

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 Large Ruminants” which was funded by the 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.

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.

Grandin, T. 2008. Recommended Captive Bolt Stunning Techniques for Cattle.

Grandin, T. Stunning Cattle. 2nd Edition.

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.

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

Palmer, J. 1994. Brazing and Welding 304L Stainless Steel. Brewing Techniques.

Rietveld, G. 2003. On-farm Euthanasia of Cattle and Calves.

www.acclesandshelvoke.co.uk/humane.htm

<http://www.grandin.com/humane/captive.bolt.html>

Slaughterhouse Equipment– Captive Bolt – Specifications

1 Scope

This standard specifies the fabrication and performance requirements for a captive bolt for large ruminants such as cattle and carabao

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 319: 2002** Engineering Materials – Engineering Plastics – Specifications and Applications
- PAES 513: 2008** Slaughterhouse Equipment – Stunning Box/ Knocking Pen – Specifications
- PAES 516: 2008** Slaughterhouse Equipment – Captive Bolt – Methods of Test

3 Definitions

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

3.1

blank cartridge

powerload

type of cartridge used in captive bolt that contains gunpowder but without bullet (Fig.1)

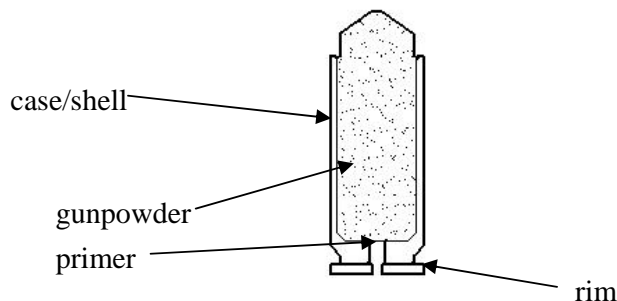


Figure 1. Blank cartridge

3.2

bolt

metal rod that extrudes from the captive bolt

3.3

bullet

round

solid projectile made of metal (usually lead) propelled by a firearm or a gun

3.4

captive bolt

stunner that uses kinetic energy to project bolt into the forehead of the animal to render it unconscious.

3.5

cartridge

metallic case containing the bullet, gunpowder and the primer

3.6

stunning

process of rendering an animal unconscious

3.7

stunning box

knocking pen

slaughterhouse equipment used to restrain the animal to facilitate stunning

4 Classification

4.1 According to form

4.1.1 Pistol type

Captive bolt that resembles a pistol or a gun (Fig. 2).

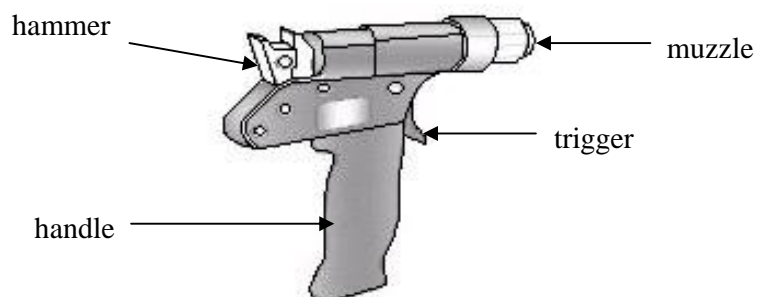


Figure 2. Pistol type captive bolt stunner

4.1.2 Cylinder type

Captive bolt that resembles a cylindrical tube (Fig. 3).

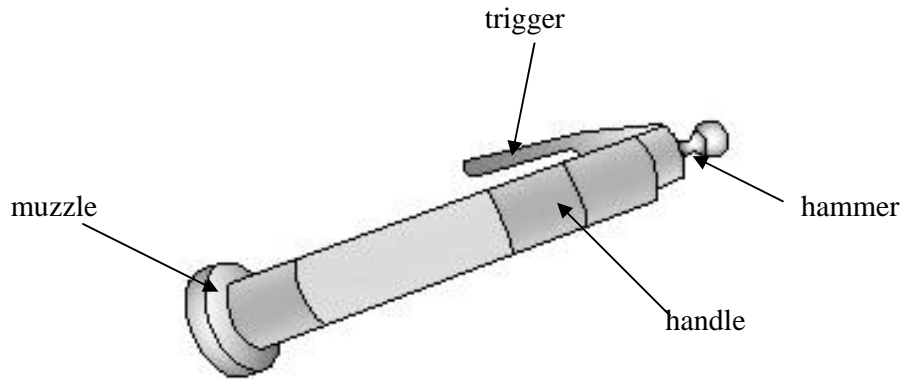


Figure 3. Cylinder type captive bolt stunner

4.2 According to driving power

4.2.1 Cartridge type

Type of mechanical stunner that uses blank cartridge explosion to propel the captive bolt into the forehead of the animal (Fig. 4).

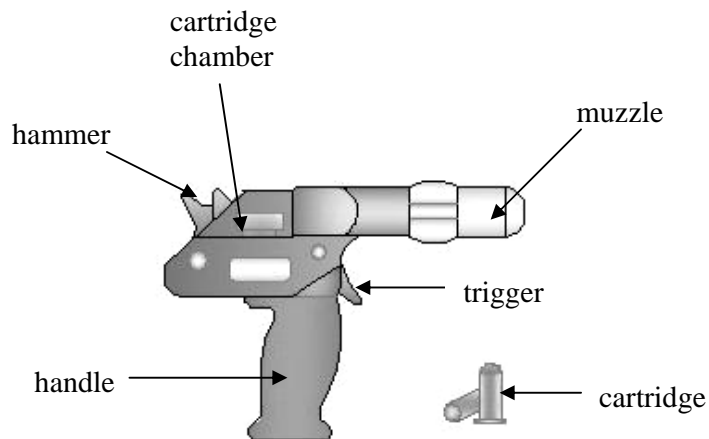


Figure 4. Cartridge type captive bolt

4.2.2 Pneumatic type

Type of mechanical stunner that uses compressed air supplied by a compressor instead of cartridge explosion to propel the captive bolt into the forehead of the animal (Fig. 5).

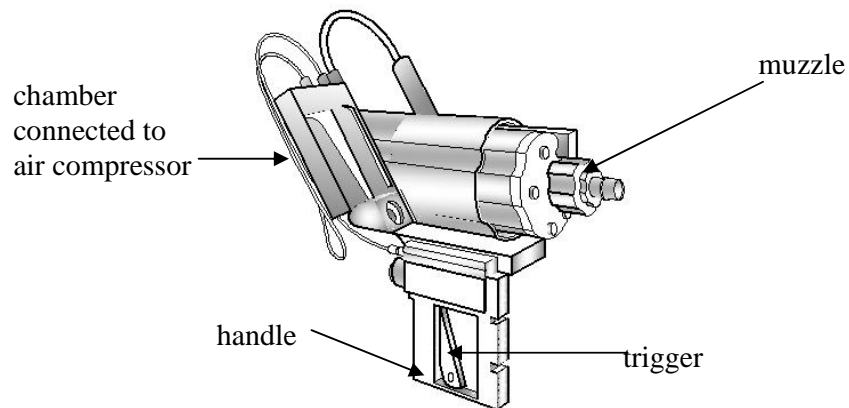


Figure 5. Pneumatic type captive bolt

4.3 According to type of bolt tip

4.3.1 Penetrating

Type of captive bolt that drives a concaved bolt tip to penetrate the skull of the animal to sever the brain (Fig.6).

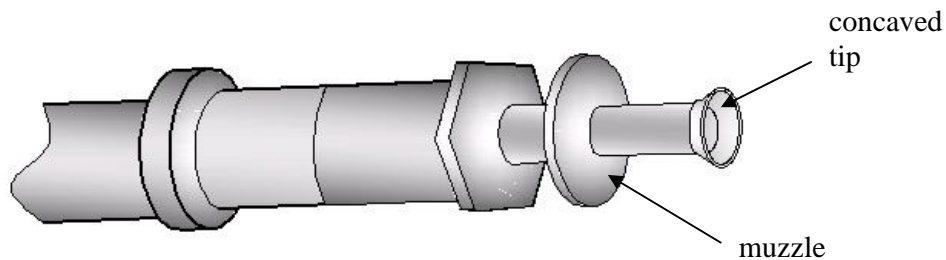


Figure 6. Penetrating type of captive bolt (disassembled)

4.3.2 Non- penetrating

Type of captive bolt that drives a mushroom-shaped bolt head against the forehead of the animal that causes concussion on the cranium and the brain without penetrating the skull (Fig. 7).

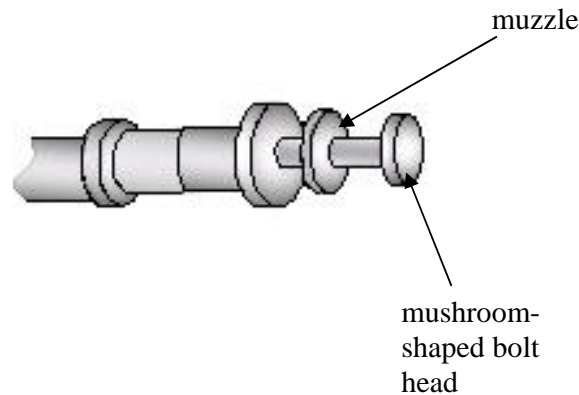


Figure 7. Non- penetrating type of captive bolt (disassembled)

5 Principle of Operation

The animal shall be restrained in the stunning box as specified in PAES 513. After restraining, the stunning process shall follow. The captive bolt shall be placed at right angle against the forehead of the animal. The equipment shall be fired to drive the bolt. For cartridge type captive bolt, the equipment shall be reloaded for the next use.

6 Fabrication Requirements

The captive bolt shall generally consist of barrel, trigger, trigger lock, handle and bolt. Parts of the captive bolt shall be made of non-corrosive material.

6.1 The bolt shall be made of non-corrosive material (e.g. stainless steel 304 or higher) with diameter ranging from 10 mm to 14 mm. It shall have a maximum extraction length of 120 mm for penetrating type and 70 mm for non-penetrating type.

6.2 The bolt shall have a concave piercing bolt tip (for penetrating type) or a mushroom-shaped bolt head (for non-penetrating type).

6.3 The bolt assembly shall be designed to retract the bolt instantly after firing.

6.4 The captive bolt shall be designed for easy operation.

6.5 The captive bolt shall be constructed such that it can be disassembled and reassembled for cleaning and maintenance of moving parts.

6.6 Pneumatic type

6.6.1 Additional handle and counterweight or balancers for captive bolt shall be available to facilitate in positioning and ease of operation. The counterweight or balancers shall be made of non-corrosive material.

6.6.2 Pneumatic type shall have a minimum operating pressure of 1.2 MPa (170 psi) or as specified by the manufacturer.

6.6.3 Pressure gauge shall be installed within the view and access of the operator and shall have a diameter of at least 70 mm with a range of 0 to 20 bars.

6.7 Parts shall be readily serviceable and consumable parts shall be readily available. Manufacturer/dealer shall show proof of capability or commitment to supply replacement parts and services.

7 Performance Requirements

7.1 The captive bolt shall render all test animal unconscious with a single application prior to sticking and bleeding.

7.2 The animal stunned with the captive bolt shall exhibit the physical signs of effective stunning as follows:

7.2.1 The animal shall collapse instantly.

7.2.2 Rhythmic breathing shall be absent.

7.2.3 Eyes shall be fixed and shall have a glazed expression.

7.2.4 Corneal reflexes shall be absent.

7.2.5 The jaw of the animal shall be relaxed.

7.2.6 The tongue of the animal shall be hanging out.

7.3 Pneumatic type captive bolt shall operate at the pressure range specified by the manufacturer.

8 Safety, Workmanship and Finish

8.1 The bolt shall not be painted and shall have a rust-free finish.

8.2 Handle of the captive bolt shall be made of high impact non-slip material.

8.3 Trigger lock shall be present in the captive bolt to avoid accidental firing.

9 Warranty of Construction

Warranty shall be provided for parts within six (6) months and for services within one year 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. Food grade grease and oil shall be initially included.
- 10.3** The blank cartridges shall be delivered in a properly labeled dry packaging.
- 10.4** The manufacturer/ dealer shall provide tools for cleaning and maintenance of the captive bolt.

11 Testing

Testing of the captive bolt shall be conducted on-site during commissioning. The captive bolt shall be tested for performance in accordance with PAES 516.

12 Marking, Labeling and Packaging

- 12.1** The captive bolt shall be marked in English with the following information using a plate, stencil or by directly punching it at the most conspicuous part:
 - 12.1.1** Brand name or Registered trademark of the manufacturer (optional)
 - 12.1.2** Model and/or Serial number
- 12.2** The packaging of the captive bolt shall be labeled with the following information:
 - 12.2.1** Name, address and contact number of the manufacturer shall be indicated in the packaging
 - 12.2.2** Country of manufacture (if imported)/ "Made in the Philippines" (if manufactured in the Philippines)
 - 12.2.3** 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 and shall be water and heat resistant under normal cleaning procedures, it shall not fade, discolor, crack or blister and shall remain legible.