THAI AGRICULTURAL STANDARD
TAS 9009-2006

GOOD MANUFACTURING PRACTICES FOR
PIG ABATTOIR

National Bureau of Agricultural Commodity and Food Standards
Ministry of Agriculture and Cooperatives
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National Bureau of Agricultural Commodity and Food Standards
Ministry of Agriculture and Cooperatives
50 Phaholyothin Road, Ladyao, Chatuchak, Bangkok 10900
Telephone (662) 561 2277 www.acfs.go.th

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Ad hoc Sub-Committee on the Elaboration of Standard for Pig Abattoir

1. Mr. Yukol Limlamthong, Chairperson
   Director General of the Department of Livestock Development

2. Representative of the Department of Livestock Development
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   Mr. Ponkrit Auita (alternate)

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   National Bureau of Agricultural Commodity and Food Standards
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   Ms. Rungtip Chuanchuen (alternate)

7. Representative of the Faculty of Veterinary Science,
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8. Representative of the Faculty of Veterinary Science,
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14. Ms. Jutarat Sethakul

15. Ms. Nuanchan Paraksa

16. Mr. Krangsak Daengpom

17. Mr. Vivat Sutiwong

18. Mr. Sompop Chatraphorn

19. Representatives of the National Bureau of Agricultural Commodity and Food Standards
   Ms. Darunee Tuntasuvan                Secretary
   Mr. Somkiat Sripisuth                Assistant Secretary
Thai Agricultural Standard (TAS) on Good Manufacturing Practices for Pig Abattoir is the criteria for certifying and practical guiding of pig abattoir. The guidelines cover all steps starting from picking up live pig at farm and transferring to abattoir and thereafter distributing of pig carcass, pork and their products to the market in order to provide safe and quality products that fit for consumption and are acceptable domestically and internationally.

The establishment of this standard is based on the information of the following documents:


**Remark:**
The standard title has been revised from “Thai Agricultural Commodity and Food Standard (TACFS)” to “Thai Agricultural Standard (TAS)” in accordance with the enforcement of The Agricultural Standards Act B.E. 2551 (2008).
NOTIFICATION OF THE NATIONAL COMMITTEE ON AGRICULTURAL COMMODITY AND FOOD STANDARDS

SUBJECT: THAI AGRICULTURAL COMMODITY AND FOOD STANDARD: GOOD MANUFACTURING PRACTICES FOR PIG ABATTOIR
B.E. 2549 (2006)

The resolution of the 1/2549 session of the National Committee on Agricultural Commodity and Food Standards dated 8 June B.E.2549 (2006) endorsed the Thai Agricultural Commodity and Food Standard entitled Good Manufacturing Practices for Pig Abattoir. This standard would be of benefits for quality improvement, facilitating trade and protecting consumers.

By virtue of the Cabinet Resolution on Appointment and Authorization of the National Committee on Agricultural Commodity and Food Standards dated 19 November B.E.2545 (2002), the Notification on Thai Agricultural Commodity and Food Standard entitled Good Manufacturing Practices for Pig Abattoir is hereby issued as voluntary standard, the details of which are attached herewith.

Notified on 10 August B.E.2549 (2006)

Khunying Sudarat Keyurapan
Minister of Agriculture and Cooperatives
Chairperson of the National Committee on Agricultural Commodity and Food Standards
1. SCOPE

1.1 Thai Agricultural Standard (TAS) on Good Manufacturing Practices for Pig Abattoir applies to pig transportation from farm to abattoir, humane slaughtering, good hygienic practices and thereafter distributing of pig carcass, pork and products from abattoir to market.

1.2 This standard shall be used in conjunction with the Thai Agricultural Standard on Good Manufacturing Practices for Abattoir (TAS 9004-2004) and Thai Agricultural Standard on Pig Meat (TAS 6000-2004).

2. DEFINITIONS

For the purpose of this standard:

2.1 Pig means animals in the family Suidae and raised for human consumption.

2.2 Pig abattoir means any premises and buildings established for pig slaughtering and dressing. It may include cut up processes to prepare pork and products for human consumption.

2.3 Pig carcass means the whole of pig after the process of humane slaughtering for human consumption by bleeding and eviscerating, either head removal or not.

2.4 Pork means tissue parts from pig carcass to be safe and fit for human consumption. The majority of tissue parts consist of pig skeletal muscle. The pork shall not be treated in any way for preservation, except chilling.

2.5 Products mean unprocessed parts of pig other than meat fit for human consumption such as blood, brain, tongue, stomach.

2.6 Pig head means head of the pig removed from the carcass by cutting through the vertebral column at the atlas joint.

2.7 Pig skin means skin that is dehaired and removed from pig carcass.

2.8 White offal means esophagus, stomach, intestine, and genital organs.

2.9 Red offal means heart, liver, kidney, spleen, trachea, and lungs.

2.10 Stunning means processes in which pigs are rendered completely unconscious prior to bleeding and remain unconscious until bleeding is complete.

2.11 Humane slaughtering means methods of slaughtering pigs whereby pig shall not be suffering.
2.12 **Transportation of pig** means movement of pig humanely by vehicle from farm to abattoir.

2.13 **Vehicle for pig** means transport vehicles i.e. truck including transport receptacles in which pigs are transported.

2.14 **Cutting** means the dividing of carcass into the required parts.

2.15 **Transportation of pig carcass, pork and products** means movement of pig carcass, pork and products by vehicle from abattoir to market.

2.16 **Vehicle for pig carcass, pork and products** means vehicles appropriately designed to control the temperature for transporting pig carcass, pork and products.

2.17 **Package** means packages or containers in which pig carcass, pork and products are packed.

2.18 **Official inspector** means an inspector who is a veterinarian or a properly trained officer appointed by the Director General or local government to inspect meat in accordance with requirements contained in the Controlling of Abattoir and Selling Fresh Meat Act.

2.19 **Competent person** means the official authority appointed by the Minister, Director General or local government to control meat hygiene, including meat inspection in accordance with requirements contained in the Controlling of Abattoir and Selling Fresh Meat Act.

2.20 **Visual inspection** means inspection of physical appearance of the objects such as meat, meat products and general appearances by visual observations. However, physical contact, smelling or other tools such as magnifying glass can be used to aid in observations depending upon the criteria for inspections and evaluate whether the results are in compliance with the requirements. The inspections may include interview or observe on working or operation processes.

2.21 **Ante-mortem inspection** means any methods of the inspection of animal health prior to slaughtering by official inspector for consumers’ safety.

2.22 **Post-mortem inspection** means any methods of the inspection of carcass and visceral organs by official inspector for consumers’ safety.

2.23 **Water and ice** means water and ice complied with the standards of potable water.
3. PROVISIONS CONCERNING CONTROL POINTS, REQUIREMENTS AND INSPECTIONS

The control points, requirements and inspections for good manufacturing practices for pig abattoir are defined in Table 1 and Section 3 of Thai Agricultural Standard on Good Manufacturing Practices for Abattoir (TAS 9004-2004).

Table 1. The Control Points, Requirements and Inspections

<table>
<thead>
<tr>
<th>Control Points</th>
<th>Requirements</th>
<th>Inspections</th>
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<tbody>
<tr>
<td>1. Transportation of live pig</td>
<td>1.1 Vehicle shall be designed to be strong and have adequate space.</td>
<td>Visual inspection and review related documents</td>
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<td>1.2 Movement of pig shall be approved by Department of Livestock Development.</td>
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<td>2. Receiving of live pigs</td>
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<td>2.2 Sick or suspected pig suffering from diseases shall be isolated and kept in separated area and sacrificed them in emergency area after slaughtering the normal pig.</td>
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<td>2.3 After unloading pig, pig containers and vehicles shall be cleaned and disinfected immediately.</td>
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<td>3. Lairage area</td>
<td>3.1 Lairage area shall have adequate space for all pigs that are held for slaughtering. Appropriate space for pigs shall be at least 0.8 m² per pig.</td>
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<td>3.2 Construction materials shall be strong and durable. Their surface shall be smooth, no protrusions or sharp edges, not harmful to pigs and have a non-slippery floor.</td>
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<td>3.3 Drinking water shall always be available for pig.</td>
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<td>8. Carcass splitting</td>
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<td>9. Carcass cleaning</td>
<td>9.1 Pig carcass shall be washed after bleeding, dehairing, eviscerating and splitting.</td>
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| 10. Carcass or pork chilling | 10.1 Within one hour after chilling or during storage for distribution, the core temperature of carcass or pork shall not exceed 7 °C.  
10.2 Temperature of carcass or pork shall be recorded.  
10.3 Chilling room shall be free of condensation. | Temperature monitoring and review related documents |
| 11. Carcass cutting | 11.1 Equipment, tools and utensils shall be cleaned properly.  
11.2 Cutting up area shall be clearly separated from other production area and strictly controlled of entering. | Visual inspection                             |
| 12. Packaging | 12.1 Packages shall be durable for transportation and soundly safe for food products.  
12.2 Label shall be legible on each package and contained the information as defined in Annex A.12.3  
12.3 Packaging area, which packaging material cannot be washed and cleaned, shall be clearly separated from other production area. | Visual inspection                             |
| 13. Operating procedures in pig abattoir | Operating procedures in pig abattoir shall be appropriately stepwise and preventing microorganisms cross contamination. | Operating procedures inspection               |
| 14. Transportation of pig carcass, pork and products | 14.1 Transportation vehicle shall be designed to maintain core temperature of pig carcass, pork and products at 7 °C or lower during transportation.  
14.2 Vehicle intended for transport pig carcass, pork and products shall not be used to transport live pigs. | Visual inspection and temperature monitoring |
Control Points | Requirements | Inspections |
--- | --- | --- |
14.3 Transportation vehicle or container shall be washed and cleaned before and after transportation. | Visual inspections and review related documents |
15. General hygiene | 15.1 Hygienic practices in production are defined in Annex B.1. 15.2 Personal hygiene is defined in Annex B.2. | Visual inspection |
16. Waste water treatment | Waste water treatment system shall be in place in compliance with relevant laws. | Visual inspection |

4. RECOMMENDATIONS ON GOOD MANUFACTURING PRACTICES FOR PIG ABATTOIR

Recommendations on Good Manufacturing Practices for Pig Abattoir (Annex A) is intended to provide guidance for producers in their operation for pig carcass, pork and products thereof which will be safe and fit for consumption. Hygienic practices in production and personal hygiene are specified in Annex B, operating procedures for pig abattoir are specified in Annex C, The necessary equipment, tools and utensils are also specified in Annex D.
ANNEX A

RECOMMENDATIONS ON GOOD MANUFACTURING PRACTICES FOR PIG ABATTOIR

A.1 TRANSPORTATION OF LIVE PIG

A.1.1. Vehicles for pig transportation

A.1.1.1 Vehicle shall be designed such that they are strong and appropriate for pig transportation.

A.1.1.2 Pig vehicle shall have adequate ventilation, a proper drainage with a roof to protect the sun and the rain.

A.1.1.3 The surfaces of the sides shall be smooth. The sides of vehicles shall be high enough to prevent animals from jumping out.

A.1.1.4 Approximate space for transporting pigs shall be 0.4 m² - 0.8 m² per pig for examples:
- Finishing pig shall have space at least 0.4 m² per pig.
- Boar and sow shall have space at least 0.8 m² per pig.

A.1.2 Methods of transportation

A.1.2.1 Transportation of pig shall be in compliance with the Regulation issued by Department of Livestock Development.

A.1.2.2 During transportation, pig shall be handling with a good care to avoid any risk causing injury e.g. transport vehicle shall be driven smoothly, without jerks or sudden stops.

A.1.2.3 Sick or pregnant pig shall not be transported with the healthy ones.

A.1.2.4 Pigs shall be transported in the early mornings or evenings. For a very hot day, pigs shall be wetted in order to reduce heat.

A.1.2.5 Transport shall be short-haul journeys, to avoid pain or stress.

A.1.2.6 Health conditions of pig shall be regularly inspected during transportation

A.1.2.7 Pig shall arrive to abattoir at least two hours before slaughtering and they shall not be offloaded feed and water more than 12 hours.

A.2 RECEIVING OF PIGS

A.2.1 Upon arrival at abattoir, all relevant documents shall be legally inspected by in charge officer.

A.2.2 Receiving area shall be constructed so that unloading dock is connected to lairage area.
A.2.3 Weighing and counting the pre-slaughtered pig.

A.2.4 Ante-mortem inspection by official inspector at abattoir before slaughtering shall be done and inspection on information such as the respiratory rate and the movement of animals shall be officially reported.

A.2.5 Sick or suspected pig suffering from diseases shall be isolated and holding for last kill after slaughtering the normal pig in separated area. Killed pig that pose a contagious diseases shall be disposed using incinerator or burial, and all concerned parties shall be informed accordingly.

A.2.6 To relieve heat stress during transportation, wetting pigs with water is allowed.

A.2.7 Pig suffered severe injury and deemed to be in pain shall be subjected to humane slaughtering instantaneously.

A.2.8 After unloading pig, vehicles shall be cleaned and disinfected immediately.

A.3 LAIRAGE/ RESTING PEN

A.3.1 The lairage shall be designed and constructed with concrete or metal partitions. The sides of partition shall be smooth and there shall be no protrusions or sharp edges. Their height shall be approximately 90 cm from the ground, and have a non-slippery floor with proper slope.

A.3.2 Lairage area shall be constructed so that there is an animal passageway leading to the stunning room. The passageway shall be sufficiently wide (depending on species and size of pigs) so that pigs cannot turn back.

A.3.3 Pigs shall be moved and rested in lairage area until slaughtering schedule.

A.3.4 In lairage area, drinking water shall always be available for pig. Density of pig in lairage pens shall be at least 0.8 m² per pig.

A.3.5 Every pigs shall be washed and cleaned with water before entering slaughter process.

A.3.6 Passageway connected to stunning room shall have door to prevent pigs turn back of the walkway.

A.3.7 Lairage area shall be washed, cleaned, and disinfected after all pigs have been moved for slaughter and there shall be adequate water for cleaning.
A.4 SLAUGHTERING

A.4.1 Stunning

Methods of slaughtering shall be humane slaughtering in which stunning process that render completely unconscious in order to eliminate pain, discomfort and stress prior to bleeding. Pigs shall remain unconscious until bleeding is completed. Stunning devices and room shall be inspected to maintain working condition before starting each slaughtering process. Stunning consists of the following four main methods:

(1) Electrical stunning

(2) Compression pistol stunning: stunning pistol consists of two types: penetrating captive bolt pistol and percussive captive bolt pistol.

(3) Gas stunning e.g. Carbon dioxide, Argon

(4) Other methods authorized by competent authority and internationally recognized.

A.4.2 Sticking

A.4.2.1 Time interval between stunning and sticking shall be minimized. Sticking process can be done while pigs are suspended or on a horizontal conveyors. Sticking knife shall be used for sticking only.

A.4.2.2 The stick hole shall be approximately 5-8 cm wide. The knife shall be inserted just to cut jugular and carotid vessels. If the knife is inserted too far to the sternum bone, blood will flow into thoracic cavity and clot will occur in thoracic cavity and muscle that line close to the vertebrae.

A.4.2.3 The sticking knife shall be cleaned and sterilized with warm water of 82 °C or higher every time after use.

A.4.2.4 After sticking, complete bleeding shall not be less than four minutes. If blood is utilized for human consumption, blood containers shall be clean and hygienic.

A.4.2.5 Slaughtered pigs shall be washed and cleaned.

A.4.2.6 Bleeding equipment, tools and floor shall be cleaned after the bleeding processes.

A.5 SCALDING, DEHAIRING AND HOOVES REMOVAL

A.5.1 Pig carcass shall be immersed into scalding vat that has sufficient warm water or sprayed with warm water. The water temperature shall be 58 °C or higher. Time period of scalding shall be determined relatively to water temperature and size of pig.
A.5.2 After scalding, pig carcass shall be moved to dehairing area, and not come into contact with the floor.

A.5.3 If suspended system is used to move slaughtered pig, Gambrel or hook anchor at the Achilles tendon shall be used.

A.5.4 Scalding and dehairing areas including scalding vat, dehairing machine and trays shall be washed and cleaned after operation.

A.5.5 Hooves shall be removed from both fore and hind limbs.

A.5.6 If singeing is practiced, slaughtered pigs shall be moved to singeing area. After passing singeing process, hair shall be completely removed. All remainders shall be scraped by a knife.

A.5.7 Slaughtered pigs shall be washed until clean before evisceration process.

A.6 HEAD REMOVAL

A.6.1 Head removal is operated by cutting through vertebral column at the atlas joint along the natural seam.

A.6.2 If head is removed before inspection is completed, head shall be placed in a container and proper identification of head and slaughtered pig shall be made.

A.6.3 If head is attached with slaughtered pig, head shall be removed after post-mortem inspection.

7. EVISCERATING

A.7.1 Process of bunging is operated by using the knife tip cutting around the anus. If slaughtered pig is boar, the first step is to remove penis and preputial pouch.

A.7.2 If knife is utilized to open the abdominal wall, abdominal wall shall be cut from bung opening to sternum. White offal shall be pulled off with caution so that it is not punctured. Proper identification of offal and slaughtered pig shall be made.

A.7.3 If knife is utilized to open thoracic cavity, it shall be cut from jowl to abdominal opening. Red offal shall be pulled off. Proper identification of offal and slaughtered pig shall be made.

A.7.4 Post-mortem inspection and recorded shall be done by official inspector. Condemnation of pig carcass is authorized by competent person.

A.7.5 Offal shall be cleaned with water.

A.7.6 Eviscerating room shall be washed and cleaned.

A.8 CARCASS SPLITTING

A.8.1 Carcass shall be split in half at the center of the vertebrae at the tail bone down to neck bone by saw or knife after evisceration process.
A.8.2 Spinal cord shall be removed after carcass splitting and dressing. Halving carcass shall be cleaned with water.

A.8.3 Halving carcass and pork shall be weighed and subjected to quality grading and recorded in an official report form.

A.8.4 Carcass splitting area shall be cleaned and washed.

**A.9 CARCASS WASHING**

The final cleaning of pig carcass shall be washed thoroughly inside and outside with water.

**A.10 CHILLING**

A.10.1 After carcass was cleaned with water, they shall be moved to the chilling room in order to reduce core temperature of the carcass to $7\,^\circ\text{C}$ or less after chilling for approximately 24 hour.

A.10.2 Carcass in chilling room shall be arranged so that cool air can be circulated thoroughly. Movement of pig carcass to and from chilling room shall follow first-in, first-out basis.

A.10.3 Workers shall inspect and keep carcass in proper order at all times. Carcass and room temperature shall be checked and recorded in an official report.

A.10.4 The chilling room shall be controlled and restricted to staff only. Workers not involved are not permitted to enter the room.

A.10.5 The chilling room shall be clean and free from water and pork debris.

A.10.6 When the chilling room is empty, it shall be immediately cleaned.

**A.11 CUTTING**

A.11.1 Knives, tools and equipment for cutting processes shall be cleaned.

A.11.2 Cutting processes shall be done quickly in order to prevent microbial overgrowth.

A.11.3 Conveyors and trays intended for moving pig carcass and pork shall be cleaned and dried. If contaminated, they shall be cleaned and dried with squeegee, sponge wiping is not permitted.

A.11.4 During cutting process, pig carcass and pork shall not be over accumulated on the conveyors.

A.11.5 Workers shall always wash their hands with soap and disinfectant.

A.11.6 Cutting room shall be controlled and restricted to staff only. Workers not involved are not permitted to enter the room.

A.11.7 Quality grading for pork shall follow: Thai Agricultural Standard on Pig Meat (TAS 6000-2004).
A.12 PACKAGING

A.12.1 Packaging materials shall be clean. If the packaging materials are made of plastic, they shall be complied with relevant laws

A.12.2 Packages shall be durable for the transportation.

A.12.3 Labels shall be legible on packages, not detached and contained the following information.

(1) Type of pig carcass, pork or products

(2) Net weight in gram or kilogram

(3) Day/ Month/ Year of Slaughter, and Day/ Month/ Year of best before

(4) Storage instruction

(5) Name of producer, distributor or trademark and address

A.12.4 If packaging materials are made of materials that cannot be cleaned or dust cannot be removed, packaging room shall be separated. The room shall be designed to provide a protection against dust, insects and rodents.

A.13 CHILL STORAGE

A.13.1 If carcass is kept at chilling storage, core temperature of carcass shall not exceed 7 °C and carcass shall be arranged so that cool air can be circulated thoroughly.

A.13.2 Chilling storage shall be free of condensation.

A.13.3 Storage carcass, pork and products shall be inspected and kept in proper order at all times. Temperature of room, pig carcass, pork and products shall be inspected and recorded in official report.

A.13.4 Chilling storage shall be cleaned at regular interval.

A.13.5 Door of chilling storage shall be equipped with a safety release system and alarm to prevent anyone from being locked inside.

A.14 TRANSPORTATION OF PIG CARCASS, PORK AND PRODUCTS

A.14.1 Transportation vehicle shall be designed to maintain core temperature of pig carcass, pork and products at 7 °C or lower during transportation.

A.14.2 Movement of pig carcass, pork and products shall be handled with care to prevent damage. The carcass, pork and products shall not come into contact with the floor or wall of transportation vehicles.
A.14.3 The doors of transportation vehicle or container shall be tightly closed, if necessary, they shall be locked or tied with metal wire or other materials to prevent opening during transportation.

A.14.4 Vehicle intended for transport pig carcass, pork and products shall not be used to transport live pigs.

A.14.5 Transportation vehicle or container shall be washed or cleaned before and after transportation.

**A.15 WASTE WATER TREATMENT**

Waste water treatment system shall be in place in compliance with relevant laws.
ANNEX B

GENERAL HYGIENE

B.1 HYGIENIC PRACTICES

B.1.1 Pig abattoir shall follow processing steps as outlined in Annex C.

B.1.2 The inspection and record of cleanliness before operation are required.

B.1.3 Effective pest control program shall be in place for inside and outside production building.

B.1.4 Cleaning and maintenance program shall be in place for processing area, equipment, machinery and tools to ensure cleanliness of abattoir before and after operation. Special care shall be focused on the surface that contact with pig carcass, meat and products.

B.1.5 Adequate hand washing facilities shall be provided.

B.1.6 Adequate space of washing facilities shall be provided corresponding to equipment and utensils. The facilities may be located at any side of the building.

B.1.7 Cleaning sink shall have proper size for cleaning equipment and utensils.

B.1.8 Storage facilities shall be provided to avoid any contamination or not be accumulation source of contamination.

B.1.9 Lockable individual storage shall be separated for keeping materials and tools such as packaging materials, cooking ingredients, staff clothing, cleaning materials and disinfectant.

B.1.10 Chemicals shall be stored separately from the production area with legible label.

B.1.11 Garbage bin with lid shall be provided and removed after operation hour to prevent contamination.

B.1.12 Plant and equipment shall be washed and cleaned before and after operation. After the final operation they shall be completely cleaned and disinfected to ensure no meat is left overnight.
B.2 PERSONAL HYGIENE

B.2.1 Workers shall have physical examination at least once a year.

B.2.2 Workers shall have the short nails and wash their hands with soap and disinfectant before entering the production area and after leaving the toilet.

B.2.3 During operation hours, every person shall wear clean and disinfected protecting clothing, aprons, bouffant cap for full hair coverage, mask, and boots.

B.2.4 Personal effects and food are prohibited to production area. They shall be deposited in provided lockers.

B.2.5 Protecting clothing, aprons, bouffant caps, mask, boots, tools and equipment shall be cleaned after work and stored at the specific rooms.

B.2.6 Workers shall not move to other production area to prevent contamination unless receiving approval.

B.2.7 Smoking, eating, chewing or spitting are prohibited in production area.
ANNEX C

FLOWCHART OF GOOD MANUFACTURING PRACTICES FOR PIG ABATTOIR

Figure C.1 Processing steps

Note: Singeing and chilling steps can be omitted where necessary or appropriate
ANNEX D

ESSENTIAL EQUIPMENT IN PIG ABATTOIR

Essential equipment in pig abattoir consist of

D.1 Stunning equipment
D.2 Sticking knives, incision knives, cutting knife
D.3 Knife sterilizer
D.4 Knife sharpener or knife sharpening tool
D.5 Scalding vat or scalding machine
D.6 Dehairing equipment
D.7 Hoof puller
D.8 Offal trays
D.9 Carcass splitting tools i.e. hand saw, electrical saw or bone cleaver
D.10 Meat tree or hook or Carcass table
D.11 Carcass moving equipment i.e. conveyors
D.12 Chilling equipment e.g. chilling room, refrigerator, chilling tank
D.13 Scale for live pig and pork
D.14 Protective clothes, aprons, bouffant cap, mask and boots
D.15 Cleaning equipment and tools
ANNEX D

UNITS

The units and symbols used in this standard and the units recognized by the International System of Units (le Système International d’Unités) or SI are as follows:

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Units</th>
<th>Symbols</th>
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<tbody>
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<tr>
<td></td>
<td>Meter</td>
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<tr>
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<td>Square meter</td>
<td>m²</td>
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<tr>
<td>Temperature</td>
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