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

PAES 020:2005 General – Metrication Guidelines

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

Sams, Alan R. *Poultry meat processing.* Department of Poultry Science, Texas A&M University. CRC Press. 2001

Small Poultry Abattoir Operation*.www.humdeyn.co.za/Abattoir.pdf.*<*Accessed May 02, 2012*>

Poultry Slaughterhouse
http://www.zhauns.com/pdf/CHICKEN_POULTRY_SLAUGHTER_HOUSE.pdf<Accessed May 02, 2012>

Guidelines on Chicken Slaughtering and Chicken Meat Handling in Small Scale Chicken Slaughterhouses. Directorate of Veterinary Public Health Directorate General of Livestock Services Ministry of Agriculture.2006

Morris, William F. III, et.al. *Chiller with improved product distribution.* United States Patent. Patent number:US007174724B2. February 13, 2007

1 Scope

This standard specifies the requirements for manufacture, installation and performance of open-type chilling tank 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 534:2012 Slaughterhouse Equipment – Poultry Chilling Tank – Methods of Test

3 Definitions

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

3.1
carcass
body of dressed/slaughtered poultry animal after defeathering, evisceration, and removal of head and feet

3.1.1
warm carcass
newly dressed/slaughtered poultry animal

3.2
chilling
process done by lowering the temperature of the carcass within 4 °C to 0 °C to reduce microbial growth to a level that will maximize its shelf life

3.3
chilling efficacy
measures the ability of the chilling tank to lower the temperature and make the temperature at any area in carcass equal

3.4
chilling tank
equipment used to lower the temperature of the carcass within 4 °C to 0 °C after dressing/slaughtering

3.5
chilling tank efficiency
measures the ability of the chilling tank to maintain consistent and equal water temperature at any point before and during the chilling

3.6
poultry
birds that are usually domesticated for their eggs, meat and feathers (e.g. chicken, geese, turkeys, ducks, and ostriches)

3.7
pre-chilling
process of washing, cleaning, and initial lowering of carcass temperature within 16 °C to 12 °C prior to chilling

4 Classification

Classification of the chilling tank shall be according to the following:

4.1 Water Cooling Process

4.1.1 Using ice

Type of chilling tank that uses ice to lower the temperature of the water used during chilling.

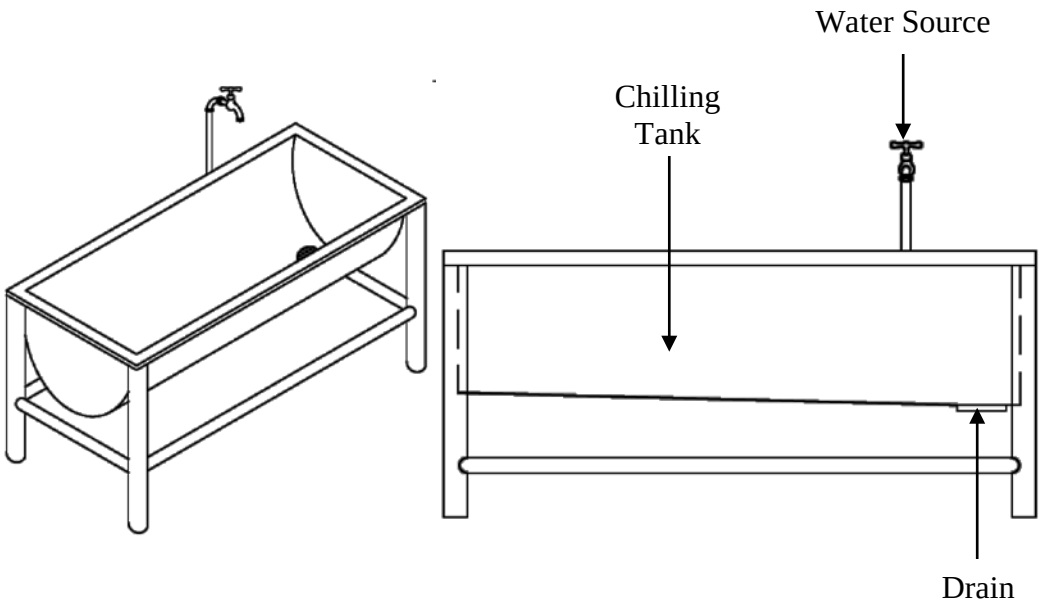

Figure 1. Chilling tank that uses ice to lower the water temperature

4.1.2 Using refrigeration system

Type of chilling tank that uses refrigeration system to lower the temperature of the water during the chilling.

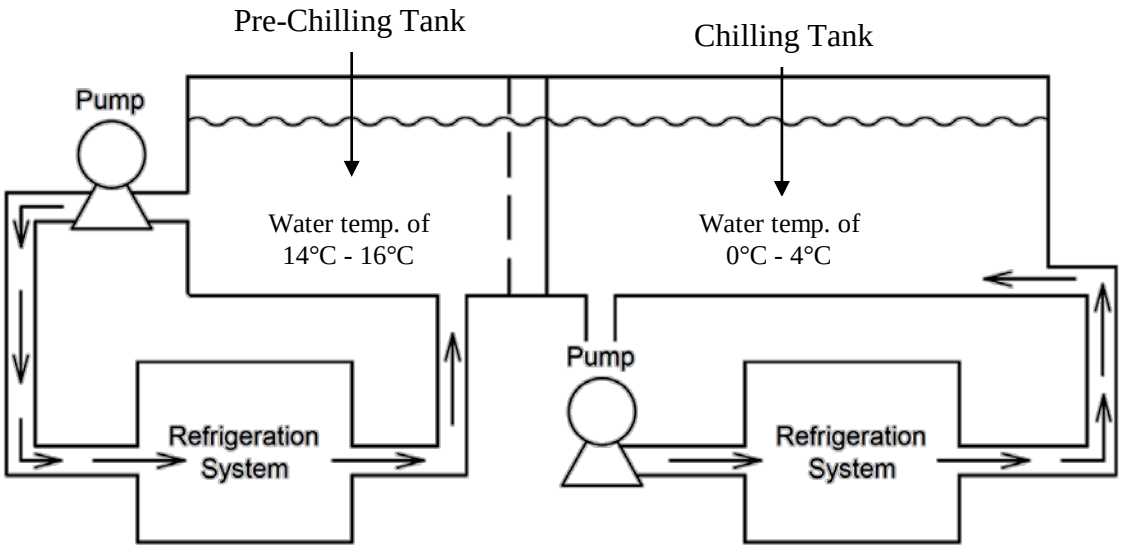

Figure 2. Chilling tank that uses refrigeration system to lower the water temperature

4.2 Water Circulation

4.2.1 Manual

Type of chilling tank that consists of stationary chilling chamber where carcasses are being submerged for chilling, and a drain. This type of chilling tank requires manual agitation of water.

4.2.2 Automatic

Type of chilling tank that uses agitators or aerators to reduce thermal layers in the tank as well as to keep the carcasses floating during the process. This type of chilling tank shall be further classified according to type of agitator.

4.2.2.1 Mechanical

Type of chilling tank that uses a rotating auger or paddles as agitating mechanism during chilling. (Fig. 3)

4.2.2.2 Jet Type

Type of chilling tank that uses pressurized air and water as agitating mechanism during chilling.

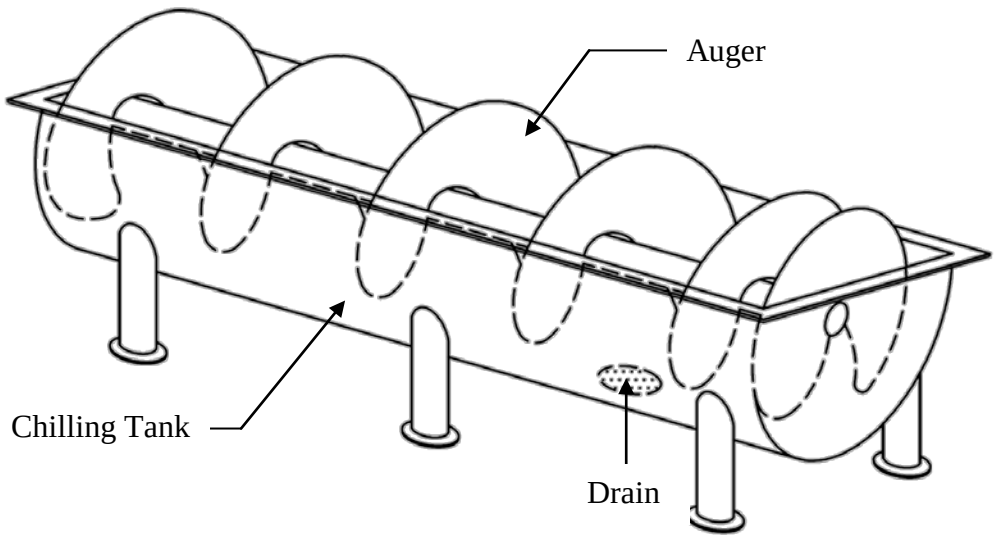

Figure 3. Chilling tank with auger

4.2.2.3 Combined mechanical and jet type

Type of chilling tank that uses both mechanical and jet type agitators during the chilling.

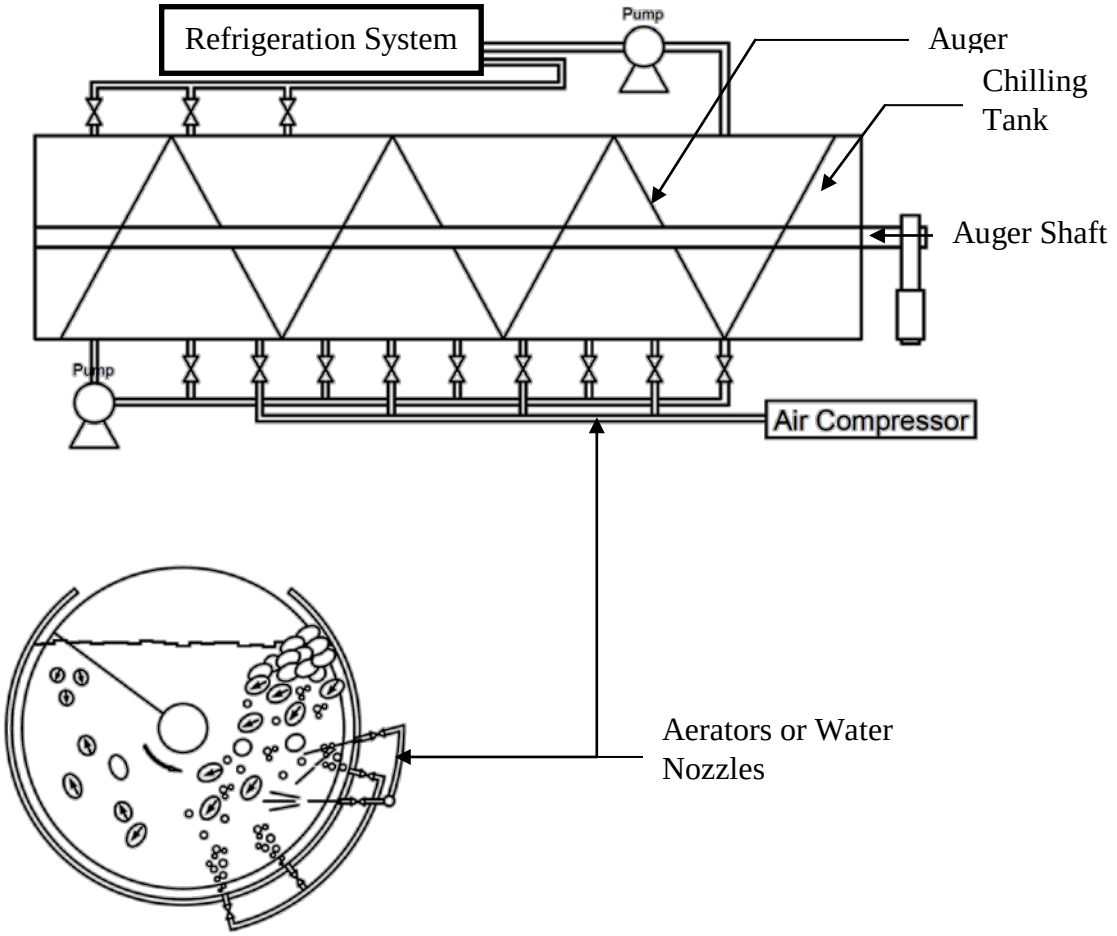

Figure 4. Chilling tank with both auger and pressurized air and water

5 Principle of Operation

5.1 The desired temperature of the pre-chilling and chilling tank shall be attained before loading the carcasses.

5.2 The carcasses shall be placed in the pre-chiller tank (if available) with a water temperature of 12 °C to 16 °C for 10 min to 15 min.

5.3 After pre-chilling, the cold carcasses shall be placed in the chilling tank having temperature range and duration as shown in Table 1. Agitating mechanisms (if available) shall be used during the process. Ice water acidity level and chlorine content shall be maintained at below pH 6 and 50 ppm respectively for anti-microbial purposes. One kilogram of ice shall be provided for every one kilogram of carcass. If necessary, water shall be replenished.

5.4 After chilling, the poultry animals shall be hung and shackled to the overhead railings to drain excess water for grading and storage.

6 Manufacturing Requirements

6.1 The chilling tank shall consists of pre-chilling section (if available), chilling section with or without agitators, water supply system and refrigeration system (if available). Pre-chilling and chilling tanks shall be made of non-corrosive materials (e.g. stainless steel 304 or higher, food grade plastics, etc.)

6.2 Agitators, such as aerators, augers, paddles, etc., should be provided. It shall be made of non-corrosive materials (e.g. stainless steel 304 or higher) with independent prime mover. Augers shall have at least 3 mm thickness.

6.3 Water supply system shall provide water at the rate of 1.9 L per poultry animal. There should be provision for maintaining the water chlorine content and acidity level.

6.4 For chilling tank using refrigeration system, parts shall be made of non-corrosive materials. Refrigerant shall be an environment friendly substance (e.g. R134a, etc.).

6.5 The major components of chilling tank shall be constructed such that it can be assembled and disassembled for cleaning and maintenance of parts. Maximum ratio between length and width of both pre-chilling and chilling tanks shall be 3:1. Thickness of the tank without agitator shall be at least 2 mm (0.08 in.) and at least 3 mm (0.118 in.) for tank with agitator.

6.6 Water drain shall be provided. For chilling tank without agitator, tank shall be slightly inclined with drain located at the lower portion to facilitate easy removal of water.

6.7 Temperature sensors for large and automatic chilling tanks shall be provided to maintain the desired temperature for chilling.

6.8 Pipes and other fittings shall have at least 3 mm (0.118 in.) wall thickness. It shall be made of non-corrosive materials (e.g brass, copper, stainless steel).

6.9 Chilling tank shall be able to support the load capacity specified by the manufacturers.

7 Installation Requirement

Chilling tank shall be securely fastened to the floor and shall be stable for operation. Bolts shall be designed to support the required load.

8 Performance Requirements

8.1 Chilling efficacy and chilling efficiency shall be at least 95%.

8.2 The chilling tank shall maintain constant water temperature recommended for different weight of carcasses shown in Table 1.

Table 1. Recommended water temperature and chilling time for different weight of carcasses

Weight of Carcass, kg	Temperature, °C	Maximum Time, h
Less than 2	0-4	4
2-4	0-4	6
More than 4	0-4	8

Source: United State Department of Agriculture

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

8.4 Pre-chilling section of the chilling tank shall maintain temperature of 12 °C to 16 °C and shall be able to lower the temperature of the warm carcass (37 °C to 40 °C) to the said temperature range within 10 min to 15 min. Temperature shall be the same at any point in the pre-chilling section.

8.5 Chilling tank shall have a capacity specified by the manufacturer.

9 Workmanship and Finish

9.1 Safety

9.1.1 Cover or guards for pulley and/or belt mechanism and prime mover shall be provided for moving components.

9.1.2 For motor driven, the following shall be the requirements:

9.1.2.1 Double pole switch shall be installed to totally disconnect the chilling tank from the power source.

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

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

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

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

9.2 Workmanship

9.2.1 There shall be no leaks in the tank and water pipelines. All bent and welded parts and joints shall be water-tight and air-tight, 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.

9.2.2 There shall be provision for easy replacement of parts of the chilling tank. The tank shall be free from manufacturing any defects.

9.2.3 Grease points for lubrication of mechanical parts shall be provided. Food grade grease and oil shall be used.

9.3 Finish

9.3.1 Chilling tank shall be smooth and shall be made of non-corrosive materials.

9.3.2 Surface of the chilling tank shall not be painted.

9.3.3 The chilling tank and agitator 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 Greasing of mechanical parts shall be done regularly.

10.3 Chilling tank shall be cleaned each used. Water should be replaced for every batch to avoid contamination.

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

11 Warranty of Construction and Durability

11.1 The chilling tank 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 chilling tank to be tested shall be randomly selected from a lot in accordance with PAES 103. It shall be tested in accordance with PAES 534.

13 Marking and Labelling

13.1 Each chilling tank 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 Country of manufacture (if made in other country)/ “Made in the Philippines” (if manufactured locally)

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

13.1.4 Model and/or Serial Number

13.1.5 Maximum weight capacity

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

13.3 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.

13.4 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.