- k) Segregation ward for sick/diseased animals; and
- m) Adequate water supply.

In addition, the facility may also be provided for rendering plant and an incinerator.

4.2.2 A flow diagram for basic operation of an abattoir is shown in Figure 1 for information and guidance only. The layout of entire abattoir, as far as possible, should have a forward flow.

4.2.3 A typical layout plan for slaughtering up to 400 sheep or goats and pigs or both per day is shown in Figure 2. The layout shows the two abattoirs with common separation wall and is for the regions where religious sentiments permit it. Typical flow diagrams for sheep and goats and pigs are given in Figure 3 and Figure 4 respectively. Typical flow diagram and layout plan for slaughtering up to 100 cattle per day are shown in Figure 5 and Figure 6 for information and guidance only. The plan may vary depending on shape and size of plot, number of animals to be slaughtered per day and individual requirements of a particular abattoir.

4.2.4 Should the retail or wholesale market for finished goods be required to be included within the complex itself, the same should be physically excluded from the rest of the establishment in such a manner that the customers have an access only to these sections where such business is transacted.

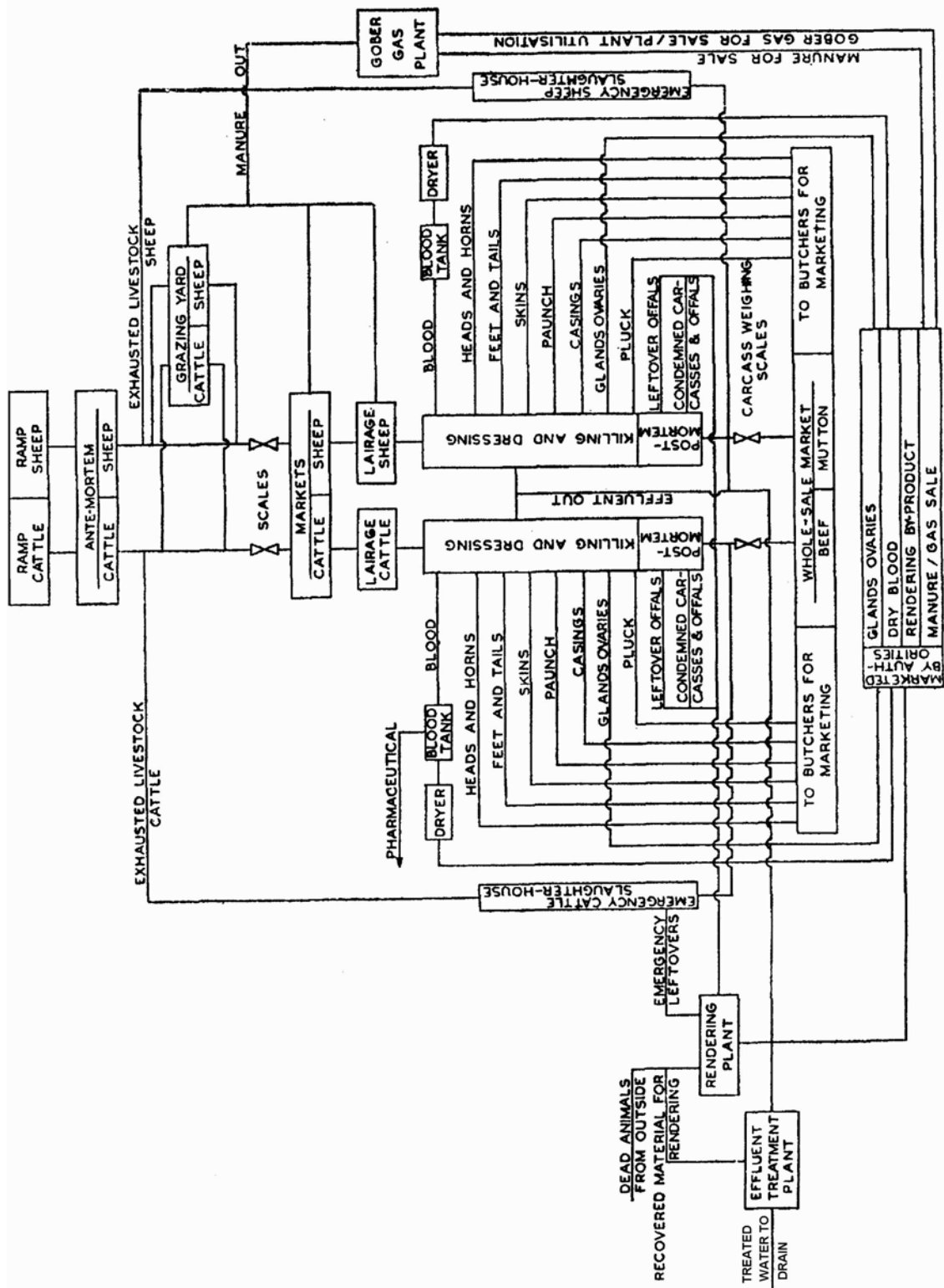


Figure 1 — Abattoir flow diagram

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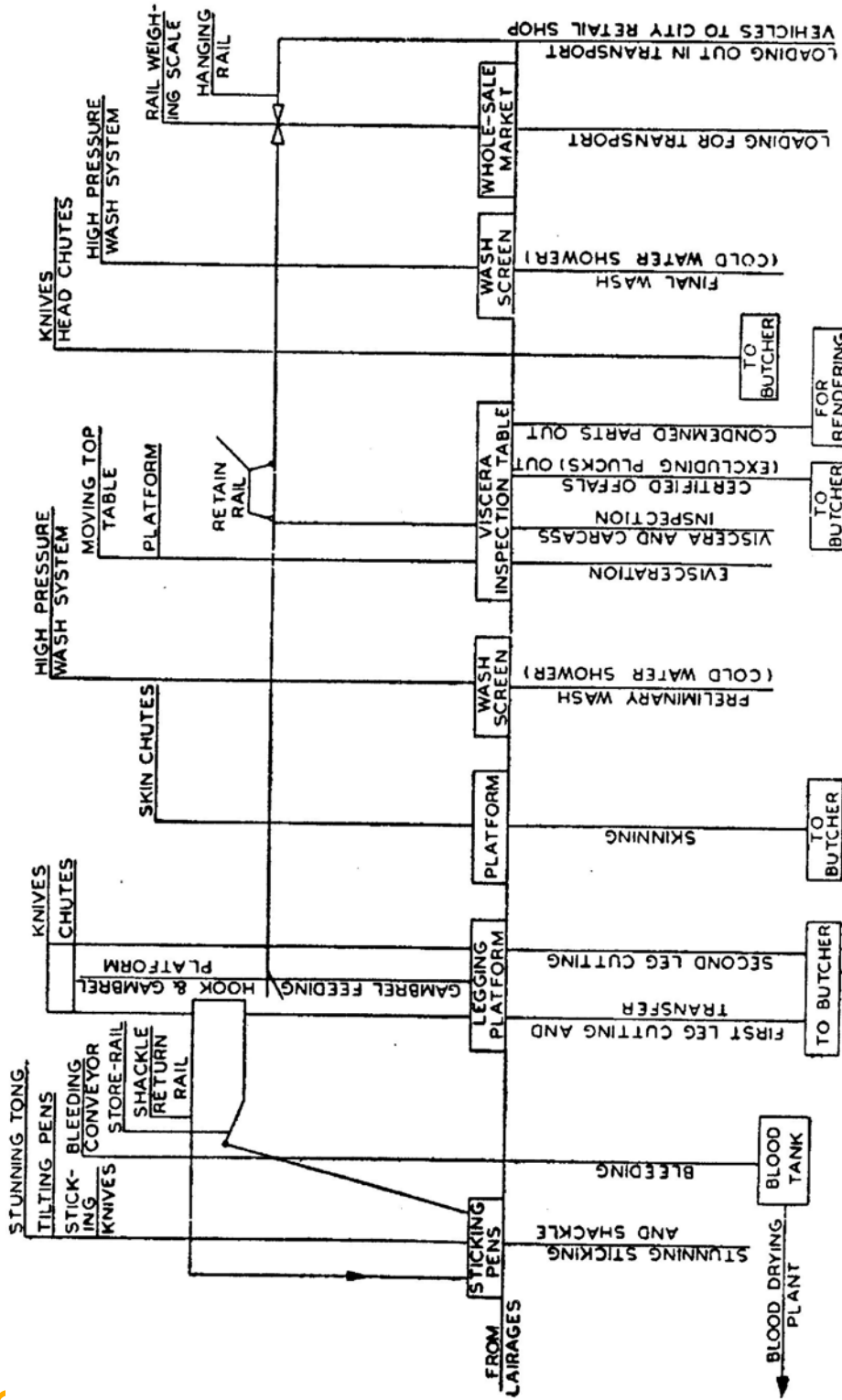


Figure 3 — Sheep and goats slaughter flow diagram

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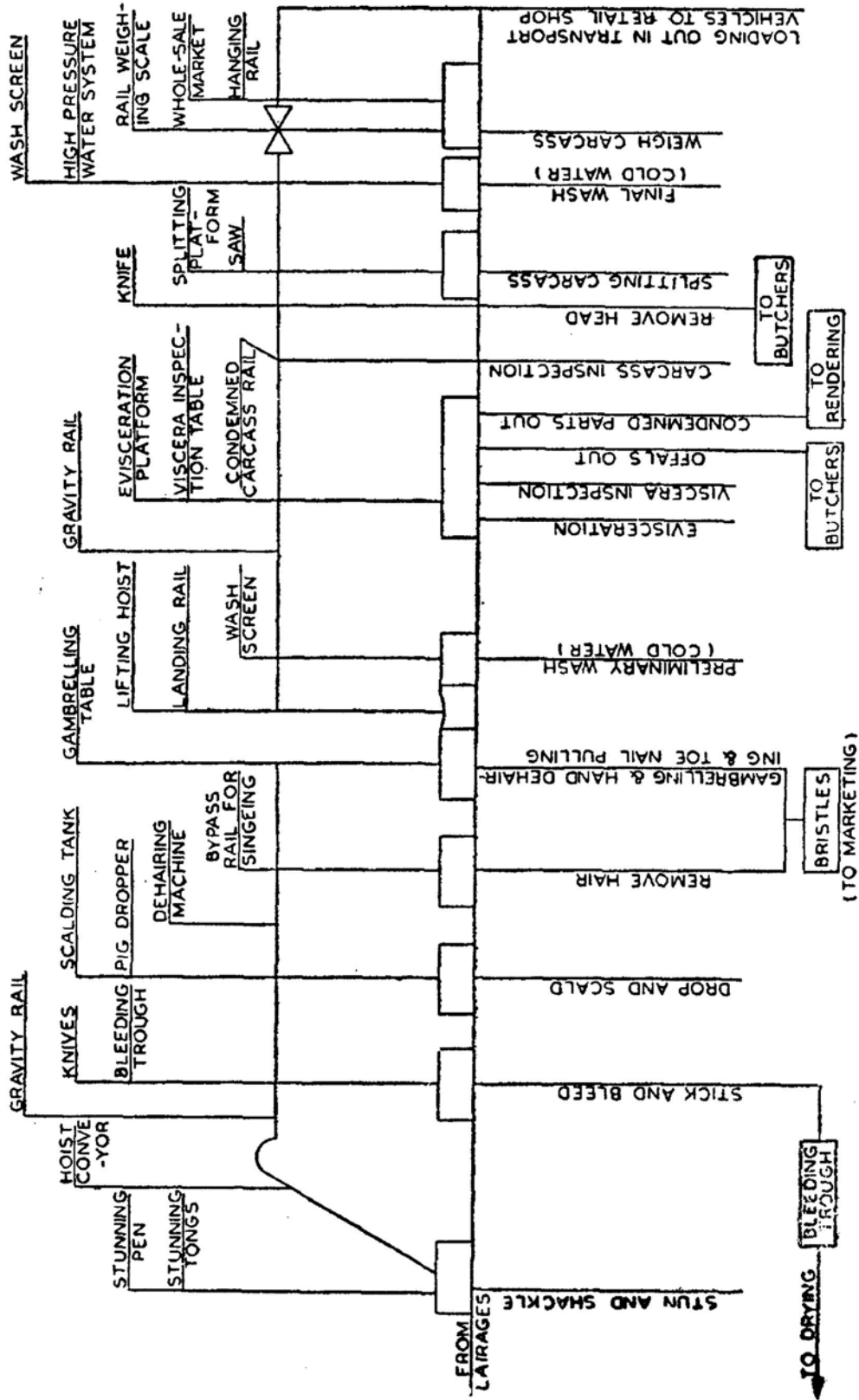


Figure 4 — Pig slaughter flow diagram

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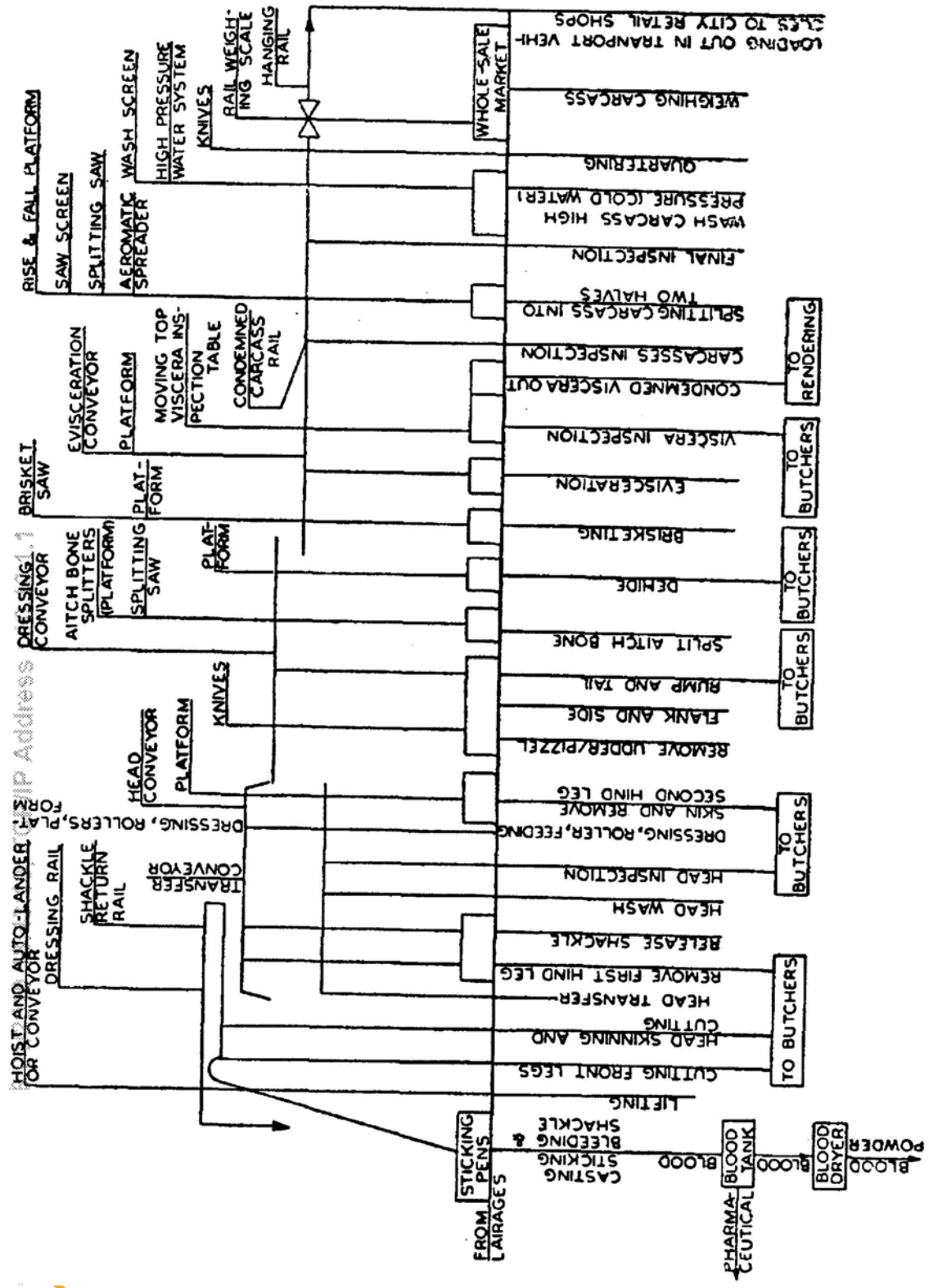
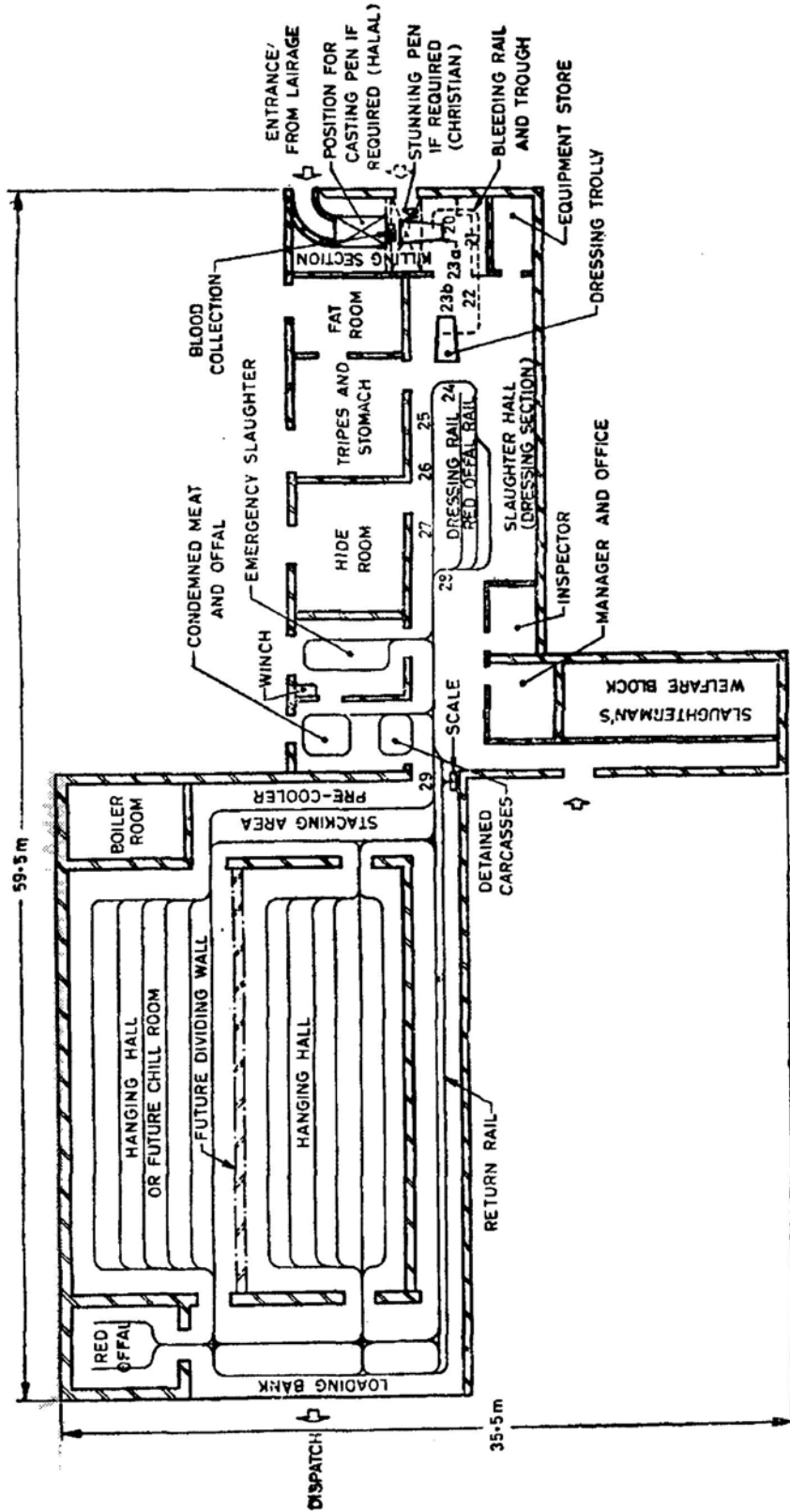


Figure 5 — Cattle slaughter flow diagram

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LEGEND

- 19 Animal Stunned (CHRISTIAN) or Stuck (HALAL)
- 20 Hoisted to Bleeding Rail (CHRISTIAN)
- 21 Animal Stuck (CHRISTIAN)
- 22 Head Detached and Washed
- 23 (a) (b) Carcass Positioned on to Cradle for Siding
- 24 Carcass at Half Hoist Fat Removed to Fat Trolley
- 25 Carcass Slung Off on Dressing Rail
- 26 Red Offal to Carrier on Red Offal Rail
- 27 Hide Removed to Hide Room
- 28 Carcass Split. Side Trimmed and Wiped
- 29 Sides Weighed and Passed to Detention Room or Pre-Cooler

Figure 6 — Typical layout plan for an abattoir (cattle)

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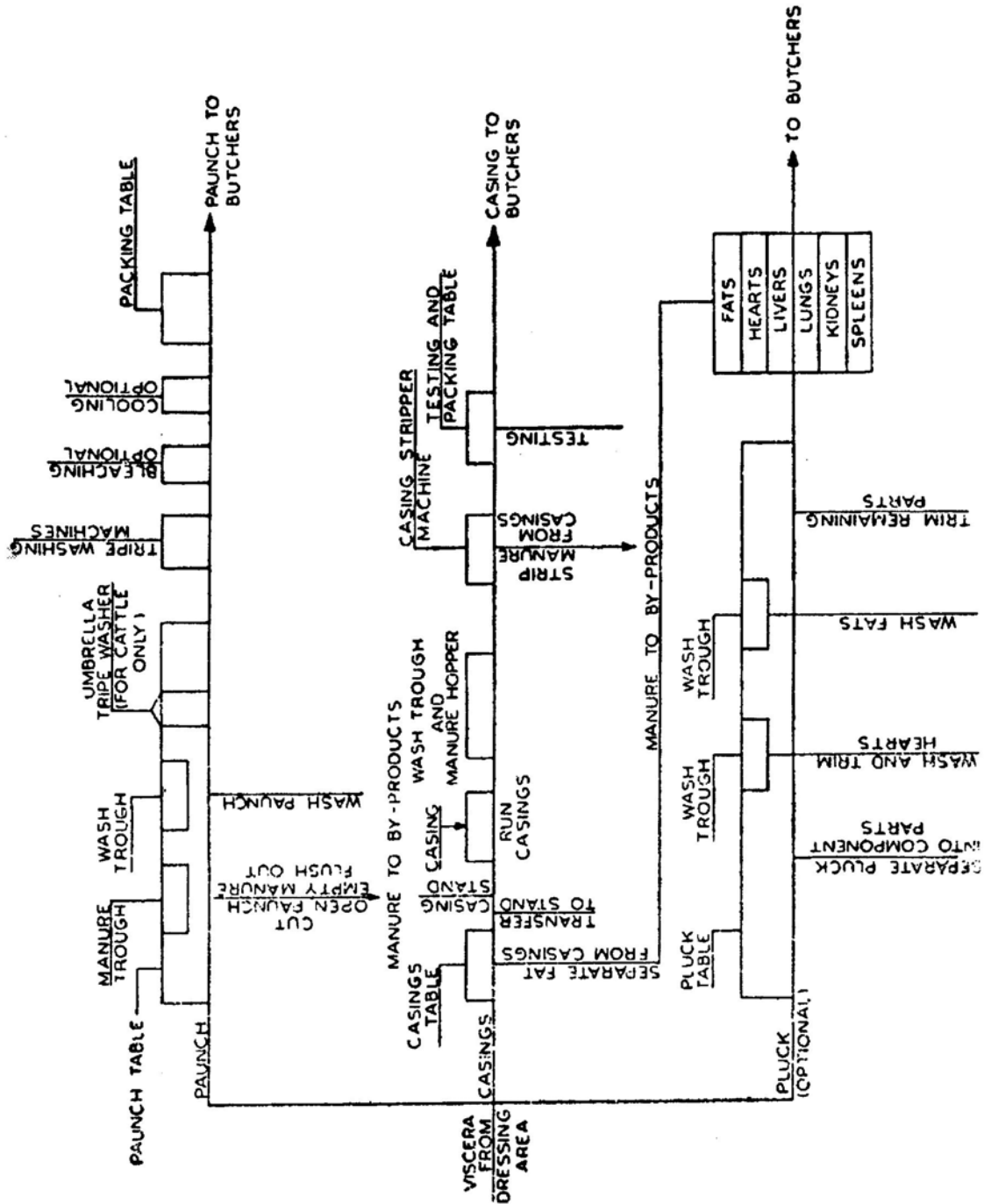


Figure 7 — Cattle, pig and goat offals flow diagram

4.3 Separation of clean and unclean sections

Abattoirs shall have an adequate separation between clean and unclean sections, which shall be arranged in such a way that from the introduction of a live animal into the abattoir up to the emergence of meat and offal classed as fit for human consumption, there shall be a continuous process, without any possibility of reversal, inter-section or over lapping between the live animals and meat, and between meat and by-products or waste. Typical flow diagrams for offals and by-products (rendering) are given in Figure 7 and Figure 8.



Figure 8 — By-products (rendering) flow diagram

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5 Units in an abattoir

5.1 In view of the facilities to be provided (4.2), the abattoir shall have the following units:

- a) Reception area or resting grounds,
- b) Lairages,
- c) Slaughter halls,
- d) Ancillary accommodation, and
- e) Refrigerated room.

5.1.1 Reception area or resting grounds

The abattoir shall have reception area of adequate size or resting grounds where the livestock are subjected to veterinary inspection before they are passed on to lairage for resting for 24 hours. This shall have the following facilities.

5.1.1.1 Unless all animals are arriving on hoof, proper ramps for direct unloading of animals from trucks or railway wagons should be provided. The ramps should directly lead to ante-mortem area with office room for veterinary inspector.

5.1.1.2 The reception area or resting grounds shall have facility for watering and examining animals before sending to holding pens.

5.1.1.3 Separate isolation pens shall be provided with watering and feeding arrangements for (a) animals suspected to be suffering from contagious and infectious diseases, and (b) fractious animals, in order to segregate them from the remaining animals.

5.1.1.4 Adequate holding area shall be provided according to the class of animals to be slaughtered. The holding area shall have water and feeding facilities. The resting grounds should have overhead protective shelters.

5.1.2 Lairages

The lairage shall be adequate in size for the number of animals to be laired. The space provided in the pens shall be not less than 2.8 m² per large animal and 1.6 m² per small animal. The animals shall be kept separately depending upon their type and class. The lairage shall be so constructed as to protect the animals from heat, cold and rain. The lairage shall have adequate facilities for watering and ante-mortem inspection as given in 5.1.1.1 to 5.1.1.4.

5.1.2.1 Where separate lairages or sections are to be provided for livestock meant for JHATKA, HALAL or Jewish slaughter, complete visual separation shall be effected and entrances shall be as far apart as possible.

5.1.3 Slaughter halls

Separate provisions, wherever required, shall be made in an abattoir for slaughtering, dressing and processing of:

- a) Sheep and goats (HALAL),
- b) Sheep and goats (JHATKA),
- c) Sheep and goats (Jewish),
- d) Pigs, and

e) Large animals.

The slaughter halls and ancillary accommodation thus provided shall be separated, keeping in view the economic and local requirements, by solid walls depending upon the site. Exits to such sections shall be kept as far apart as possible.

5.1.3.1 Separate space shall be provided for stunning (wherever applicable), bleeding and dressing of the carcasses. The curbing should be not less than 150 mm high and 100 mm wide with the top sloped not less than 45°.

5.1.3.2 Knocking section may be so planned as to suit the animal and particularly the ritual slaughter, if any. It should have facility to slaughter crippled animals brought from ante-mortem inspection yard to slaughter department and also the floor and hand washing facilities. An animal shall not be slaughtered in sight of other animals. The knocking section and dry landing area associated with it shall be so built that escape from this section can be easily carried out by an operator without allowing the animal to pass the escape barrier. This may normally be accomplished by an arrangement such as placing vertical pipes 150 mm in diameter, 1.5 m high on prepared vertical pipe inserts, about 120 mm high or the internal diameter of the pipe used for the vertical placed not less than 500 mm apart.

5.1.3.3 A curbed-in bleeding area of adequate size should be provided. It shall be so located that the blood shall not be splashed on other animals being slaughtered or on the carcass being skinned. Blood drain and collection should be immediate and proper. A floor wash point should be provided for intermittent cleaning. Also a hand-wash basin and knife sterilizer should be provided for the sticker to sterilize knife and wash his hands periodically.

5.1.3.4 Dressing area — Dressing of carcasses should not be done on floor. Adequate means and tools for dehiding or belting of the animals should be provided. Means for immediate disposal of hides or skins should be provided. Hides or skins should be immediately transported either in a closed wheel barrow or by a chute provided with self-closing door. In no case the hides or skins should be spread on slaughter floor for inspection. Floor wash point and adequate number of hand wash basins with sterilizer should be provided in this section. Means for immediate disposal of legs, horns, hooves, etc, should be provided through spring load floor chutes or side wall doors or closed wheel barrows. In case wheel barrows or trucks are used, care should be taken that at no point wheel barrow or truck has to ply under the dressing rails and a clear passage is provided for movement of the trucks.

5.1.3.5 Viscera inspection facilities — Adequate space and suitable and properly located facilities shall be provided for inspection of the viscera of the various types of animals slaughtered. This department shall have adequate facilities for hand washing, tool sterilization and floor washing and contrivances for immediate separation and disposal of condemned material. Adequate arrangements may be made for identification, inspection and correlation of carcass, viscera and head.

5.1.3.6 Carcass washing — A curbed and separately drained area or an area of sufficient size sloped 33 mm per metre to a floor drain, where approved carcasses may be washed with a jet of water, should be provided.

5.1.4 Ancillary accommodation

5.1.4.1 A separate room and hanging space shall be provided for emptying and cleaning of stomachs and intestines. This room shall have a separate exit. Pluck and viscera cleaning and separating departments should be divided into edible and inedible sections for further processing. Those sections should preferably be separated from the slaughter floor, except for one or two connecting doorways provided with solid, self-closing doors, completely covering the opening.

5.1.4.2 Suitable and sufficient facilities shall be provided for the isolation of meat requiring further examination by the veterinary inspector in a suitable laboratory within the premises of the abattoir.

5.1.4.3 Suitable and sufficient accommodation shall be provided for the retention of all meat condemned as unfit for human consumption and shall be locked up separately.

5.1.4.4 Labour welfare facilities — Well located toilet rooms should be provided in the abattoir building sufficiently away from slaughter walls. A separate hall with lockers and shower facilities should be provided. Adequate drinking water and washing facilities should be provided at convenient locations. Adequate facilities for canteen and first-aid should also be provided.

5.1.4.5 If a separate block for hide curing or skin drying is not provided in the abattoir, the hides or skins may be stored in a separate room and removed daily by the licensees.

5.1.4.6 Similarly, if rendering facilities are not provided, the condemned material should be denatured and held in watertight metal containers in suitable inedible product room pending daily removal by contractors.

5.1.5 Refrigerated room — Hanging halls if air-conditioned should have temperature not higher than 10°C. Two retaining compartments constructed of rust-resistant wire gauge or expanded metal portion extending from about 75 mm above ground to ceiling should be provided, one for holding retained carcasses and the other for holding the carcasses affected with *Cysticercus bovis*.

5.1.6 If the incidence of *Cysticercus bovis* is high, it is advisable to have a freezer with storage for 10 days at a temperature not higher than -9.5 °C.

6 Rails for carcasses

6.1 Rails with hooks of suitable rust-proof metal or mild steel shall be provided for hanging the carcasses and similar provision for plucks shall be made, permitting free circulation of air. The hooks shall be suitably cleaned and sterilized regularly.

6.2 The height and length of rails, provided for bleeding and dressing, shall be in accordance with Table 1.

Table 1 — Requirements of height and length of bleeding and dressing rails

| S/No. | Carcass | Height mm | Length per carcass mm | Position of Figure |
|-------|---|---------------|--|-----------------------|
| (1) | (2) | (3) | (4) | (5) |
| (i) | Bleeding rail for sheep, goats and pigs | *3000 to 2200 | 450 | 2 and 12 of Figure 2 |
| (ii) | Bleeding rail for large animals | 4500 to 5000 | 600 | Throughout |
| (iii) | Dressing rail for sheep, goats and pigs | 2000 to 2200 | 900 | 4 and 13 of Figure 2 |
| (iv) | Dressing rail for large animals | 3200 | 1800 for legging, dehiding and 2400 for evisceration and further | Throughout |

*Falling at the rate of 10 mm per 1000 mm (for gravity rail).

6.3 The space required per carcass and the distance between the rails in hanging or chill room, shall be in accordance with Table 2.

Table 2 — Requirements of space per carcass and distance between rails in hanging or chill room

| S/No. | Carcass | Space per carcass (mm) | Distance between rails (mm) | Height of rails (mm) |
|-------|------------------------|---------------------------|--------------------------------|---|
| (1) | (2) | (3) | (4) | (5) |
| (i) | Sheep and goats | 300 to 400 | 300 to 400 | 2000 to 2200 Min (single changing) |
| (ii) | Pigs | | | |
| | a) Mass 70 kg and over | 450 to 600 | 450 to 600 | 2000 to 2200 |
| | b) Mass below 70 kg | 300 to 400 | 300 to 400 | 2000 to 2200 |
| (iii) | Large animals | 450 to 600 | 800 to 1000 | 3200 (for halves) and 2000 to 2200 for quarters |

7 Civil construction

7.1 Ante-mortem and pen area

The area should be paved with impervious material such as concrete non-slippery herring-bone type suitable to stand wear and tear by hooves, or brick, and pitched to suitable drainage facilities. Curbs of impervious material 150 to 300 mm high should be provided around the borders of livestock pen area, except at the entrances. The pen should preferably be covered.

7.2 Plant building

Materials used shall be impervious, easily cleansable, and resistant to wear and corrosion. Materials such as wood, plaster board, and porous acoustic-type boards, which are absorbent and difficult to keep clean should not be used in edible departments.

7.2.1 Floors

The floors should be non-absorbent and non-slippery with rough finish, and shall have suitable gradient for drainage.

7.2.2 Coves

Coves with radii sufficient to promote sanitation should be installed at the juncture of floors and walls in all rooms and not less than 100 mm.

7.2.3 Interior walls

Interior walls should be smooth and flat and constructed of impervious materials such as glazed brick, glazed tile, smooth surfaced Portland cement plaster, or other non-toxic, non-absorbent material applied to a suitable base. Walls should be provided with suitable sanitary type bumpers to prevent damage by hand trucks, carcass shanks, and the like. It is recommended that the interior walls should have washable surface up to the height of 2 m from the floor so that the splashes may be washed and disinfected.

7.2.4 Ceilings

Ceilings should be of good height (5 m or more is desirable in work rooms). So far as structural conditions permit, ceilings shall be smooth and flat. Ceilings shall be constructed of Portland cement plaster, large size cement asbestos boards with joints sealed with a flexible sealing compound, or other acceptable impervious material and finished so as to minimize condensation, mould development, flaking and accumulation of dirt. The walls (above glazed type portion) and ceiling may be painted with water-resistant paint to maintain them clean.

7.2.5 Window ledges

Window ledges should slope at 45° to promote sanitation. To avoid damage to glass in windows from impact of hand trucks and similar equipment, the window sills should be 1 200 mm above the floor level. Proper ventilation through mechanical venting or through working vents should be provided in the roof structure.

7.2.6 Doorways and doors

Doorways through which product is transferred on rails or in hand trucks shall be at least 1500 mm wide, except for the doors used in connection with rails approximately 3 000 mm high can be at least 1500 mm wide. Doors shall either be of rust-resistant metal construction throughout, or if made with rust-resistant metal having tight soft wood, they shall be clad on both sides with soldered or welded seams. Door jambs shall be clad with rust-resistant metal securely affixed so as to provide no crevices for dirt or vermin and the juncture at which the door joins the walls shall be effectively sealed with a flexible sealing compound.

7.2.7 Screens and insect control

All windows, doorways, and other openings that may admit flies should be equipped with effective insect and rodent screens. Fly chaser fans and ducts or air curtains shall be provided over doorways in outside wall of food handling areas that are used for dispatch or receiving.

7.2.8 Rodent-proofing

Except in the case of solid masonry walls constructed of glazed tile, glazed brick, and the like, expanded metal or wire mesh, not exceeding 12.5 mm mesh, shall be embedded in walls and floors at their junction. This mesh should extend vertically and horizontally to a sufficient distance to exclude the entrance of rats and other rodents.

7.2.9 Stairs

Stairs in edible product handling departments shall be of impervious construction with solid treads and closed risers and shall have side curbs of similar material 150 mm high measured at the front edge of the treads. Floor openings for chutes, etc, and for stairways except at entrances should have curbs of impervious materials, such as concrete or metal, at least 300 mm high, to prevent floor drainage from entering such chutes.

7.3 Vehicular areas for trucks

Concrete paved areas, properly drained and extending at least 6 metres from building, loading docks or livestock platforms shall be provided at places where vehicles are loaded or unloaded. Pressure washing jets and disinfection facilities for trucks carrying animals should be provided.

7.4 Drainage

7.4.1 All parts of floors where wet operations are conducted should be well drained. As a general rule, one drainage inlet should be provided for each 37 m² of floor space. A slope of about 20 mm per metre to drainage inlets should be provided for usual conditions.

It is important that the floors slope uniformly to drains with no low spots which collect liquid. Floor drains should not be provided in freezer rooms or dry storage areas. When floor drains are installed in rooms where the water seal in traps is likely to evaporate without replenishment, they should be provided with suitable removable metal screw plugs.

7.4.2 Traps and vents on drainage lines

Each floor drain, including blood drains, should be equipped with a deep seal trap (P-, U-, or S-shaped). Drainage lines shall be properly vented to the outside air and be equipped with effective rodent screens.

7.4.3 Sanitary drainage lines

Drainage lines from toilet pans and urinals should not be connected with other drainage lines within the plant and may not discharge into a grease catch basin. Such lines shall be installed so that if leakage develops, it shall not affect the product or the equipment.

7.4.4 All floor drains should be so constructed and the floor so made that these can be easily cleaned and then shall be a minimum area to be drained per outlet. It is recommended that 'U' drains set with satisfactory covers should be used and made totally fly-proof and rodent-proof.

7.4.5 Special drainage requirements

In certain departments, special floor drainage is required. For example, floor drainage valleys are essential under the dressing rails for hogs, calves and sheep. Such valleys shall be about 600 mm wide and integral with the floor. The valleys shall slope at least 10 mm per metre to drains with the

valleys. In the so-called on the rail cattle slaughtering departments, floor valleys under the dressing rails shall be provided unless the floor drainage is carefully localized with drainage inlets placed advantageously beneath the dressing rails.

8 Lighting and ventilation

8.1 Unrefrigerated work rooms should be provided with adequate direct natural light and ventilation or ample artificial light and ventilation by mechanical means. Uncoloured glass having a high transmissibility of light may be used in skylights and windows. The glass area should be approximately one-fourth the floor area of a work room. This ratio should be increased where there are obstructions, such as adjacent buildings, overhead catwalks, and hoists, which interfere with the admittance of direct natural light. Well distributed artificial lighting of good quality should be provided at all places where adequate natural light is not available or is insufficient.

8.2 Every abattoir shall be so constructed that meat inspection may be carried out in daylight. Sockets for the use of inspection lamps shall be provided at convenient places.

8.3 Every abattoir shall be provided with well-distributed artificial light of an overall intensity of not less than 200 lux throughout the slaughter hall and workrooms and at places where meat inspection is carried out, the overall intensity of artificial light shall be not less than 500 lux.

8.4 Every abattoir shall be provided with suitable and sufficient means of ventilation to the outside air. The construction of the slaughter hall should be so arranged that the dressed carcasses are not exposed to direct sunlight.

9 Supply of water

9.1 A sufficient, safe, potable and constant supply of fresh water shall be available at adequate pressure throughout the premises.

9.1.1 The pressure for the general purpose of floor washing, etc, may preferably be 200 to 330 kPa for thorough floor cleaning.

9.1.2 For thorough and efficient washing of carcasses, a higher pressure of 1 000 to 1 700 kPa is recommended.

9.1.3 Floor washing point may be provided preferably for minimum 37 m² on slaughter floor and working departments.

9.1.4 The water distribution plant may be located at the load centre.

9.2 A constant supply of clean hot water shall be available in the slaughter hall and workrooms during working hours.

9.2.1 Hot water is required at not less than 82 °C for frequent sterilizing of equipment.

9.3 Every sanitary convenience in an abattoir shall be supplied with water by means of suitable flushing appliance.

9.4 Suitable facilities for washing of hands (including adequate supplies of hot and cold running water, nail brushes and soap or other detergent) shall be provided for persons working in an abattoir. Where non-potable water is used for fire control, etc, it shall be carried in completely separate lines preferably identified by colour and with no cross-connection or back siphonage with lines carrying potable water.

10 Equipment construction

10.1 General

Excepting such equipment as utility boards, other equipment shall be constructed either of rust-resisting metal such as stainless steel or galvanized metal with smoothness of high quality commercial hot dip. The galvanized metal is generally not desirable where high resistance to corrosive action of food products and cleaning compounds is required. Plastic may be used. In that case plastic shall be abrasion- and heat-resistant, shatter-proof, nontoxic and should not contain any constituents that may affect the meat or meat products during contact.

10.2 Accessibility for cleaning and maintenance

10.2.1 All parts of the product zone shall be readily accessible to sight and reach for cleaning and inspection.

10.2.2 Where necessary for proper cleaning and inspection, equipment shall be easily demountable. To facilitate this dismantling, quick opening devices that require no tools or, such simple tools as a mallet and an open-end wrench shall be provided. Bayonet joints, butterfly clamps, spring bolts, and other similar devices are desirable for connecting or closing parts of equipment. Where parts should be retained by nuts and bolts, the design shall provide for fixed studs with wing nuts, rather than bolts to a tapped hole.

10.2.3 All bearings shall be located outside the product zone and if adjacent thereto, shall be constructed with a readily removable seal at the entrance of the shaft, into the product zone.

10.2.4 Interior corners of equipment shall be provided with radii (minimum 6 mm), except where greater radii are required to facilitate drainage and cleaning.

10.2.5 All welding within the product zone shall be continuous, smooth, even and relatively flush with the adjacent surfaces.

10.2.6 All parts of the product zone shall be free of recesses, open seams and gaps, crevices, protruding ledges, inside threads, inside shoulders, inside bolts or rivets and deal ends.

10.2.7 Where necessary for sanitary maintenance, equipment shall be constructed and installed so as to be completely self-draining.

10.2.8 Care shall be taken to prevent contaminating product by lubricants used in over1,ead motors, gears, and similar devices. If drip pans are necessary, they should be easily accessible for inspection and removable for cleaning.

10.2.9 All safety or gear guards shall be readily removable for cleaning and inspection.

10.2.10 All external surfaces that do not contact with food products shall be free of pen seams, gaps, crevices and inaccessible recesses.

10.3 Non-acceptable materials

The following materials shall not be used in an abattoir:

- a) Copper and its alloys in equipment used for edible products;
- b) Cadmium in any form in equipment handling edible products;
- c) Equipment with painted surface in product zone;
- d) Enamel containers or equipment is not desirable, and
- e) Lead.

10.3.1 For elimination of fatigue and comfortable working for labourers the working table should be at waist height of the worker to work in standing position. If the table is at more height (that is 800 mm to 860 mm) it should have a platform incorporated for the balance height above 860 mm.

10.3.2 Working platform for on-the-rail operations should be of such height that the slaughter man has neither to stoop too low or stretch himself to his operation zone, and he should be able to reach operation zone in his natural standing position.

11 Installation

11.0 Following points should be strictly observed during installation of equipment from hygiene and sanitation point of view.

11.1 All permanently mounted equipment shall either be installed sufficiently away from walls (minimum 300 mm) to provide access for cleaning and inspection, or should touch the walls.

11.2 All permanently mounted equipment shall either be installed sufficiently above the floor (minimum 300 mm) to provide access for cleaning and inspection or be completely sealed (watertight) to the floor area.

11.3 Wall-mounted cabinets and electrical connections (such as switch boxes, electrical control panels, and BX cables) shall be installed at least 25 mm from equipment or walls or shall be completely sealed to the equipment or walls.

11.4 water-washing equipment, such as soaking and cooking vats, sausage stuffing tables, can sterilizers, and casing preparation equipment, shall be installed so that waste water from each unit is delivered through an interrupted connection into the drainage system without flowing over the floor. Valves on drainage lines serving such equipment should be easily cleansable and shall be mounted flush with the bottom of the equipment. Soaking and cooking vats should be provided with overflow pipes at least 50 mm in diameter. The upper end of each overflow pipe should be equipped with an open-end cleanout tee to facilitate cleaning.

11.5 Vent stacks from covered cooking vats or hoods over hook tanks shall be so arranged or constructed as to preclude drainage of condensate back into the vats.

11.6 All tables or other equipment having water on the working surface shall be provided with turned-up edges. The height of the turned-up edge depends on the volume of water used and the operations conducted. In no instance should the turn-up be less than 25 mm.

12 Plant waste water disposal

12.1 Disposal of waste

An efficient method of disposing of plant wastes should be provided. If permitted by local bye-laws, the plant waste may be discharged into a municipal sewer system, as this is most desirable. If the wastes are discharged into a stream, the flow of water shall be sufficient at all seasons of the year to carry the sewage well away from the plant. The sewage so discharged should be reasonably free of organic material such as fat and manure. If a private septic tank or sewage disposal system is used, it shall be efficiently designed and operated so as not to produce objectionable conditions on or near the official premises. Normally: for removal of grease and manure catch basins and vibrating screen with hopper, respectively, should be provided.

12.2 Catch basin for grease recovery

Catch basin for the recovery of grease should be suitably located and not placed in or near edible products department or area where edible products are unloaded from or loaded on to vehicles. To facilitate ready cleaning, such basins should have inclined bottoms and should be without covers. They should be so constructed that they may be completely emptied of their contents for cleaning. A hose connection for furnishing hot water for cleaning purposes should be provided at convenient locations near the basin. The area surrounding an outside catch basin should be paved with impervious material, such as concrete, and provided with suitable drainage facilities. Suitable facilities should be provided for the transfer of grease to the point of disposal after it is skimmed from tile basins by mechanical or other means.

12.3 Manure removal

A separate drain line for water containing manure should be provided. This waste water may be pumped by wet pit or dry pit non-clog pumps and manure screened out and disposed of by mechanical or the other suitable means. Some consideration as in catch basin should be given for location of this plant.

13 Safety requirement

There shall be adequate fire fighting arrangements and portable first aid fire appliances shall be fixed.

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