Foreword

The formulation of this national standard was initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) under the project entitled "Development of Technical Standards for Poultry Dressing/Slaughtering Plant" which was funded by the Department of Agriculture – National Meat Inspection Service (DA-NMIS)

This standard has been technically prepared in accordance with PAES 010-2 – Rules for the Structure and Drafting of International Standards.

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

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

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

PAES 020:2005 General – Metrication Guidelines

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

PAES 505:2007 Slaughterhouse Equipment – Hog Scalder – Specifications

Mead, G.C. 2004. *Poultry meat processing and quality*. Woodhead Publishing in Food Science and Technology. Woodhead Publishing Limited. Cambridge England

Sams, A.R. 2001. *Poultry meat processing.* Department of Poultry Science Texas A&M University. CRC Press. Taylor and Francis Group. Boca Raton, Florida

Compliance Guideline for Controlling *Salmonella* and *Campylobacter* in Poultry (Third Edition).http://www.fsis.usda.gov/PDF/Compliance_Guide_Controling_Salmonella_Campylobacter_Poultry_0510.pdf <Accessed May 11, 2012>

Guidelines on Chicken Slaughtering and Chicken Meat Handling in Small Scale Chicken Slaughterhouses.http://aitoolkit.org/site/DefaultSite/filesystem/documents/Guidelines_on_Slaughter_in_Small%20Scale%20Chicken%20SH__E.pdf <Accessed May 6, 2012>

Covel, E. H., III. 1990. *Poultry scalding system and process.* Patent Number: 4,947,518. United States Patent.

Criscione, F.J., II, et al. *Scalder apparatus.* Patent Number: 4,961,248. United States Patent.

1 Scope

This standard specifies the requirements on manufacture, installation and performance of scalder for poultry animals such as chicken, geese, turkeys, ducks, ostriches and others.

2 References

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

AWS D1.1:2000 Structural Welding Code – Steel

PAES 102:2000 Agricultural Machinery – Operator's Manual – Content and Presentation

PAES 103:2000 Agricultural Machinery – Method of Sampling

PAES 530:2008 Slaughterhouse Equipment – Poultry Scalder – Methods of Test

PNS-PAES 242:2010 Agricultural Machinery – Biomass Furnace – Specifications

3 Definitions

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

3.1
boiler
closed vessel in which water or other fluid is heated

3.2
plucker
defeathering machines
mechanical assembly equipped with rotating device with attached rubberized spines that aids in removing the feathers from the poultry animal after scalding

3.3
poultry
birds that are usually domesticated for their eggs, meat and feathers (e.g. chicken, geese, turkeys, ducks, and ostriches)

3.4
scalder
scalding tank
slaughterhouse equipment that contains hot water with specific temperature that is being used to loosen the poultry animal's feathers from its skin, and for sanitation purpose

3.5
scalding
process of subjecting poultry animal to steam or hot water to loosen feathers from its skin prior to defeathering

3.6
thermostat
device used to automatically control and keep temperature within the required settings

4 Classification

Classification of the scalder shall be based on the following:

4.1 Scalding Water Application

4.1.1 Through Immersion

Type of scalder where poultry animals are being submerge for scalding (Figs 2, 3 and 4).

4.1.2 Through Spraying

Type of scalder where the heated water is evenly sprayed on the poultry animal's body for scalding.

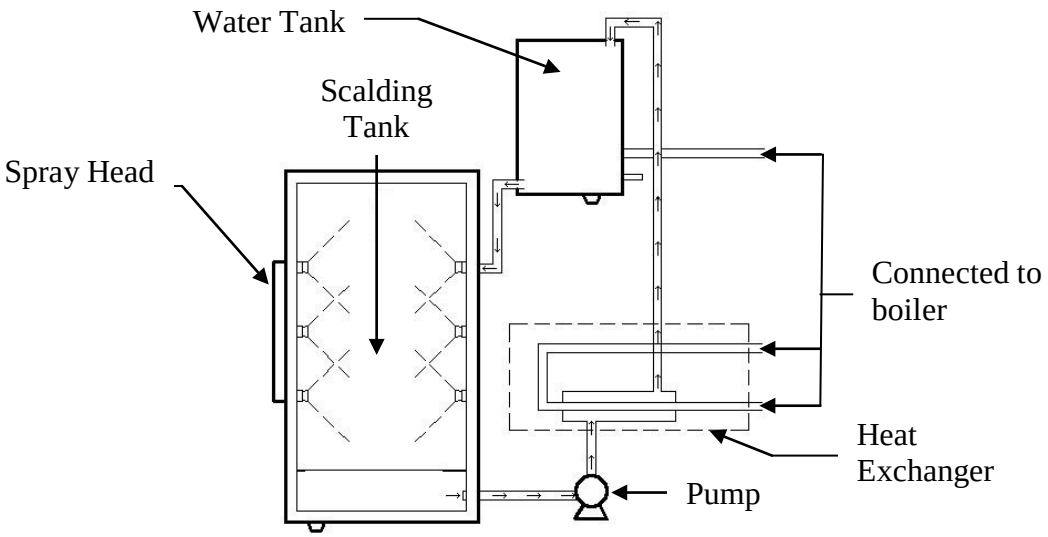

Figure 1. Steam bath/vertical scalder

4.2 Scalding Capability

4.2.1 Hard Scalding

Type of scalding that results into easier removal of feathers and loosens the stratum corneum (cuticle) of skin surface. This type of scalding produces a skinless carcass.

4.2.2 Medium Scalding

Type of scalding that is appropriate for mature poultry animals whose feathers are more difficult to remove. This type of scalding produces carcass with pinkish skin.

4.2.3 Soft Scalding

Type of scalding wherein the feathers are loosened without causing appreciable damage to the outer layers, the cuticle or skin surface. This type of scalding produces carcass with skin containing a waxy yellow-pigmented layer.

4.3 Scalding Water Heating Process

4.3.1 Direct Heating

Source of heat is directly in contact with the scalding chamber and/or to the scalding water.

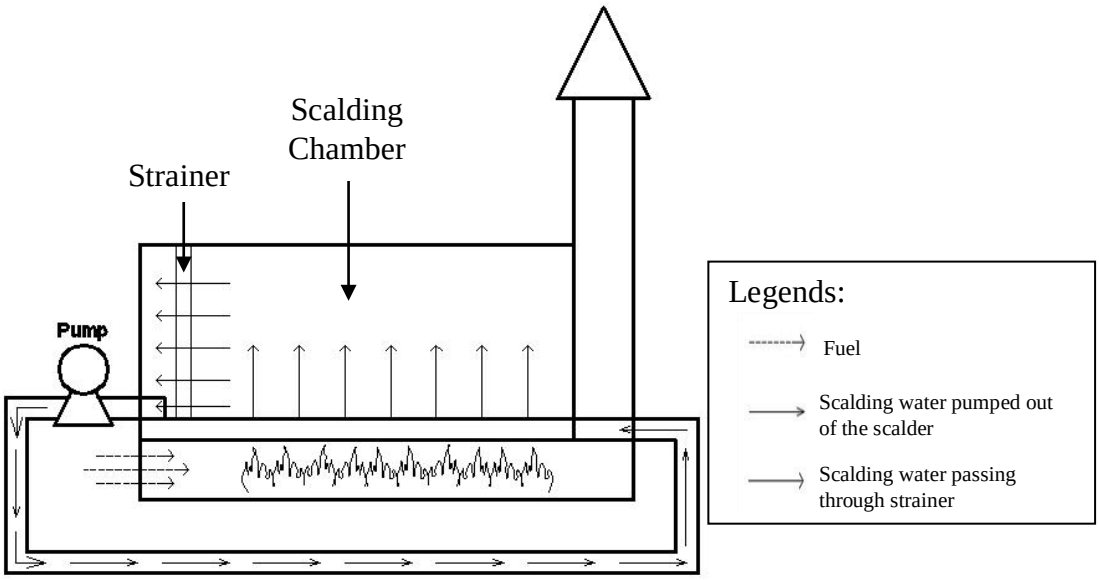

Figure 2. Scalder with heat source directly in contact with scalding chamber

4.3.2 Indirect Heat

Used boiler and heat exchanger to increase the temperature of water to be delivered and used at the scalding chamber.

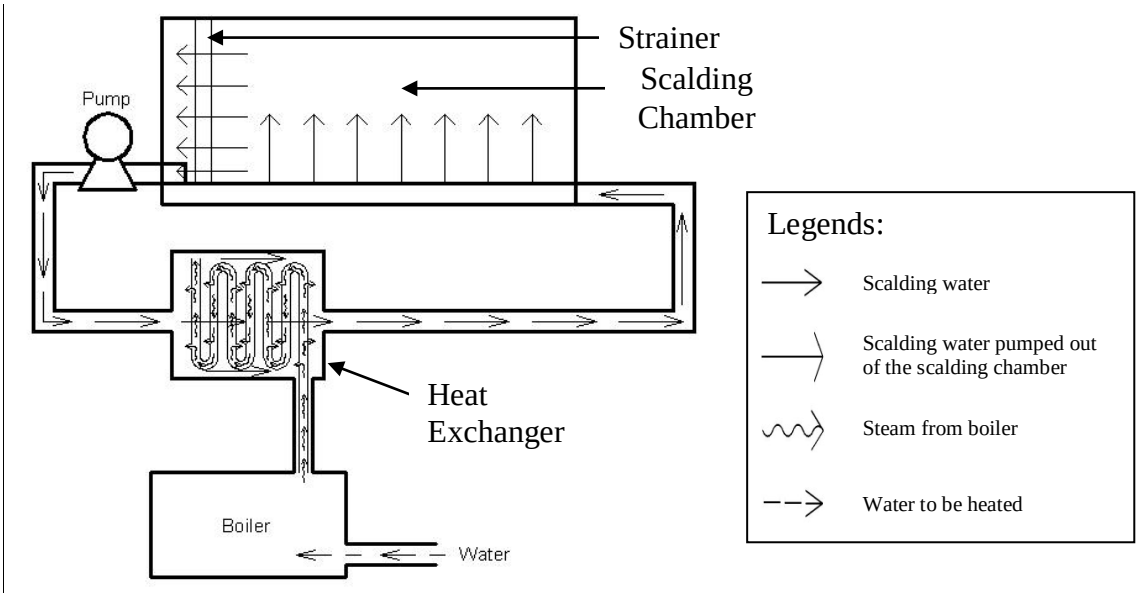

Figure 3. Scalder using boiler and heat exchanger

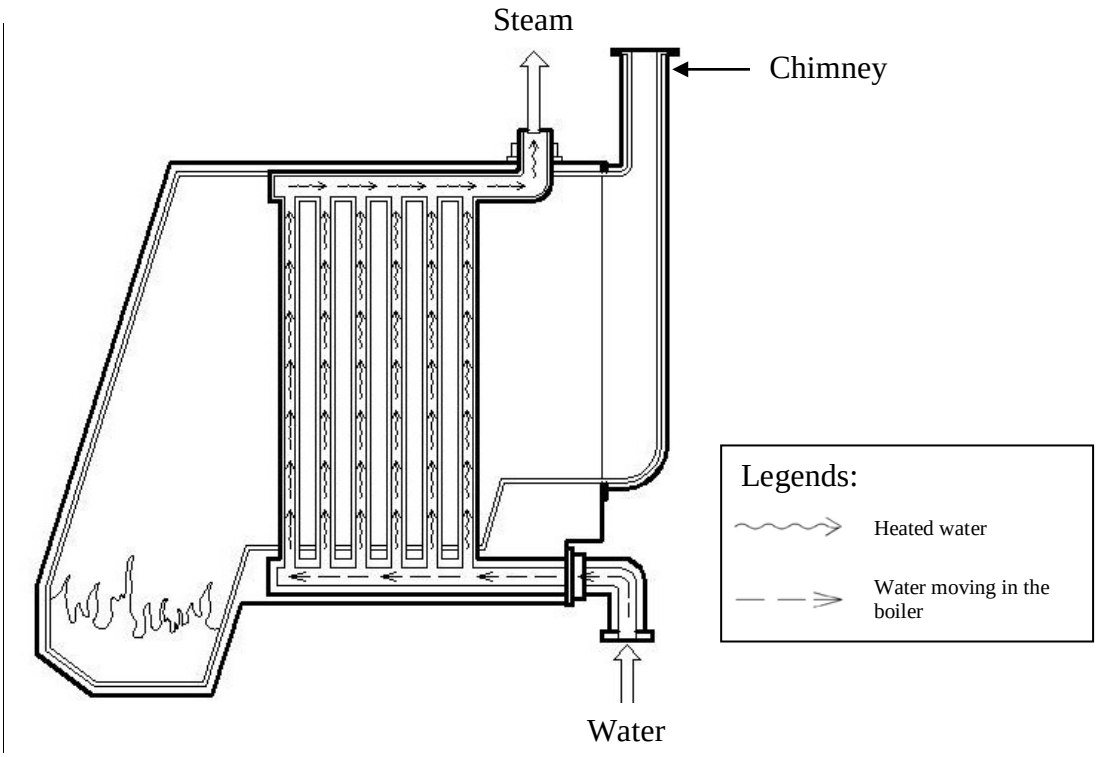

Figure 4. Boiler for scalder

5 Principle of Operation

5.1 Water Immersed

The poultry animal shall be totally submerged into the scalding tank cointaining pre-heated water with temperature and duration depending on the kind of the poultry animal (Table 1 of Section 8). The temperature of water shall be maintained at the temperature and time prescribed. From the scalder, the poultry animal shall be defeathered.

5.2 Water Sprayed

Prior to stunning, the water that shall be used for scalding shall be heated according to temperature specified in Table 1 of Section 8 and the temperature of water shall be maintained at the temperature and time prescribed. The heated water shall be evenly sprayed to the poultry animal's body within the duration specified in Table 1. From the scalder, the poultry animal shall be defeathered.

6 Manufacturing Requirements

6.1 The scalder shall generally consist of scalding tank and heat source. Agitator (if needed), automatic temperature controllers and sensors may also be included for large and automatic scalder. The scalder shall be made of high temperature resistant, warping resistant and non-corrosive materials (e.g. stainless steel 304 or higher).

6.2 There shall be water inlet and outlet valve. Outlet shall be located at the bottom of the water vat. Easy means for refilling and draining of scalding water to and from the scalding tank shall be provided.

6.3 Strainer shall be provided before the suction tube of the pump to avoid foreign matters (e.g. feathers) to clog on the pipes and pump.

6.4 The outer sides and the top of the walls and all heated pipes and parts of the scalder shall be heat insulated.

6.5 There shall be no leak in the tank, pipe lines and gas lines.

6.6 Perforated pipes and other fittings shall be made of at least Sch 40 material. It shall be made of non-corrosive materials (e.g brass, copper, stainless steel).

6.7 Agitator, such as propeller, paddles, aerator, etc., shall be provided to induce turbulence for large and automatic tank (Fig. 5). It shall be made of non-corrosive materials (e.g. stainless steel 304 or higher) and shall be able to withstand high temperature. Separate motor shall be provided for this device.

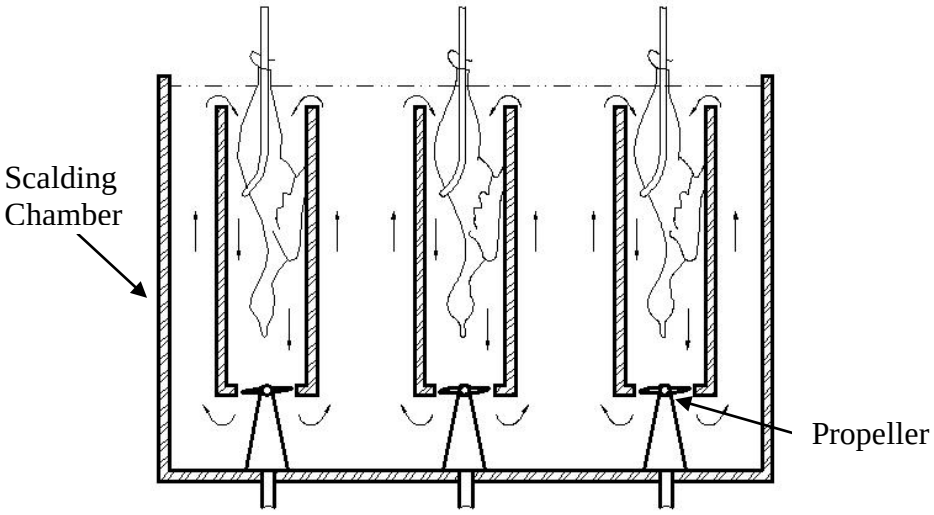

Figure 5. Mechanically-induced turbulence using propeller

6.7.1 Speed of rotation of the cage on scalder that has mechanically induced turbulence shall be 30 to 40 rpm.

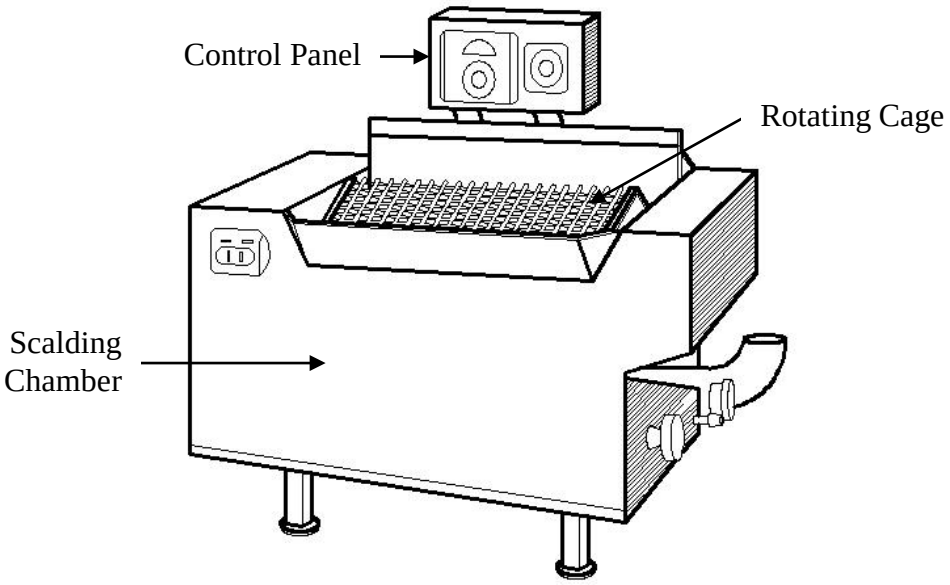

Figure 6. Mechanically-induced turbulence using rotating cage

68 Gauges shall be incorporated for monitoring water temperature and pressure.

6.9 Sensors for large and automatic scalder shall be able to automatically transmit to the temperature controller signals for any change in temperature in the scalding chamber to be able to maintain the desired temperature for scalding.

6.10 For electrical scalder, the following shall be the requirements:

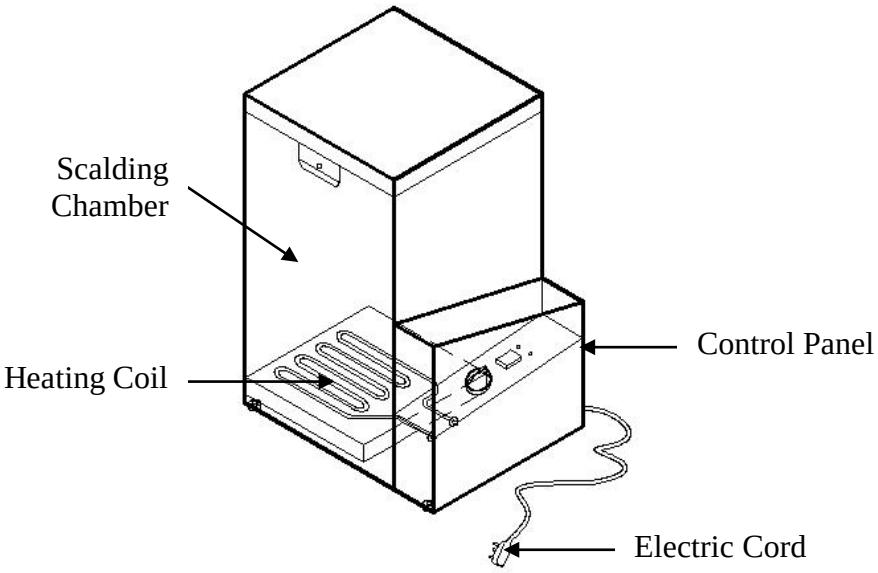

Figure 7. Electric scalder

6.10.1 Control panel and parts that are in contact with the operator shall be properly insulated.

6.10.2 An ammeter and voltmeter shall be provided to indicate actual current and voltage usage and an insulated button switch shall be installed.

6.10.3 Enclosure of the control panel shall be splash-proof and shall be made of non-corrosive material (e.g. stainless steel 304 or higher).

6.10.4 The size of the power cord shall correspond to the maximum power rating supplied.

6.11 For gas heated scalder, the following shall be the requirements:

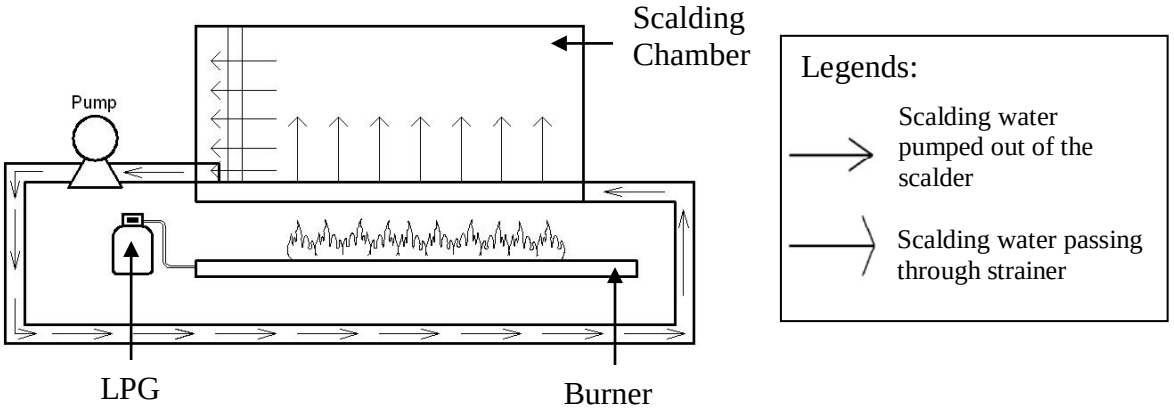

Figure 8. Gas heated scalder

6.11.1 For gas heated scalder, burner shall be equipped with control knob to adjust flame.

6.11.2 Heat distributors shall be evenly installed beneath the flooring.

6.12 For biomass heated scalder, the following shall be the requirements:

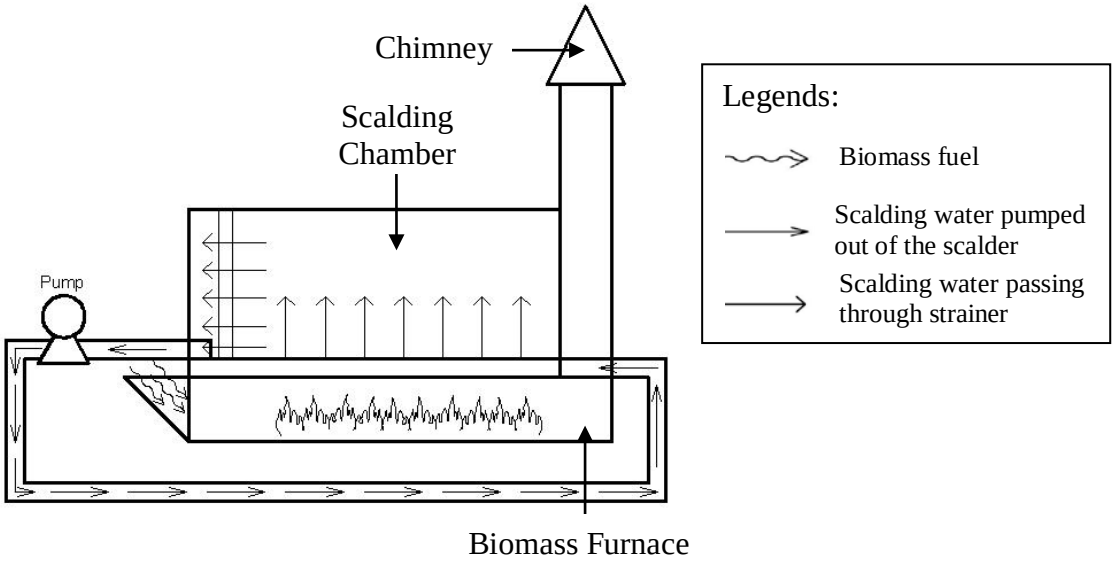

Figure 9. Biomass heated scalder

6.12.1 It shall have a furnace with chimney built based on PNS-PAES 242.

6.12.2 The furnace shall have the same area as that of the scalding tank floor.

6.12.3 The chimney shall be made 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 (RA8749).

6.12.4 Heat distributor shall be evenly installed beneath the flooring.

6.13 For scalder that uses boiler and heat exchanger, the following shall be the requirements (Figs. 3 and 4):

6.13.1 Boiler and heat exchanger shall provide steam and increase the temperature of scalding water as specified in Table 1.

6.13.2 The heat exchanger shall be made of boiler tube as specified in PNS-PAES 242:2012. The tubes shall be perforated and shall have the provision for ease of replacement.

7 Installation Requirements

7.1 Scalder shall be securely fastened to the floor and shall be stable for operation. Bolts shall be designed to support the maximum required load.

7.2 For electrically heated scalder, wirings and parts that are in contact to the operator shall be properly insulated.

8 Performance Requirements

8.1 The scalder shall maintain constant water temperature recommended for scalding different poultry animal as shown in Table 1.

Table 1. Recommended scalding water temperature and scalding time for different poultry animals

Type of Poultry Animal	Temperature, °C	Time, s
Broiler (Chicken)	52-55	90-120
Native (Chicken)	65-80	30-45
Goose	60-68	60-180
Turkeys and Ostrich	59-63	50-125
Waterfowl (e.g. ducks)	68-82	30-60

Source: Compliance Guideline for Controlling *Salmonella* and *Campylobacter* in Poultry by US Department of Agriculture, May 2010

8.2 The poultry animal shall be scalded evenly throughout the body parts. The flesh shall not be ripped during defeathering. The body after defeathering should have no blemishes.

8.3 The temperature of the scalding water shall be the same at any point in the tank.

8.4 All type of scalder, except biomass heated scalder, shall be capable of attaining the required scalding temperature mentioned in Table 1 within 4 minutes. Biomass heated scalder shall be capable of attaining the desired temperature within 30 minutes.

8.5 Scalding efficacy shall be at least 98% and scalding efficiency shall be at least 95%.

8.6 Air and water-induced turbulence, the range of ratio for the volumetric flowrate of air or water per volume of water shall be 0.5 to 0.8 m^3/h of air of water per cubic meter water in tank.

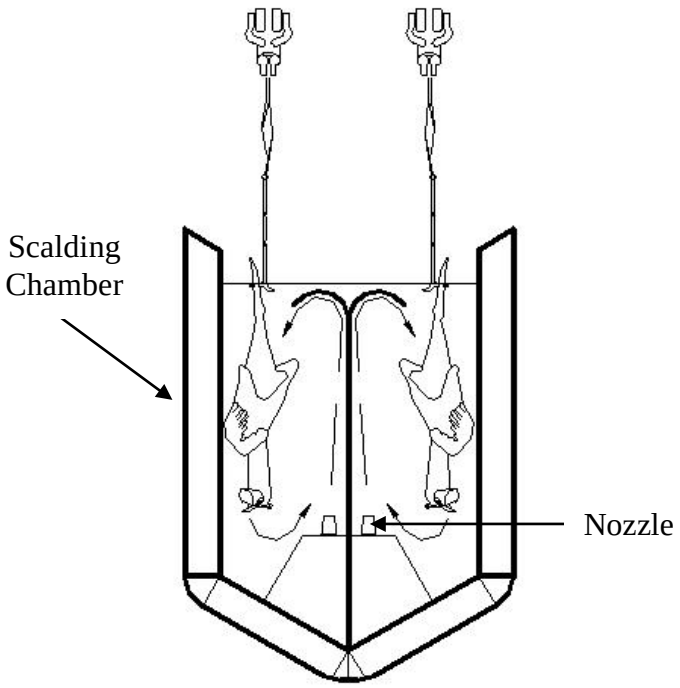

Figure 10. Air/Water-induced turbulence

8.7 Scalder shall be able to process the maximum capacity specified by the manufacturer.

9 Safety, Workmanship and Finish

9.1 Safety

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

9.1.2 Protective guard shall be installed for operator safety.

9.1.3 Pressure relief valves shall be installed in the boiler.

9.1.4 Warning signs shall be provided for safety.

9.1.5 For electrical scalder, the following shall be the requirements

9.1.5.1 Double pole switch shall be installed to totally disconnect the scalder from the power source.

9.1.5.2 There shall be proper insulation and shall have provision for proper grounding.

9.1.5.3 Safety fuse or power overload breakers shall be integrated in the power control system.

9.1.5.4 Double insulations (e.g. royal cord) for cord shall be used.

9.1.6 Pilot light and sound emitting device shall be provided for power signal notification.

9.2 Workmanship

There shall be no leaks in the tank, pipe lines and gas lines. All welded parts shall be smoothly polished and shall pass visual inspection criteria (AWS D1.1). Welded joints shall not be less than 4 mm (1/8 inch) side fillet welded. Undercut shall not exceed 2 mm (1/16 inch) for any length of weld.

9.3 Finish

Scalder tank or chamber shall be made of non-corrosive materials and shall have a smooth finish surface free from sharp edges.

10 Maintenance

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

10.2 A set of manufacturer's standard tools required for maintenance shall be provided.

10.3 Flushing of the pipelines shall be conducted to avoid scaling

10.4 Parts of the scalder shall be easy to clean.

11 Warranty of Construction and Durability

11.1 The scalder's construction shall be rigid and durable without any major breakdown on its components within six (6) months after installation and acceptance by the consumer.

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

12 Testing and Sampling

The scalder to be tested shall be randomly selected from a lot in accordance with PAES 103. It shall be tested in accordance with PAES 530.

13 Marking and Labelling

13.1 Each scalder shall be marked in English with the following information using a plate, stencil or by directly punching it at the most conspicuous part:

13.1.1 Name, address and contact number of manufacturer

13.1.2 Brand name or Registered trademark of the manufacturer (optional)

13.1.3 Model and/or Serial Number

13.1.4 Maximum weight capacity

13.1.5 Country of manufacture (if made in other country)/ “Made in the Philippines” (if manufactured locally)

13.2 Safety precaution markings shall be provided. Marking shall be stated in English and Filipino and shall be printed in red color with a white background.

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

13.4 The markings shall be securely fastened and shall be all-weather resistant. Under normal cleaning procedures, it shall not fade, discolor, crack or blister and shall remain legible.