

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:

European Food Safety Authority. 2004. *Welfare Aspects of Animal Stunning and Killing Methods*. Scientific Report of the Scientific Panel for Animal Health and Welfare on a request from the Commission related to welfare aspects of animal stunning and killing methods. pp 82 – 95.

Grandin T. G. 2001. *Livestock- handling quality assurance*. J. Animal Sci. 79. (E. Suppl.):E239–E248

Grandin, T. G., 2005. *Recommended Animal Handling Guidelines and Audit Guide for Cattle, Pigs, and Sheep (2005 Edition)*. American Meat Institute Foundation. 2005. pp. 25-27, 29-36, 42-43, 52-55.

Ministry of Agriculture, Fisheries and Food.2000. *Captive Bolt Stunning Equipment and the Law – How it Applies to You*. The National Assembly for Wales. Cathays Park.. 6pp.

North Carolina State University Extension Swine Husbandry. 2000. *Euthanasia for Hog Farms*. Swine News July, 2000. Vol. 23. No. 6. pp. 4-5.

www.en.wikipedia.org

<http://www.kochequipment.com>

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1 Scope

This standard specifies the methods of test and inspection for hog stunner used for rendering the hog unconscious prior to sticking and bleeding. Specifically, it shall be used to:

- 1.1** verify the mechanism, dimensions, materials, accessories of the hog stunner and the list of specifications submitted by the fabricator;
- 1.2** determine the performance of the equipment;
- 1.3** report the results of the tests.

2 References

The following normative documents contain provisions, which through reference in this text constitute provisions of these standards:

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

PAES 503:2007 Slaughterhouse Equipment – Hog Electric Stunner- Specifications

3 Definitions

For the purpose of this standard, the definitions given in PAES 503 and the following shall apply:

3.1

blood splash

blood spots or clots formed on the muscle tissue

3.2

stunning effectivity

ratio of the total number of hogs stunned successfully to the total number of hogs expressed in percent (%)

3.3

stunning performance

ratio of the total number of hogs that did not die immediately after stunning to the total number of hogs stunned expressed in percent (%)

3.4

vocalization

animal sound such as squealing in pigs

4 General Conditions for Test and Inspection

4.1 Role of fabricator/dealer

The fabricator shall submit the operator's manual for hog stunner and shall abide with the terms and conditions set forth by an official testing agency.

4.2 Role of the operator

An officially designated operator shall be skilled and shall be able to demonstrate, operate, adjust and repair as the case may be related to the operation of the equipment.

4.3 Test site conditions

The hog stunner shall be tested in the slaughterhouse.

4.4 Test instruments

The suggested list of minimum test materials needed to carry out the hog stunner test is shown in Annex A.

4.5 Test material

The hogs used for testing the equipment shall have a body length of 1.2 m to 1.5 m and shall have a live weight of 75 kg to 250 kg preferably of the same breed.

4.5.1 Required Test Materials

There shall be at least 10 hogs of various live weights falling within the capacity of the stunner as specified by the fabricator.

4.5.2 Termination of test

If during the test run, the hog stunner stops due to major component breakdown or malfunctions, the test engineer shall terminate the test.

5 Test and Inspection

5.1 Verification of the fabricator's technical data and information

This inspection is carried out to verify the mechanism, dimensions, materials and accessories of the hog stunner in comparison with the list of fabricator's technical data and information. Inspection and testing of the ammeter and voltmeter shall also be conducted. All information shall be recorded in Annex B.

5.2 Condition of test material

Initial data such as weight and breed of the test hogs shall be obtained and recorded in Annex C before the test operation.

5.3 Performance test

5.3.1 This is carried out to obtain actual data on overall performance of the equipment.

5.3.2 Operation of the hog stunner

The body of the hog shall be sprayed with water to improve conduction. The hogs shall be properly restrained and shall be immediately stunned. This procedure shall be repeated for the succeeding trials.

5.3.2.1 Manual application stunner

5.3.2.1.1 The voltage and current shall be set to zero before turning the power on.

5.3.2.1.2 The electrical stunner shall be tested at 1.25 amps following the stunning voltage chart.

Table 1. Stunning voltage chart¹.

Hog weight (kg)	Voltage (V)
45.6 – 113.64	280
113.65 – 159.09	320
159.10 – 227.27	400
227.28 – 295.45	500
295.46 – 363.64	520
364.65 – 545.45	620

5.3.2.1.3 The electric prods shall be positioned on the hog to allow current to pass through the brain (for head-only) or through the heart (for head-to-back).

5.3.2.1.4 Observations shall be recorded in Annex C.

5.3.2.2 Automatic stunner

5.3.2.2.1 The current and the voltage shall be set before the hog walks into the automatic restrainer. As the hog is moved into the stunning area of the restrainer allowing the forehead and the forelegs of the hog to be in contact with the electrodes.

5.3.2.2.2 The hogs are automatically stunned as it passes through the electrodes of the conveyor restrainer.

5.3.2.2.3 The electrical stunner shall be tested at 1.25 amps following the stunning voltage chart in Table 1

5.3.2.2.4 Observations shall be recorded in Annex C.

¹ Stunning voltage requirements from Koch Equipment - Best and Donovan Model ES Electric Stunners.

5.3.3 Insensibility test

The test hog's head shall be observed for assessing the insensibility of the animal after stunning.

5.3.3.1 Corneal reflex shall be absent.

5.3.3.2 Rhythmic breathing shall be absent.

5.3.3.3 There shall be no vocalization of the animal.

5.3.3.4 The tongue shall be hanging out.

5.3.3.5 The properly stunned animal shall have no response to nose pinch.

5.3.3.6 Observations shall be recorded in Annex C.

5.3.3.7 This procedure shall be repeated for the succeeding test trials.

5.3.4 Electrical stunner performance

5.3.4.1 The electric stunner shall be tested for constant delivery of current. The current passing through the electric prods shall be measured using an ammeter and shall be observed for 5 seconds.

5.3.4.2 The frequency of the electric stunner shall be measured using a frequency meter.

5.3.4.3 The effectivity and stunning performance of the electric stunner shall be computed using the formula in Annex D.

5.3.5 Inspection of carcass

Inspection of the carcass after splitting shall be conducted to verify to determine blood splashes caused by the stunner.

5.4 Test trial

There shall be at least 10 trials of hogs with live weights falling within the fabricator's specified weight.

6 Test Report

The test report shall include the following information in the order given:

6.1 Title

- 6.2** Summary
- 6.3** Purpose and Scope of Test
- 6.4** Methods of Test
- 6.5** Description of the Machine
 - Table 1 – Machine Specifications
- 6.6** Results and Discussions
- 6.7** Observations (include pictures)
 - Table 2 –Performance test data
- 6.8** Names, signatures and designation of test engineers

Annex A

Suggested Minimum List of Test Equipments

Items	Quantity
A.1 Test hog characteristics	
A1.1 weighing scale, capacity: 500 kg	1
A.1.2 tape measure, capacity: 5 m	1
A.2 Overall Dimension	
steel tape, capacity: 5m	1
weighing scale, capacity: 10 kg	1
caliper	1
A.3 Current Measurement	
ammeter	1
A.4 Frequency	
digital pulse meter	1
A.5 Voltage Measurement	
voltmeter	1
A.6 Insensibility Test	
pin	1
timer	1

Annex B
(informative)

Specifications of Hog Stunner

Name of Applicant/ Distributor: _____
 Address: _____
 Tel No: _____
 Name of Fabricator: _____
 Address: _____
 Tel No: _____

GENERAL INFORMATION

Classification: _____
 Serial No: _____ Brand/Model: _____
 Production date of Hog stunner to be tested: _____
 Testing Agency: _____ Test Engineer: _____
 Date of Test: _____ Location of Test: _____

Items to be inspected

ITEMS	Fabricator's Specification	Verification by the Testing agency
B.1 Voltmeter		
B.1.2 range, V		
B.1.2 sensitivity		
B.2 Ammeter		
B.2.1 range, A		
B.2.2 sensitivity		
B.3 Manual Application Stunner		
B.3.1 Overall dimensions		
B.3.1.1 length of handle, m		
B.3.1.2 weight of handle, kg		
B.3.1.3 length of cord, m		
B.3.1.4 distance between prods, cm		
B.3.2 Construction Material		
B.3.2.1 handle		
B.3.2.2 selector enclosure		
B.3.2.3 cord		
B.3.2.4 revolving spurs		
B.3.3 Operating frequency, Hz		
B.4 Automatic Stunner		
B.4.1 Construction Material		
B.4.1.1 stunner enclosure		
B.4.1.2 electrodes		
B.4.2 Operating frequency, Hz		

ANNEX C

Performance Test Data Sheet

Items to be Measured and Inspected

ITEMS	Trials			Average
	1	2	3	
C.1 Test Material Condition				
C.1.1 Breed of test hog				
C.1.1 Weight of hog, kg				
C.1.2 Girth of hog, mm				
C.1.3 Length of hog, mm				

C.2 Observations	Rating*			
	Trials			Average
	1	2	3	
C.2.1 Electrical Stunner Performance				
C.2.1.1 Blood splash				
C.2.1.1.1 at _____ V				
C.2.1.1.2 at _____ V				
C.2.1.2 Broken Back or Pelvic Bones				
C.2.1.2.1 at _____ V				
C.2.2.2.2 at _____ V				
C.2.2.3 Insensibility				
C.2.2.3.1 rhythmic breathing				
C.2.2.3.2 response to nose pinching				
C.2.2.3.3 vocalization				
C.2.2.3.4 blink/s after stunning**				
C.2.2.3.4.1 within 5 secs.				

C.3 Electric Stunner Performance Data Sheet									
C.3.1 Test for Constant Delivery	Trial 1			Trial 2			Trial 3		
	Time, sec			Time, sec			Time, sec		
	1	2	3	1	2	3	1	2	3
C.3.1.1 Current, A									
C.3.1.2 Frequency, Hz									
C.3.2 Test for Performance									
C.3.2.1 Total of hogs stunned									
C.3.2.2 No. of hogs that did not die immediately after stunning									
C.3.2.3 No. of successfully stunned hogs									
C.3.2.4 Stunning Performance, %									
C.3.2.5 Stunning effectivity, %									

* 1 - very high
2 - high

3 - moderate
4 - low

5 - very low
6 - none

ANNEX D

Formula Used During Calculation and Testing

D.1 Stunning Effectivity

$$E = \frac{Hp}{Hs} \times 100$$

where:

- E* the effectivity of the stunner, %
Hp total number of hogs stunned successfully
Hs total number of hogs stunned.

D.2 Stunning Performance

$$Pf = \frac{Hd}{Hs} \times 100$$

where:

- Pf* performance of the stunner, %
Hd total number of hogs that did not die immediately after stunning
Hs total number of hogs stunned.