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DRAFT EAST AFRICAN STANDARD

**Basic design and operation of abattoir/slaughterhouses —
Requirements**

PUBLIC REVIEW DRAFT

EAST AFRICAN COMMUNITY

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Foreword

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

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. 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 Principles and procedures for development of East African Standards.

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.

The committee responsible for this document is Technical Committee EASC/TC 004, *Meat, poultry, game, eggs and related products*.

Attention is drawn to the possibility that some of the elements of this document may be subject of patent rights. EAC shall not be held responsible for identifying any or all such patent rights.

Introduction

All animals, wherever they have been reared, shall be managed to ensure that their transport, lairaging, restraint and slaughter is carried out without causing undue stress to the animals. This standard addresses the need to ensure the welfare of food animals during pre-slaughter and slaughter processes, until they are dead.

Abattoir/slaughterhouses may be one of the most stressful places that an animal stays in and can cause a number of behavioural changes in the animals thus leading to physiological and biochemical changes in the meat quality intended for human consumption.

The main issues addressed by this standard are: general principles for slaughter, as related to personnel, animal behaviour, and the removal of distractions which can cause animals to stop or turn back; moving and handling animals following their arrival at the slaughterhouse;

lairage design and construction; care of animals in lairages; and animal welfare issues associated with acceptable handling, restraining, stunning and slaughter methods applicable to various relevant species.

The standard acknowledges the significance of religious requirements as well as the cultural and ethnic factors associated with slaughter such as halal slaughter, jhatka slaughter, kosher slaughter and appropriate proposals are considered. Important but less frequently occurring issues such as the management of fetuses during the slaughter of pregnant animals are also included in this standard.

Basic design and operation of abattoir/slaughterhouses — Requirements

1 Scope

This Draft East African Standard covers the typical layout plan, hygienic, sanitary, basic requirements for an abattoir or slaughterhouse for carrying out slaughter of food 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.

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

3 Terms and definitions

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

3.1

Food animal

animals declared edible for human consumption under the laws of competent authority of a partner state

3.2

Carcass

Body of an animal after dressing

3.3

Cattle

bull, cow, ox, steer, heifer, calf

3.4

Condemned

whole, parts or organs slaughtered animal so marked by a competent authority as unfit for human consumption meant to be destroyed or rendered unfit for food purposes

3.5

competent Authority

official authority charged by the government for implementation of animal health, animal movement control, and welfare measures to ensure meat hygiene and quality.

3.6

Meat

whole or parts of slaughtered animal carcasses that are intended for and have been judged as safe and suitable for human consumption

3.7

Meat Inspector

person appointed, authorized, or recognized by competent authority for meat inspection.

3.8

Slaughter-Hall

actual place where the animals are slaughtered for food purposes

3.9

abattoir/slaughterhouse

any establishment licensed by competent authority for slaughter of animals and/or processing into meat products intended for human consumption

4.0 LOCATION

Abattoir/slaughterhouses and establishments shall be located in areas not subject to regular and frequent flooding and free from objectionable odours, smoke, dust or other contaminants, Adequate facilities for handling the effluent generated, Copious supply of potable water and electricity connection and accessible. The slaughterhouse shall be completely separated from any other buildings used for industrial, commercial, agricultural, residential or other purposes other than connected building used for the processing of the meat. The slaughter house site shall be guided by the Part Development Plans (PDP) of the areas within the partner states.

4.1 General provision

Slaughter house shall be hygienically managed and under the supervision of a competent authority. A slaughterhouse shall have:

- a) Properly built and drained lairage erected not less than ten meters from the slaughterhouse and equipped with adequate facilities for ante-mortem inspection and Isolation pens for suspect animals.
- b) Fenced cattle races from the lairages to the slaughterhouse, properly drained and in a suitable place equipped with facilities for washing the animals.
- c) Separate facility for handling hides and skins
- d) Separate room for the cleaning and treatment of intestines and ovals.
- e) Separate room for the storage, disposal and treatment of inedible and condemned animals, carcass and meat.
- f) Impervious, easily cleaned and resistant to wear and corrosion materials.
- g) Floors constructed of dense, acid-resistant, waterproof concrete and have appropriate non slip finish.
- h) Walls smooth and flat and made of smooth-surfaced Portland cement plaster or other non-toxic, non-absorbent material applied to a suitable base, and walls shall be provided with sanitary bumpers to prevent damage by movable equipment.
- i) Coves with sufficient radii to promote good sanitation shall be installed at the juncture of floors and walls in all rooms.
- j) Ceilings of adequate head room be smooth and flat and be constructed of portland cement plaster or other acceptable impervious material that allow for easy cleaning.
- k) Provisions for adequate natural lighting and ventilation.
- l) Doorways at least one hundred and fifty centimeters wide and the doors must be made of rust-resistant metal having tight soldered or welded seams. Door jambs shall be covered with rust-resistant metal.
- m) Pest proofing to prevent the entry of insects and rodents.
- n) Dressed timber used for all exposed interior wood work, and it shall be painted with a good non-toxic oil or plastic base paint, treated with linseed oil or with a clean wood sealer.
- o) All parts of floors where wet operations are conducted well drained, with at least one drainage inlet provided for each thirty-five square meters of floor space. The inlets shall be placed under the dressing rails, if necessary, together with drainage valleys, not less than seven decimal five centimeters wide, with a slope of the floor towards drainage valleys or inlets of at least two decimal five centimeters per meter.
- p) Drains for paunch and stomach contents at least twenty centimeters in diameter.

- q) Waste disposal system of adequate size and must comply with Environmental Management and Coordination laws and local regulations.

5. Typical layout plan

5.1 The abattoir/slaughterhouses shall have the following essential facilities

1. Staff welfare facilities
2. Secure gate control/fence
3. Food grade carriage containers where applicable
4. Packaging and labelling room
5. examination/inspection
6. carcass splitting and washing area
7. Proper transport of animals
8. Facilities for proper offloading
9. Holding pens for animals before slaughter (lairage)
10. Ante mortem inspection facilities
11. Facilities for vehicles and foot disinfection
Stunning pen/area
12. Facilities for Carrying out humane slaughter/Religious – Jhatka/halal method
13. Stainless steel bins for blood, edible and inedible offal
14. Facilities for handling and Storage of fats/hide/pig bristle/horns/hooves, where applicable
15. Separate demarcation between clean and un clean area
16. Meat inspector room
17. Lockers/rest room/laundry/toilets for meat handlers
18. Store room
19. Electrical and machine room where necessary
20. Isolation pen for sick and suspected animals
21. Water proof flooring and side walls
22. Proper drainage with catch basins
23. Traps and vents for drainage
24. Good ventilation with adequate lighting
25. Potable water supply and storage tank
26. Effluent treatment plant
27. Separate place for storing manure
28. Protection against pest and vermin control facilities
29. Office room, first aid and security room
30. Facility for vehicle washing
31. Non-corrodible food grade equipment and instruments
32. Disposal of condemned carcass/material as per the law of partner state
33. Refrigerated or non-refrigerated covered vehicles/trucks for transport of carcass
34. Dispatch area for finished products
35. Bleeding area
36. Overhead rail system
37. Slaughter hall to ensure maintenance of strict hygienic during slaughter
38. Facilities for flaying and dressing of carcasses
39. Post mortem examination facilities
40. Hot water washing facilities (82 °C)
41. Knife sterilizers
42. Emergency slaughter hall
43. Detained and condemned meat room
44. Movable or permanent working platform
45. Wide doors for free passage of meat carcasses
46. Knee/elbow/foot operated wash basins

47. Separate rooms for cleaning gut, stomach, and intestine

5.1.1 Typical layout plan and flow diagram for an abattoir/slaughterhouse for slaughtering cattle are given in *annex I* and *Annex II* respectively. Typical layout plan and flow diagram for an abattoir/slaughterhouse for slaughtering pigs are given in *Annex III* and *Annex IV*, respectively. Typical layout plan and flow diagram for an abattoir/slaughterhouse for slaughtering goats are given in *Annex V* and *Annex VI* respectively.

5.1.2 The retail or wholesale market for meat, if required, can be included within the complex itself, the same shall 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.

5.2 Abattoir/slaughterhouses 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/slaughterhouse 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 offal and by-products (rendering) are given in *annex VII* and *annex VIII*

5.2.1 A flow diagram for basic operation of an abattoir/slaughterhouse is shown in *annex I* for information and guidance only. The layout of entire abattoir/slaughterhouse, as far as possible, shall have a forward flow.

5.3 Reception area or resting grounds

The abattoir/slaughterhouse shall have reception area of adequate size or resting grounds where the livestock are subjected to antemortem inspection before they are passed on to lairage for resting for 12 -24 h. This shall have the following facilities.

5.3.1 Facilities for offloading off-loading ramp

5.3.1.1 Proper ramps for direct off-loading of animals from trucks or railway wagons shall be provided. Offloading ramps shall not have sharp or protruding edges or any other features that may cause injury to animals

5.3.1.2 Ramps shall be positioned to be even with the vehicle; width shall be suitable enough for animals. Ramps shall have side protection and non-slip floors and be aligned so that there are no gaps where an animal might become trapped and injured. Ideally, animals shall not have to walk up and down ramps with slopes greater than 30° to the horizontal. It is better to use hydraulic loading platforms or hydraulically operated lifting desks on vehicles.

5.3.1.3 The reception area or resting grounds shall have water facility and examining animals before sending to holding pens

5.3.1.4 Separate isolation pens shall be provided with water and feed for (a) animals suspected to be suffering from contagious and infectious diseases, and (b) animals with fractures, in order to segregate them from the remaining animals.

5.3.1.5 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 shall have overhead protective shelters.

5.3.2 Lairage

5.3.2.1 Animals shall be kept in the lairage without overcrowding or injury or being exposed to climatic stress for 12 to 24 h. The lairage shall be adequate in size for the number of animals to be kept Space provided to animals shall be such that the animals can freely move and express its normal behaviour patterns as far as possible. Lairage shall have a provision for isolating sick or animals suspected to be sick.

5.3.2.2 the animals shall be kept separately depending upon their type and class. There shall be no mixing of animals of different species. There shall be separate pens for males and female, horned and polled, animals in heat (estrous) and pregnant animals.

5.3.2.3 the lairage shall be roofed and so constructed as to protect the animals from extreme climatic conditions like heat, cold and rain to avoid stress.

Handling facilities shall be designed to ensure ease of handling and to prevent injury to animals. There shall be no physical features in the lairage which cause recurring injuries to animals.

5.3. 2.4 Floors shall have mild slopes to prevent accumulation of water and prevent water logging. Slurry and manure shall be frequently removed from the shelter facilities.

5.3. 2.5 Lairage shall be maintained dry, clean and free from rodents and insects. The lairage shall have adequate facilities for cleaning and/or drying of animals; adequate supply of clean water for drinking and washing and facilities for feeding whenever necessary; and ante-mortem inspection.

5.3. 2.6 Where separate lairages or sections are to be provided for livestock meant for Jhatka, Halal or Jewish slaughter, complete visual separation shall be affected and entrances shall be as far apart as possible.

5.3.3 Slaughter Halls

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

- a) Sheep and goats (Halal),
- b) Sheep and goats (Jhatka),
- c) Sheep and goats (Jewish),
- d) Pigs,
- e) large animals

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

5.3.3.2 Races

Single-file race shall not be too wide, crowded and shall not appear as a dead end. Single-file races must be narrow enough to prevent animal from turning around or becoming wedged beside each other. Cattle race shall be wide (76 cm) and races for pigs, goats and sheep shall have only 3 cm of clearance on each side of the largest animal. Curved race is more efficient because animals entering the race cannot see the people or other activity up ahead, provided laid out correctly. Curved races must be laid out so that animal standing in the crowding-pen can see a minimum of three body lengths of the race before it turns.

5.3.3.3 Stunning area (where applicable)

The area in front of the stunning pen shall be at least 3 m in width to the opposing wall or bleeding trough and be fitted with upright bars 5 cm in diameter and 1.2 m high, spaced in 40 cm intervals for safety purposes. Animals shall enter the device easily. If they balk or back up, check for distractions. Animal's vision shall be blocked so that they do not see people or suddenly moving objects. Metals shields shall be installed around the animals' head on box type restrainers. Animals tend to panic when they lose their footing. Non-slip flooring shall be provided in box type restrainers and non-slip cleated entrance ramp shall be provided on conveyor restrainers. Parts of restraint device that press against the animal's body shall move with slow steady motion. Animals shall never be left in a stunning box or restraint device but shall be stunned slaughtered immediately after entry with rituals or otherwise, as the case may be.

5.3.3.4 Knocking section may be so planned as to suit the animal and particularly the ritual slaughter, if any. It shall 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.

5.3.3.5 A curbed-in bleeding area of adequate size shall 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 shall be immediate and proper. A floor wash points shall be provided for intermittent cleaning. Also, a hand-wash basin and knife sterilizer shall be provided for the sticker to sterilize knife and wash his hands periodically.

5.3.3.6 Dressing area

Dressing of carcasses shall not be done on floor. Adequate means and tools for de-hiding or belting of the animals shall be provided. Means for immediate disposal of hides or skins shall be provided. Hides or skins shall 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 shall be spread on slaughter floor for inspection. Floor wash point and adequate number of hand wash basins with sterilizer shall be provided in this section. Means for immediate disposal of legs, horns, hooves, etc. shall be provided through spring load floor chutes or side wall doors or closed wheel barrows. In case wheel barrows or trucks are used, care shall 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.

5.3.3.7 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.

5.3.3.8 Carcass washing facilities

Where necessary carcasses may be washed with a jet of water, the treatment of the carcass with food grade carcass cleaning agent approved by competent authority within a partner state.

5.3.4 Ancillary Accommodation

5.3.4.1 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 shall be divided into edible and inedible sections for further processing. Those sections shall preferably be separated from the slaughter floor, except for one or two connecting doorways provided with solid, self-closing doors, completely covering the opening.

5.3.4.2 condemned carcasses shall be disposed-off at rendering plant. If rendering facilities are not provided, the condemned material shall be denatured and held in a watertight metal container in suitable inedible product room pending daily removal by contractors for disposal through prescribed waste disposal methods.

5.3.4.3 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.

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

5.3.4.5 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/slaughterhouse.

5.3.4.6 Veterinary Laboratory

A room equipped for carrying out trichoscopic test is compulsory in abattoir/slaughterhouses handling pigs. In larger premises, a well-equipped laboratory is essential, not only for preliminary diagnosis of animal diseases but also to maintain the overall hygienic standards.

5.3.4.7 Meat Inspector Office

An adequately equipped lockable room for the exclusive use for meat inspector. The rooms shall be provided with hand-washing and shower facilities, and lockers for clothing (clean and dirty) and meat inspection equipment. A convenient means of cleaning footwear before entry into changing rooms is an advantage

5.3.4.8 Labour welfare facilities

Well located toilet rooms (1 per 15 employees) shall be provided in the abattoir/slaughterhouse building sufficiently away from slaughter walls. A separate hall with lockers and shower facilities (1 per 15 employees) shall be provided. Adequate drinking water and washing facilities (cleaning agents, soaps and chemicals) shall be provided at convenient locations. Adequate facilities for cloak room, canteen with dining hall and first-aid shall also be provided. A store room for overalls, equipment and clean manual implements, normally required for the work, must be provided. Hand basins or wash troughs with taps controlled preferably with knees or elbow must be provided at the exit of these facilities.

5.3.5 Isolation block

It is also called as emergency slaughterhouse or miniature abattoir/slaughterhouse. In large abattoir/slaughterhouses isolation block is necessary for detention of suspected animals for its observation and treatment and if necessary to do emergency slaughter in case of fractured, injured animals. The isolation block will have a small lairage to keep 4 cattle with a slaughter hall, cooling hall, bacteriological laboratory, incinerator and sterilization room. This block must be located a distance from the main building and workers shall not move from here to the main buildings. It shall be situated near to the suspect meat detention room and shall be direct communication with the by-products department.

5.3.6 Chiller and freezer room

Chiller room shall have temperature of 0 °C to 4 °C and a freezer room shall have a temperature below -18°C. Hanging halls if air-conditioned shall 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 shall be provided, one for holding retained carcasses and the other for holding the carcasses affected with *Cystercercus bovis*.

5.3.7 Rails for Carcasses

Rails with stainless steel hooks shall be provided for hanging the carcasses and similar provisions for plucks shall be made, permitting free circulation of air. The hooks shall be suitably cleaned and sterilized regularly.

6. CIVIL CONSTRUCTIONS

6.1 A abattoir/slaughterhouse Premises

abattoir premise shall be fenced with security in order to control the entrance of unauthorized persons, vehicles, and animals. Surfaces on the site must be paved or grassed. Small abattoir or slaughterhouses must have a surface that is a dust and mud free, readily cleanable and well drained. Lager houses shall be planted with trees in order to make the premise environment friendly. Provision of sufficient storm water drainage shall be there.

6.2 Ante-mortem and Pen Area

The area shall 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 shall be provided around the borders of livestock pen area, except at the entrances. The pen shall preferably be covered.

6.3 Plant Building

In addition to the requirements given in EAS 39, an abattoir or slaughterhouse building shall comply with the following:

6.3.1 Floors

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

6.3.2 Coves

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

6.3.3 Interior Walls

Interior walls shall 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 shall 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 shall have washable surface up to the height of 2 m from the floor so that the splashes may be washed and disinfected. The smooth walls will be painted in light colours to a height of 3 m.

6.3.4 Ceilings

Ceilings shall be of good height. So far as structural conditions permit, ceilings shall be smooth and flat. Ceilings shall be constructed of acceptable impervious material and finished so as to minimise condensation, mould development, flaking and accumulation of dirt. The walls and ceiling may be painted with water-resistant paint to maintain them clean.

6.3.5 Doors and windows

All doors shall be sufficiently wide and those opening from departments where edible material is handled, unless provided with an effective and operating air screen shall be solid and as far as practicable, two frame self-closing or snug-fitting double action door. Windows shall be fitted with whole panes and those which open shall be screened. The screens shall be made so as to be easily movable for cleaning. Internal window sills: if present shall be sloped to prevent use as shelves.

6.3.6 Screens and Insect Control

All windows, doorways, and other openings that may admit flies shall 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.

6.3.7 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 shall extend vertically and horizontally to a sufficient distance to exclude the entrance of rats and other rodents

6.3.8 Stairs

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

6.4 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 shall be provided. Vehicles which offload live animals, loads intestines, heads and feet as well as vehicles removing paunch contents, condemned materials and refuse are restricted to the dirty area and may not enter areas where meat vehicles and staff who handle meat are to be found. Separate routes for stock and meat vehicles shall be provided. Approach roads shall be at least 6 m wide. Drainage and cleaning facilities shall be available in vehicles parking areas where animals are offloaded or meat is loaded.

6.5 Drainage

6.5.1 All parts of floors where wet operations are conducted shall be well drained. As a general rule, drainage channels shall be smooth, impervious, washable and provided with grates or covers. the floors shall have

uniform slope to drains with no low spots which collect liquid. Drainage shall allow the flow of waste water from clean to dirty areas. the drainage system shall be covered. Drainage lines from toilet pans and urinals shall not be connected with other drainage lines within the plant. All floor drains shall 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 shall be used and made totally fly-proof and rodent-proof.

7 LIGHTING AND VENTILATION

7.1 Un-refrigerated work rooms shall 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 shall be approximately one-fourth the floor area of a workroom. This ratio shall 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 shall be provided at all places where adequate natural light is not available or is insufficient.

7.2 Every abattoir or slaughterhouse shall be provided with well-distributed artificial light throughout the slaughter hall and workrooms and at places where meat inspection is carried out. Where bulbs are used, these shall be covered by materials which are removable and washable

7.3 Every abattoir/slaughterhouse 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.

8 SUPPLIES OF WATER

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

8.2 Hot water at 82 °C for frequent sterilizing of equipment shall be provided

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

8.4 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/slaughterhouse. 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.

9 BASIC EQUIPMENT REQUIRED FOR SLAUGHTER AND DRESSING

9.1 The basic equipment that are needed for the slaughtering operation shall be available in an abattoir depending on the slaughtering procedure employed.

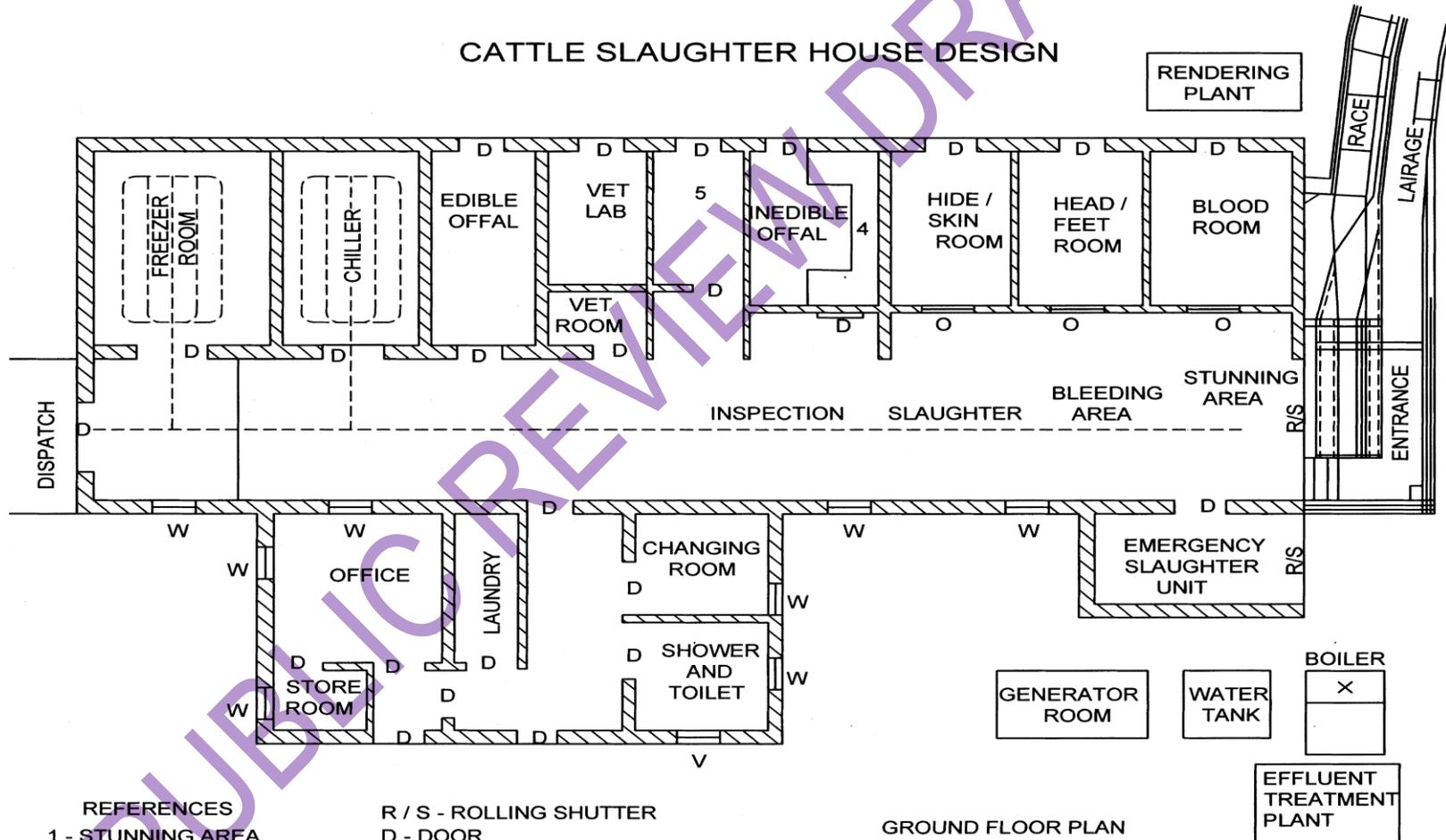
9.2 Non-acceptable Materials

The following materials shall not be used in an abattoir/slaughterhouse:

- a) Copper and its alloy 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 and other related material.

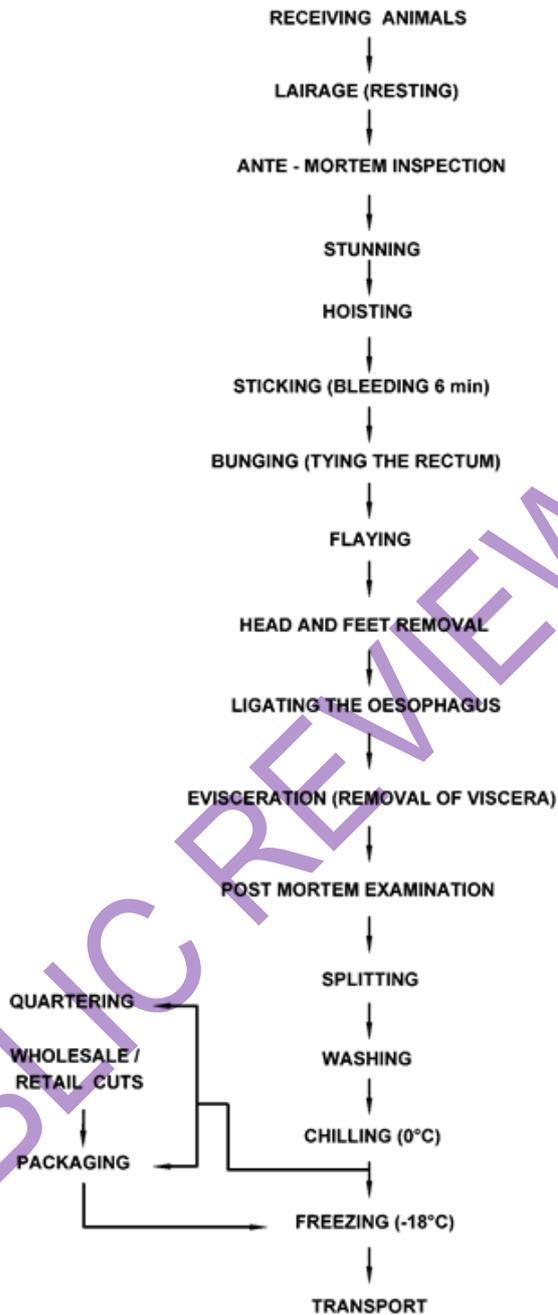
**Annex I
(Informative)**

Annex I – Typical layout plant for cattle abattoir/slaughterhouse



**Annex II
(Informative)
Flow diagram for cattle abattoir/slaughterhouse**

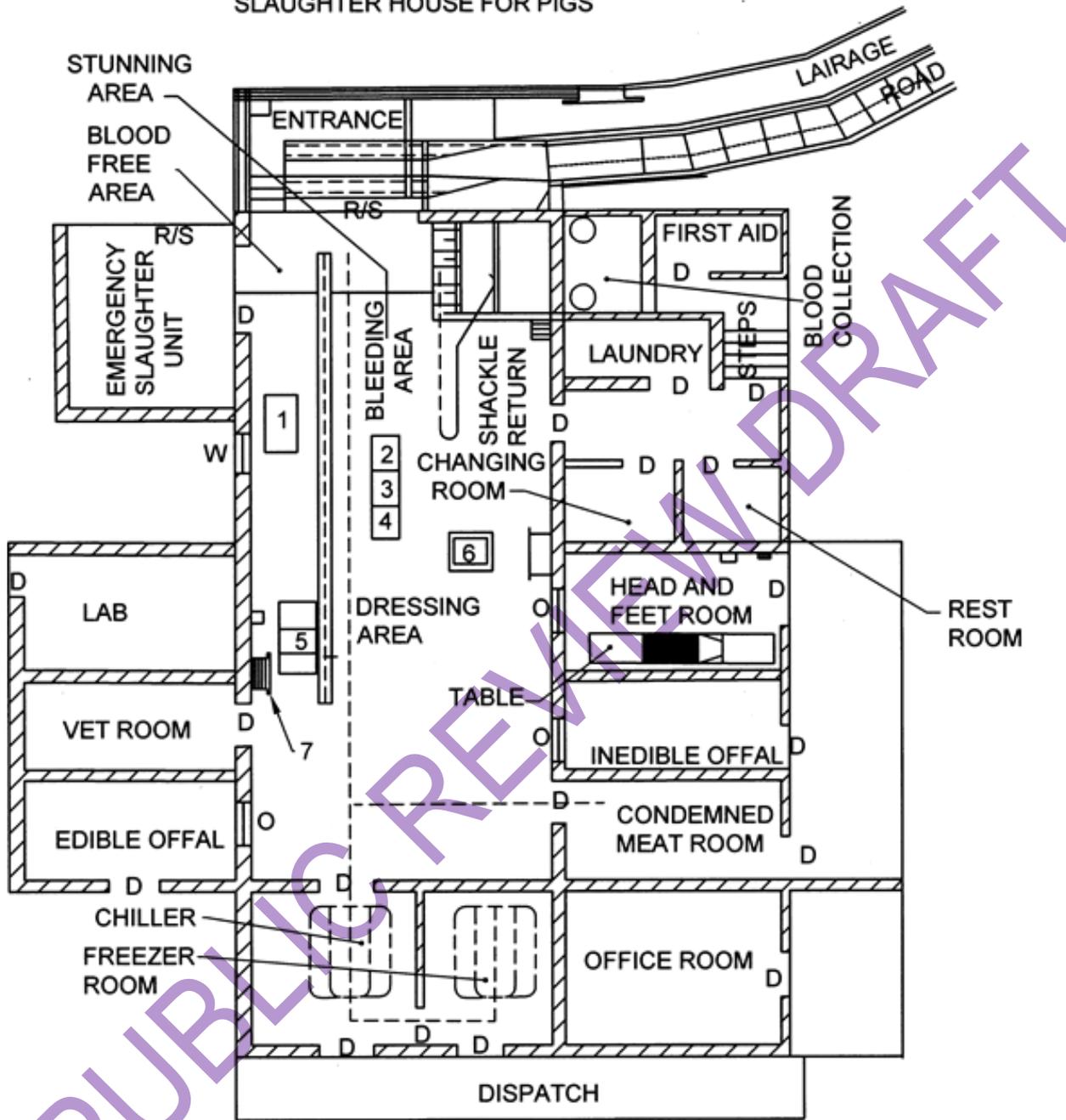
CATTLE / BUFFALO - SLAUGHTER PROCEDURE



**Annex III
(Informative)**

Typical layout plant for pig abattoir/slaughterhouse

SLAUGHTER HOUSE FOR PIGS



GROUND FLOOR PLAN

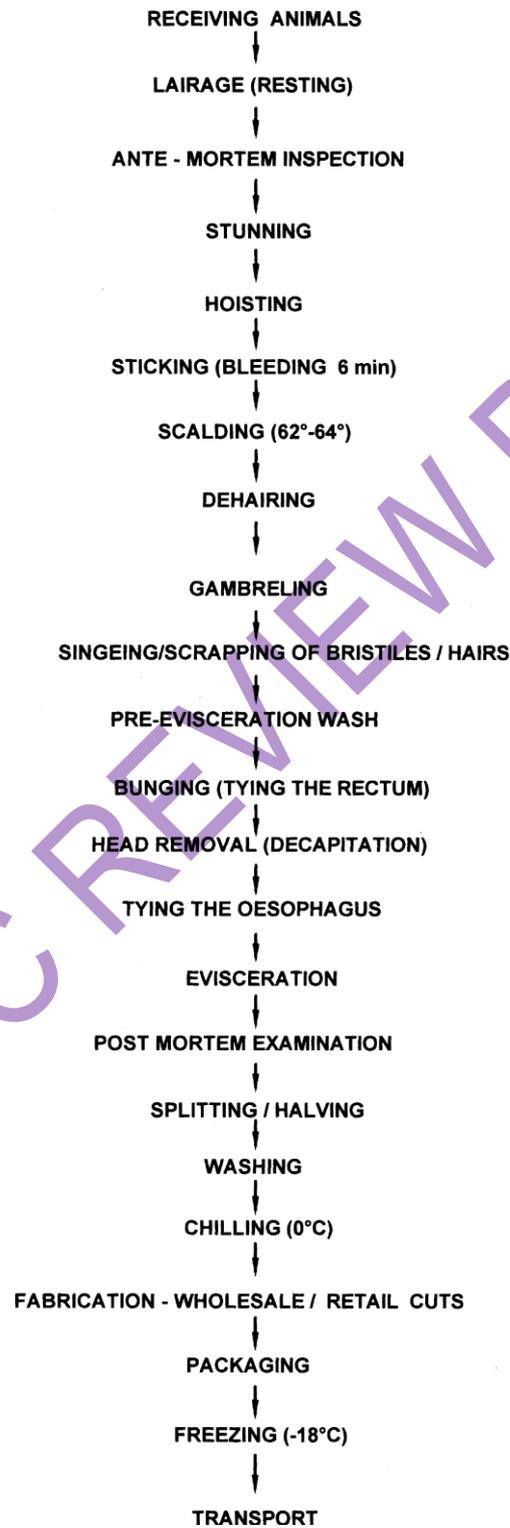
REFERENCES

- | | |
|-------------------|-------------------------|
| 1 - SCALDING TANK | 7 - HOT WATER HOSE |
| 2 - DEHAIRING | R / S - ROLLING SHUTTER |
| 3 - SINGEING | D - DOOR |
| 4 - DEHEADING | W - WINDOW |
| 5 - SPLIT & WASH | O - COUNTER (OPENING) |
| 6 - OFFAL TROLEY | |

Annex IV (Informative)

Flow diagram for pigs' abattoir/slaughterhouse

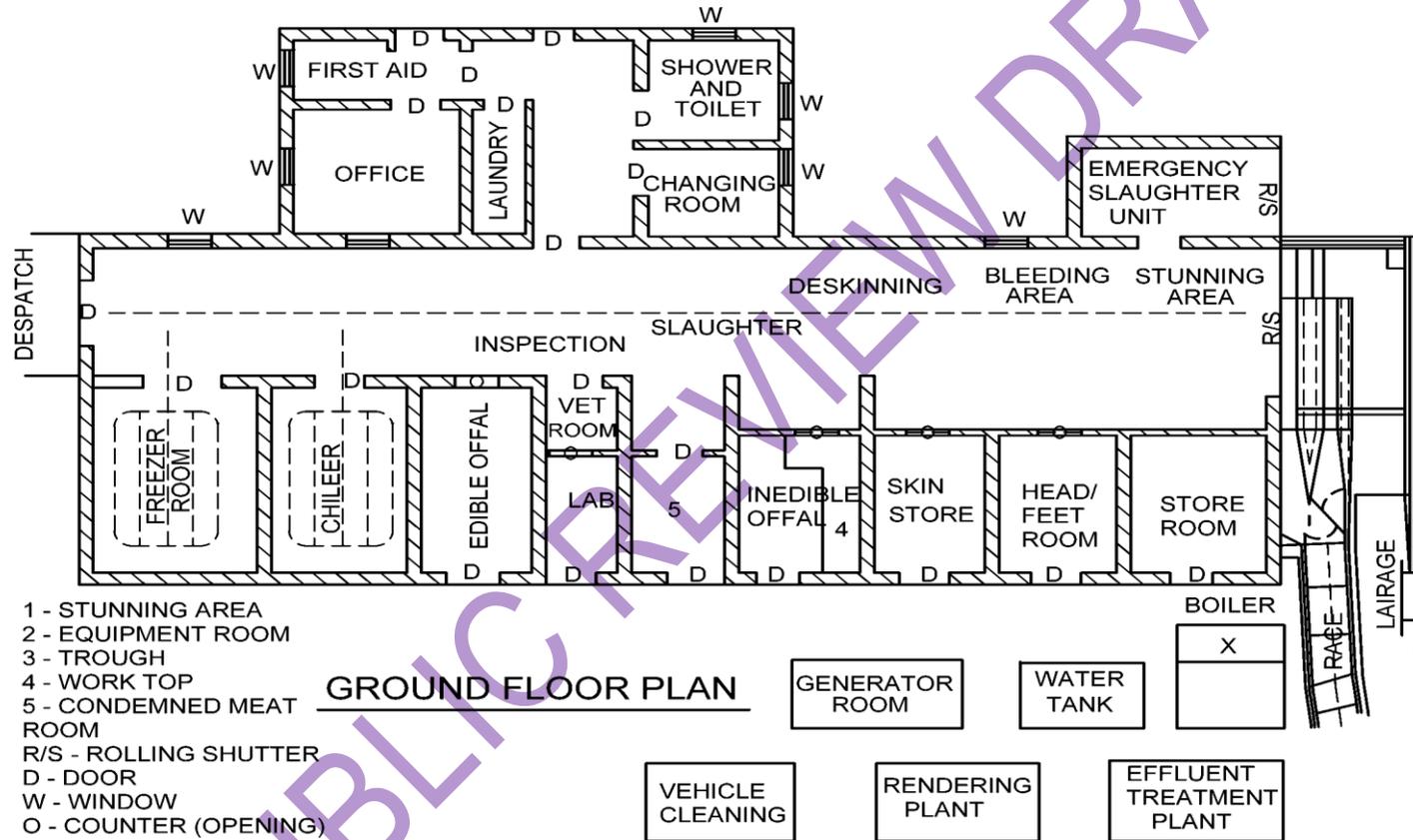
PIG-SLAUGHTER PROCEDURE



**Annex V
(Informative)**

Typical layout plant for goat and sheep abattoir/slaughterhouse

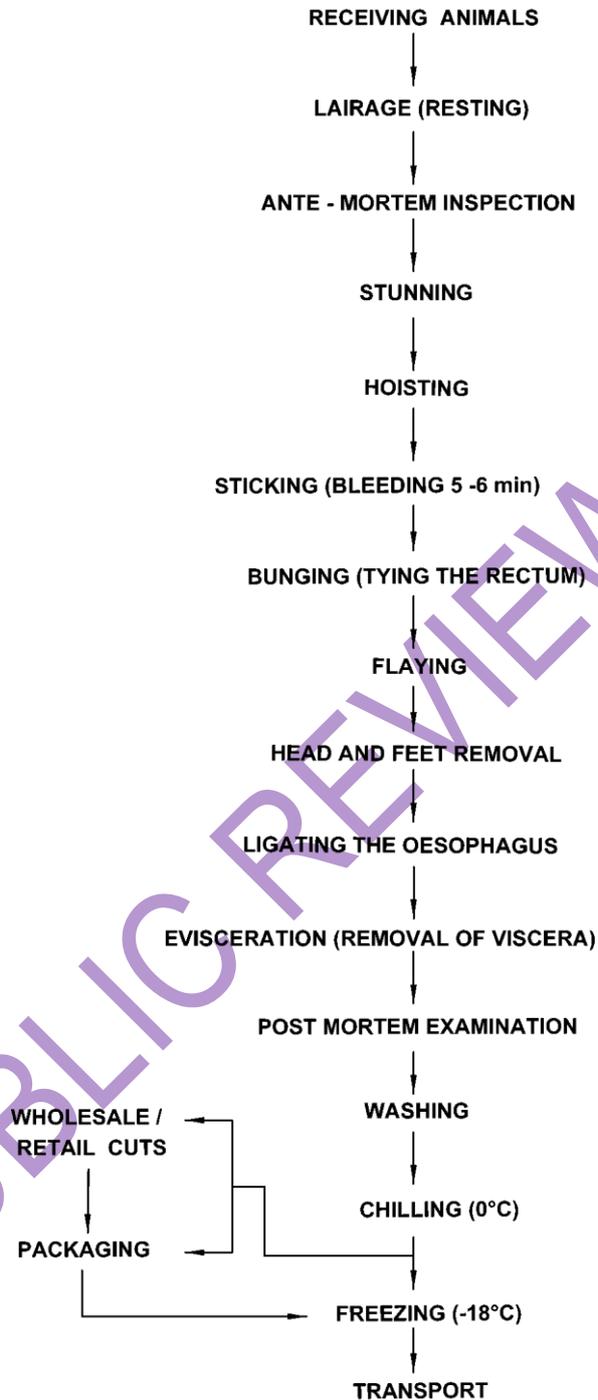
SHEEP / GOAT SLAUGHTER HOUSE DESIGN



**Annex VI
(Informative)**

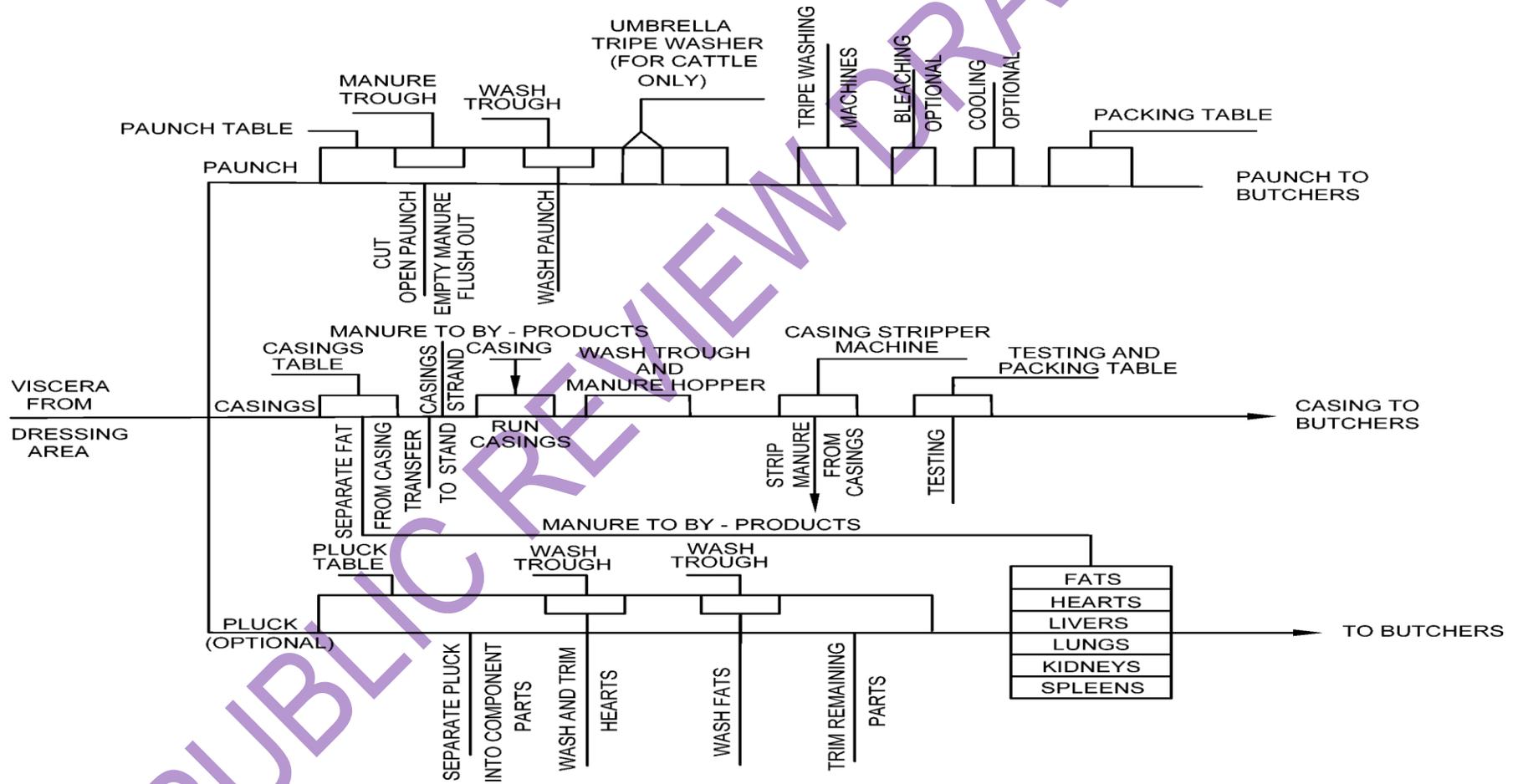
Flow diagram for goat and sheep abattoir/slaughterhouse

SHEEP/GOAT - SLAUGHTER PROCEDURE



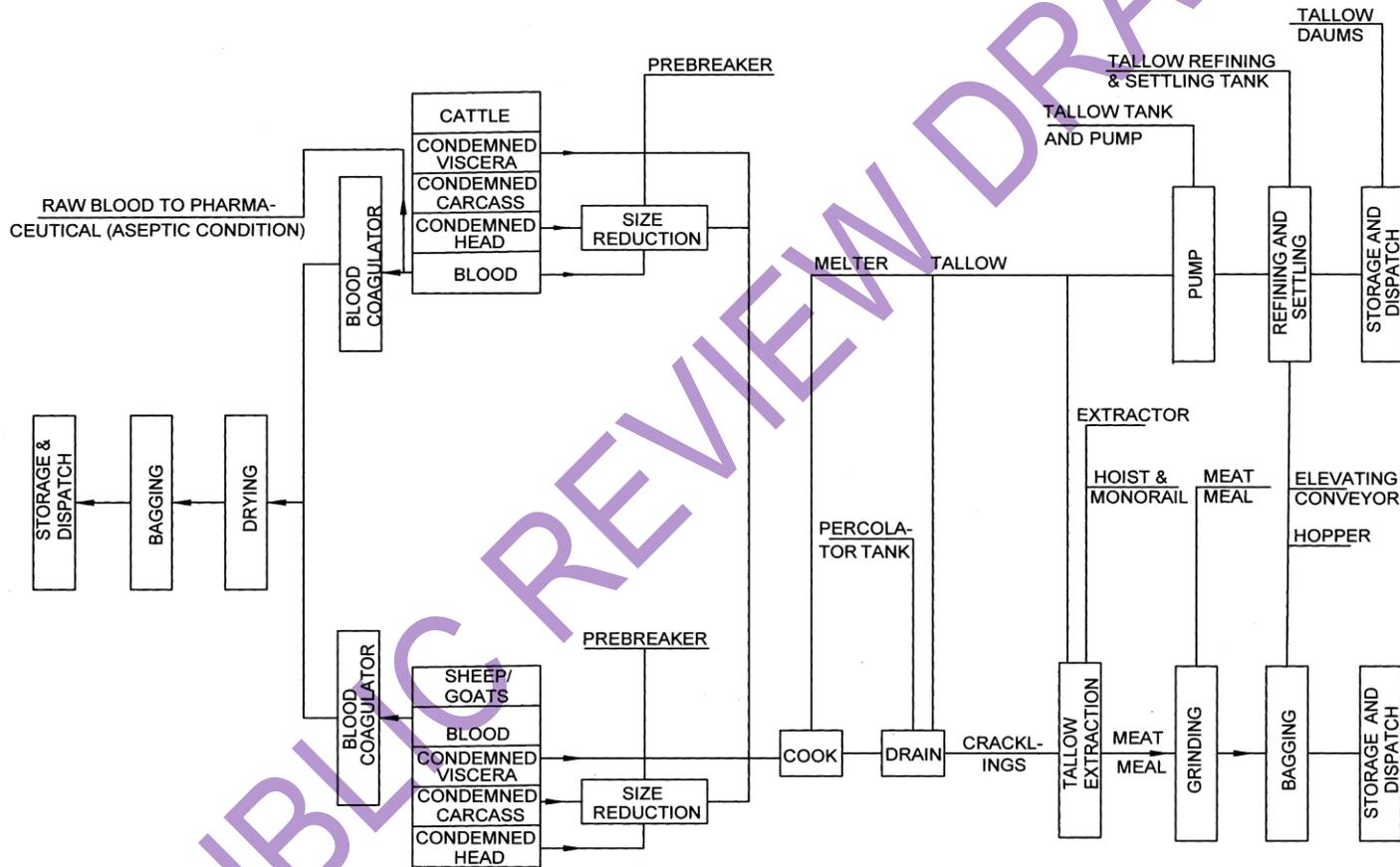
Annex VII (Informative)

Cattle, Pig and Goat Offal Flow Diagram



Annex VII (Informative)

BY-PRODUCTS (RENDERING) FLOW DIAGRAM

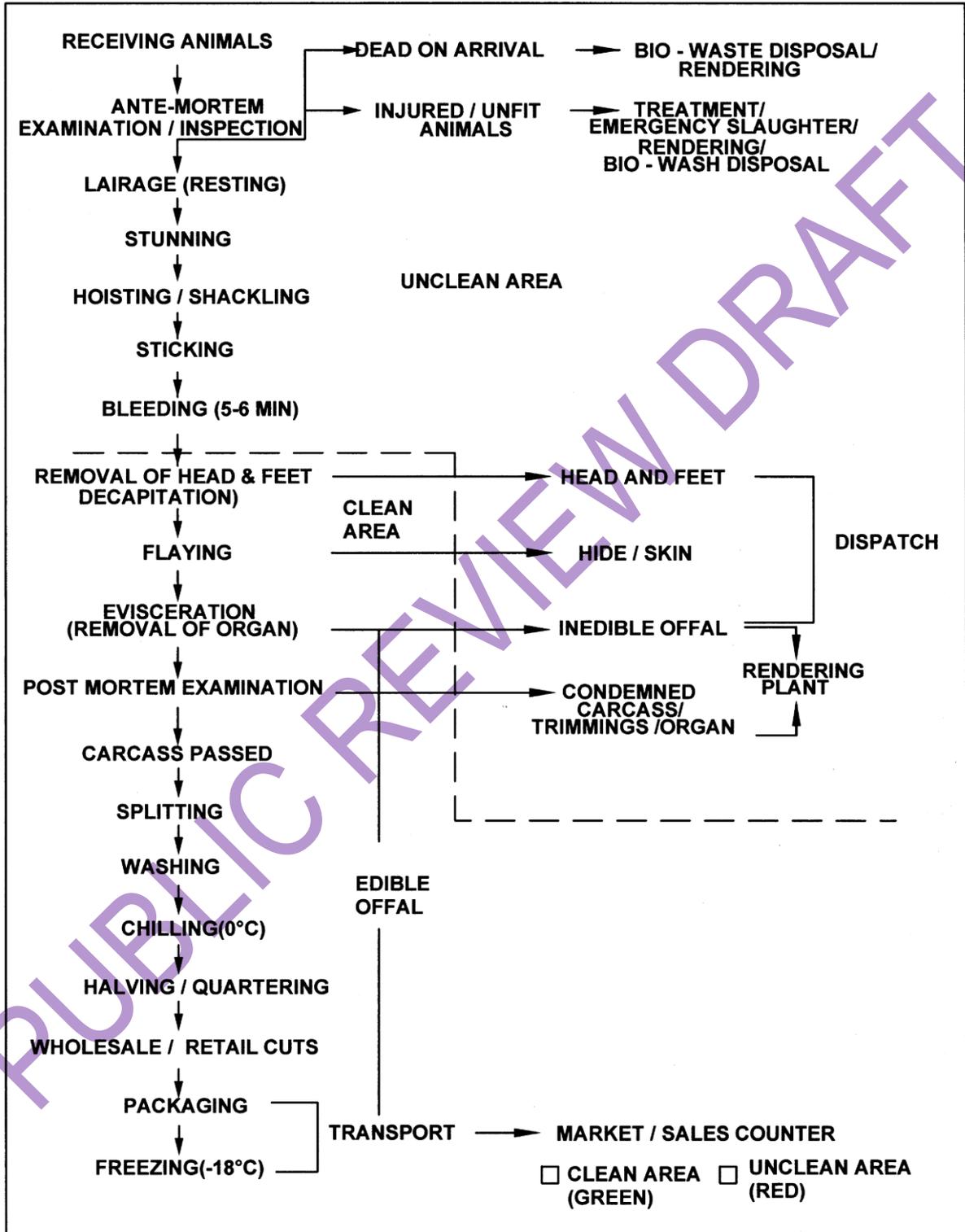


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**Annex IX
(Informative)**

GENERAL PROCESS FLOW DIAGRAM

PROCESS FLOW DIAGRAM



Bibliography

IS 4393: Basic requirements for an abattoir

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