

Foreword

The formulation of this national standard was initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) under the project entitled “Development of Standards for Slaughterhouse Equipment (for hogs)” which was funded by Department of Agriculture- National Meat Inspection Service (DA- NMIS).

This standard has been technically prepared in accordance with BPS Directives Part 3:2003 – Rules for the Structure and Drafting of International Standards.

The word “shall” is used to indicate mandatory requirements to conform to the standard.

The word “should” is used to indicate that among several possibilities one is recommended as particularly suitable without mentioning or excluding others.

In the preparation of this standard, the following documents/ publications were considered:

Baumeister, T., E.A. Avallone and T. Baumeister III. 1978. *Marks’ Standard Handbook for Mechanical Engineers*. 8th ed. McGraw- Hill, Inc.

Food Protection Services. 2005. Abattoirs. BC Centre for Disease Control.

The Pork Production Committee. 1996. Philippine recommends for pork production. Los Baños, Laguna: PCARRD and PARRFI, 1999. 148p. – (Philippine Recommends Series No. 13-B).

www.engineersedge.com/pipe_schedules.htm

www.motherearthnews.com

1 Scope

This standard specifies the requirements for a hog scalding.

2 References

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

PAES 102: 2000	Agricultural Machinery – Operator’s Manual – Content and Presentation
PAES 407: 2001	Agricultural Structures – Slaughterhouse for Swine, Small and Large Animals – General Requirements
PAES 506: 2007	Slaughterhouse Equipment – Hog Scalding – Methods of Test

3 Definitions

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

3.1

boiler

a vessel to which water, fuel and air are supplied and in which steam is generated

3.2

dehairing machine

dehairer

mechanical assembly equipped with rotating flexible paddles used in removing hair from animal carcass after scalding

3.3

release cradle

part of the scalding that is used to remove hogs from the scalding

3.4

scalding

scalding tank

slaughterhouse equipment that can contain water which is heated to loosen the animal’s hair from the follicles

3.5

scalding

process of subjecting an animal to heated water to loosen animal's hair from its follicles

3.6

schedule

refers to the standard wall thickness of the commercially available pipe which is relative to the applied pressure and material strength

3.7

solenoid valve

an electromechanical valve used to automatically shut off or open steam line in hog scalding

3.8

thermostat

device used to automatically control and to keep temperature within the required settings

4 Classification

4.1 Horizontal Scalding

4.1.1 Steam heated scalding

Type of hog scalding wherein water is directly heated by using steam which passes through perforated pipes (Fig. 1).

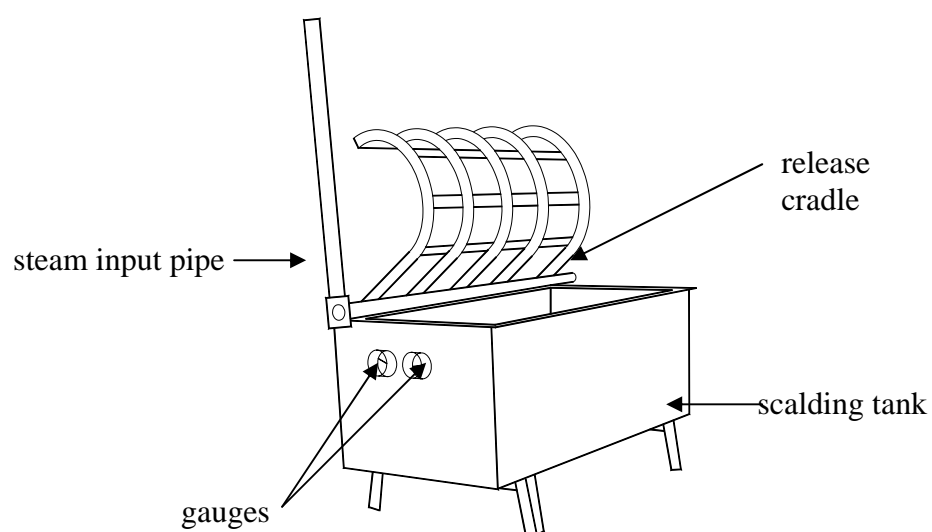


Figure 1. Steam Heated Hog Scalding

4.1.2 Gas heated scalding tank

Type of hog scalding wherein water is heated by using a burner (Fig. 2)

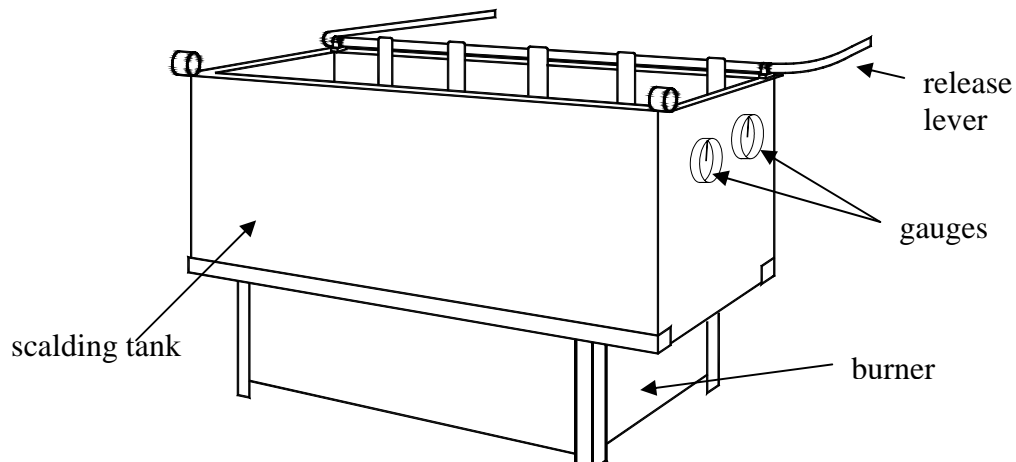


Figure 2. Gas Heated Hog Scalding

4.1.3 Solid fired scalding tank

Type of hog scalding wherein water is heated by using biomass fuels such as coconut shell, saw dust, firewood and rice hull fed into the furnace to be burned (Fig. 3).

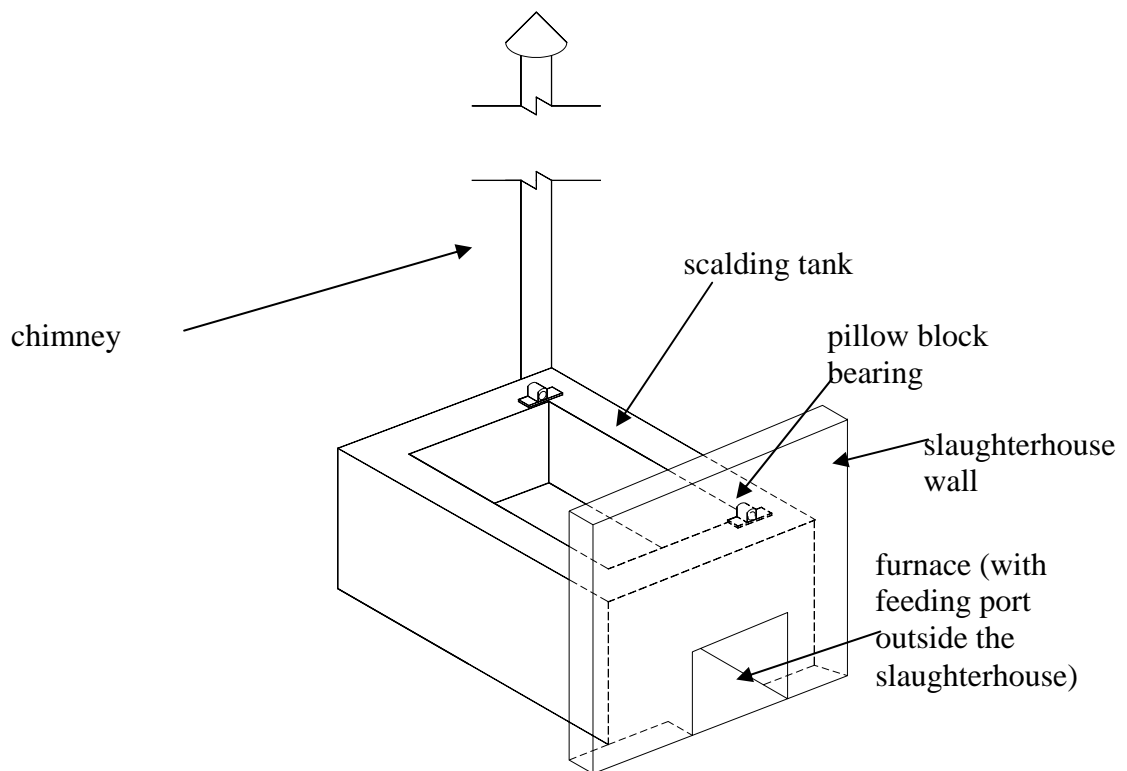


Figure 3. Solid fired scalding tank (release cradle detached).

4.2 Vertical Scalders

Type of hog scalders usually integrated in automated slaughterhouses wherein hogs are scalded while being hung on the overhead railing. The vertical scalders make use of spray heads connected to the boiler to spray hot water throughout the body of the hog (Fig.4).

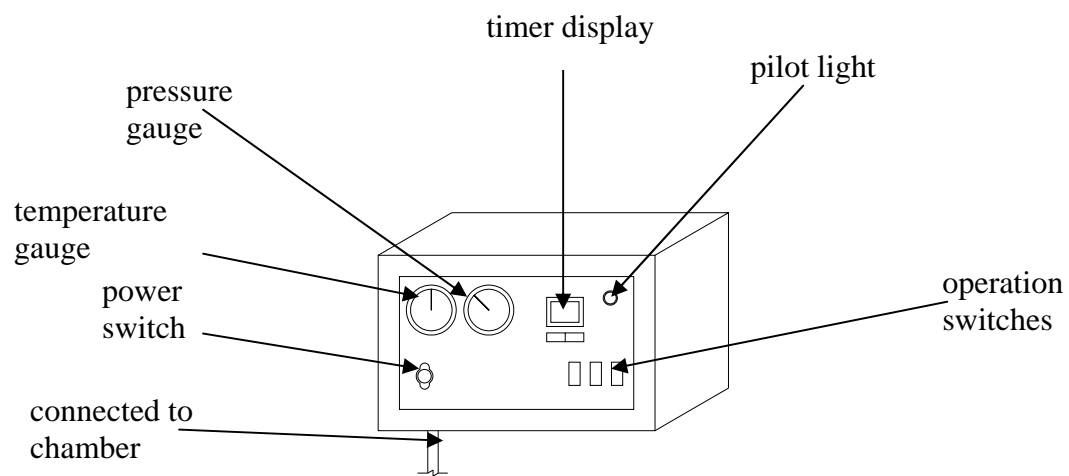


Figure 4a. Vertical scalding control panel.

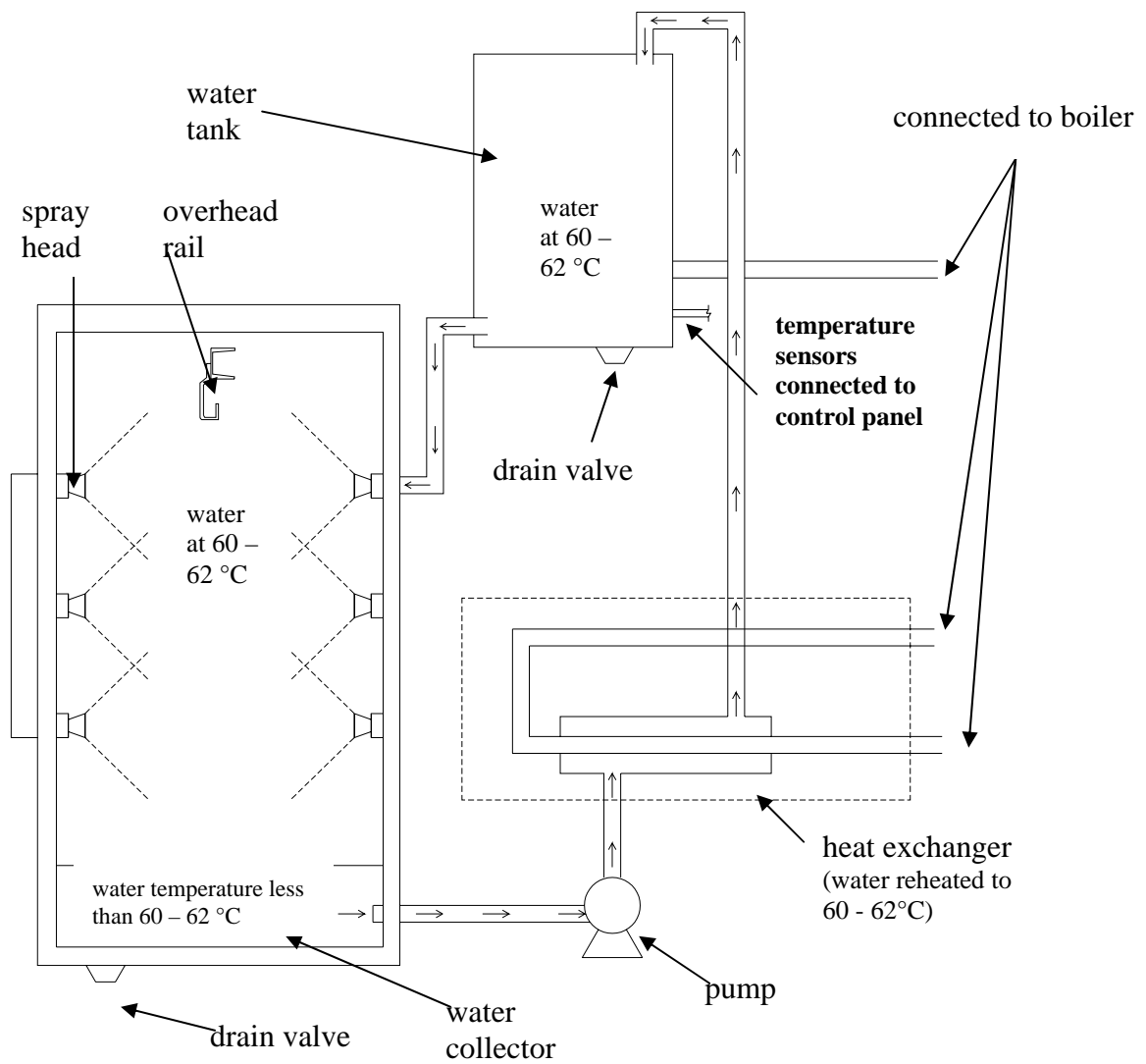


Figure 4b. Vertical scalding.

5 Principle of Operation

5.1 Horizontal scalders

The same principle applies to the horizontal scalders. However, water is not sprayed into the hog's body but instead, the hog is totally submerged into a tank containing pre-heated water (with 60 – 62 °C temperature) for about four (4) to five (5) minutes. The hog shall be removed from the scalders using the release lever and shall be dumped for dehairing.

5.2 Vertical scalders

Prior to stunning, the water that shall be used for scalding shall be heated up to 60 – 62 °C to loosen the hair from the follicles of the animal. The temperature of water is maintained automatically by the included solenoid valves which have temperature sensors. The heated water shall be evenly sprayed to the hog's body to allow efficient dehairing. After exposure to the scalders, the hog shall be dehaired.

6 Fabrication Requirement

Generally, the hog scalders shall be made of non-corrosive materials and resistant to warping (e.g. stainless steel 316 or higher). Valve fittings shall be made of non-corrosive material (e.g. brass).

6.1 Horizontal scalders

- 6.1.1** The floor of the scalders shall be sloping towards the drain to totally remove water.
- 6.1.2** There shall be inlet valve for water.
- 6.1.3** The release cradle shall be attached to the scalders by pillow block bearings on both ends to allow swinging action.
- 6.1.4** Pillow blocks shall be sealed to prevent leaks that may drip into the scalders.
- 6.1.5** There shall be thermostat incorporated in the scalders to automatically maintain the temperature of water required for scalding. Temperature and pressure gauges shall be incorporated for monitoring water temperature and steam or gas pressure. The gauges shall have at least 70 mm diameter.
- 6.1.6** Counterweight should be provided to the release lever to assist in lifting the cradle. It shall be made of non-corrosive material (e.g. concrete).

6.1.7 Grills shall be laid on the floor to prevent the hog's body from touching the floor of the scalding.

6.1.8 The outer sides and the top of the walls of the scalding shall be insulated.

6.1.9 All heated pipes shall be insulated.

6.1.10 Steam heated scalding

6.1.10.1 The hog scalding shall consist of a tank, release cradle, release lever, perforated pipes and a drain valve.

6.1.10.2 The hog scalding shall be generally constructed from non-corrosive material (e.g. stainless steel 316 or higher) with at least 4 mm thickness provided with reinforcements and/or ribbings.

6.1.10.3 The perforated pipes and other fittings shall be constructed from at least schedule 40 stainless steel pipes.

6.1.10.4 The pipes shall have perforations for steam and shall be laid on the floor of the scalding. No perforated pipe shall be in contact with the hog's body.

6.1.10.5 Release cradle shall be made from non-corrosive material (e.g. stainless steel 316 or higher) with at least 6mm thickness. The release cradle shall have an inner angle not greater than 90°.

6.1.11 Gas heated scalding

6.1.11.1 The hog scalding shall consist of a tank, release cradle, release lever and burner.

6.1.11.2 The hog scalding shall be generally constructed from non-corrosive material (e.g. stainless steel 316 or higher) with at least 6 mm thickness.

6.1.11.3 Heat distributor shall be installed beneath the flooring for even distribution of heat. It shall be made from ceramics or other castables to protect the flooring from direct contact with flame.

6.1.11.4 Burner shall be equipped with a control knob to adjust flame.

6.1.11.5 Release cradle shall be made from non-corrosive material (e.g. stainless steel 316 or higher) with at least 6mm thickness. The release cradle shall have an inner angle not greater than 90°.

6.1.12 Solid fired scalding

6.1.12.1 The solid fired scalding shall consist of a tank, release cradle, release lever, drain valve, furnace and chimney.

- 6.1.12.2** The scalding tank shall be made of non-corrosive material (e.g. stainless steel 316 or higher) with at least 6mm thickness.
- 6.1.12.3** Release cradle shall be made from non-corrosive material (e.g stainless steel 316 or higher) with at least 6mm thickness. The release cradle shall have an inner angle not greater than 90°.
- 6.1.12.4** The furnace shall have the same area as that of the scalding tank floor. It shall lined with bricks to contain the heat inside the furnace.
- 6.1.12.5** Heat distributor shall be installed beneath the flooring for even distribution of heat. It shall be made from ceramics or other castables to protect the flooring from direct contact with flame.
- 6.1.12.6** The main frame shall be constructed of non-corrosive material (e.g. concrete).
- 6.1.12.7** The chimney shall be constructed of non-corrosive material (e.g. concrete, or bricks) and shall have an outlet outside the slaughterhouse. The outlet shall be equipped with scrubbers or its equivalent to minimize pollution and shall conform to the requirements of the Clean Air Act (RA 8749).

6.2 Vertical scalding

- 6.2.1** The vertical scalding shall consist of spray heads, water collector with filter, water tank, drain, control panel (consisting of temperature gauge, pressure gauge, variable timer, power switch and operation switches) and scalding chamber. Auxiliary components (e.g. pump, heat exchanger and boiler) should be integrated in the system.
- 6.2.2** The scalding chamber consisting of spray heads and water collector shall be made of non-corrosive material (e.g. stainless steel 316 or higher) with at least 3 mm thickness.
- 6.2.3** The entrance and exit ports of the vertical scalding shall have water curtains to minimize water spills.
- 6.2.4** There shall be spray heads on both sides of the inner walls of the enclosure to ensure uniform scalding of all parts of the hogs.
- 6.2.5** A water collector with filter shall be installed on the flooring of the scalding chamber to recycle water for reheating.
- 6.2.6** A water pump shall be installed to move the water from the water collector back to the water tank.
- 6.2.7** Pipes and other fittings shall be constructed from at least schedule 40 stainless steel pipes.

- 6.2.8 There shall be a water drain installed to remove used water after the scalding operation.
- 6.2.9 Temperature and pressure gauges shall have graduations of 1°C and 0.1 kgf/cm² respectively and shall have at least 70 mm diameter.
- 6.2.10 There shall be a timer with variable settings expressed in seconds.
- 6.2.11 There shall be a heat exchanger to reheat the recycled water before the water flows into the water tank.
- 6.2.12 The filter in the water collector shall be made of non-corrosive material (e.g. stainless steel 304 or higher).
- 6.3 All welded parts shall be water- tight and/or air- tight and smoothly polished and it shall pass the visual inspection criteria (AWS D1.1:2000) for discontinuity of material.
 - 6.3.1 There shall be no crack on welded area.
 - 6.3.2 There shall be fusion between adjacent layers of weld metal and between weld metal and base metal.
 - 6.3.3 All craters shall be filled to provide the specified weld size, except for the end of intermittent fillet welds outside of their effective length.
 - 6.3.4 Weld profiles shall be in its acceptable form.
 - 6.3.5 Welded joints shall not be less than 4mm site fillet weld.
 - 6.3.6 Undercut shall not exceed 2mm (1/16 inch) for any length of weld.

7 Performance Requirements

7.1 Horizontal scalding

- 7.1.1 The scalding shall maintain a water temperature optimal to scalding of about 60 - 62 °C for about four (4) minutes.
- 7.1.2 The hog shall be scalded evenly throughout the body parts.
- 7.1.3 The release angle shall be optimum to dump the hog for dehairing.
- 7.1.4 The temperature of water (about 60 - 62 °C) shall be evenly distributed in the tank.
- 7.1.5 There shall be no leaks in the tank, pipe lines and gas lines.

7.1.6 For solid fired scalders, the equipment shall be capable of attaining the required scalding temperature of about 60 - 62 °C preferably within 30 minutes.

7.2 Vertical scalders

7.2.1 The body of the hog shall be scalded evenly.

7.2.2 There shall be no leaks on the pipe lines and out of the chamber.

8 Safety, Workmanship and Finish

8.1 The scalding tank or chamber shall have a rust-free finish and shall be free from sharp edges or surfaces.

8.2 The main tank shall have no leaks. All bent and welded joints shall be water-tight and air-tight.

8.3 Control panel shall be splash-proof and shall have proper insulation.

8.4 Protective guard shall be installed for operator safety.

8.5 Pressure relief valves shall be installed in the boiler.

9 Warranty of Construction

9.1 The hog scalding tank's construction shall be rigid and durable without breakdown of its major components within six (6) months from the date of original purchase.

9.2 Warranty shall be provided for parts and services within six (6) months after installation and acceptance by the consumer.

10 Maintenance and Operation

10.1 An operator's manual which conforms to PAES 102, shall be provided.

10.2 Grease points for lubrication of mechanical parts shall be provided.

10.3 A set of fabricator's standard tools required for maintenance shall be provided.

10.4 Flushing of the pipelines shall be conducted to avoid scaling.

11 Testing

Testing of the hog scalding shall be conducted on-site during commissioning. The hog scalding shall be tested for performance in accordance with PAES 506.

12 Marking and Labeling

12.1 The hog scalding shall be marked in English with the following information using a plate, stencil or by directly punching it at the most conspicuous place:

12.1.1 Brand name or Registered trademark of the fabricator (optional)

12.1.2 Model and/or Serial number

12.1.3 Maximum weight capacity

12.1.4 Name, address and contact number of the fabricator

12.1.5 Country of manufacture (if imported)/ “Made in the Philippines” (if manufactured in the Philippines)

12.2 Other additional markings shall be provided and shall include the name and address of the importer, if imported (optional).

12.3 Safety/ precautionary markings shall be provided. Markings shall be stated in English or Filipino and shall be printed in red color with a white background.

12.4 The markings shall have a durable bond with the base surface material. The markings shall be water and heat resistant under normal cleaning procedures, it shall not fade, discolor, crack or blister and shall remain legible.