Foreword

The formulation of this National Standard was initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) with support from the Department of Agriculture (DA).

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:

American Society of Agricultural Engineers (ASAE) S360:1984. Test Procedure for Determining the Load Carrying Ability of Farm Wagon Running Gear.

International Organization for Standardization (ISO/FDIS 17900:2001) Agricultural Trailer – Balanced and semi-mounted trailers – Determination of payload, vertical static load and axle load.

Agricultural Machinery – Agricultural Trailer – Methods of Test

1 Scope

This standard specifies the methods of test and inspection for agricultural trailers with up to 10 metric tons capacity. Specifically, it shall be used to:

1.1 verify the requirements specified in PAES 136 and the specifications submitted by the manufacturer;

1.2 determine the performance of the trailer;

1.3 evaluate the ease of handling and safety features; and

1.4 prepare a report on the results of the tests.

2 References

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

PAES 103:2000, Agricultural Machinery – Method of Sampling

PAES 136:2004, Agricultural Machinery – Agricultural Trailer – Specifications

3 Definitions

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

3.1
agricultural trailer
trailer designed to carry load for agricultural purposes without power of its own

3.2
gross load
sum of payload and unladen mass of the trailer expressed in tons

3.3
ground clearance
vertical distance between the ground and the lowest point of the trailer

NOTE In measuring ground clearance, the trailer shall be loaded to its payload and the tires shall be inflated at the recommended pressure.

3.4
over-run brake
brake actuated by a compressive force in the hitch between a trailer and the towing tractor used to decelerate a moving trailer

3.5
parking brake
brake actuated by a pedal or lever to keep the trailer in stationary or parked position

3.6
payload
net weight
uniformly distributed maximum safe load which can be transported by the trailer expressed in tons

3.7
service brake
brake actuated by a pedal or lever to decelerate and stop a moving trailer

3.8
unladen mass
tare weight
mass of a trailer with all its usual fittings but without any load

3.9
wheel base
horizontal distance between foremost and rearmost axles or wheels measured at the center of the ground contact

3.10
wheel tread
wheel track
distance between the outermost wheels at the same axle measured at the center of ground contact

4 General Conditions for Test and Inspection

4.1 Trailer on Test

The trailer submitted for test shall be sampled in accordance with PAES 103.

4.2 Role of the Manufacturer/Dealer

The manufacturer/dealer shall submit to the official testing agency the specifications and other relevant information on the trailer. An official representative of the manufacturer/dealer shall be appointed to conduct minor repairs and adjustments and witness the test. It shall be the duty of the representative to make all decisions on matters of adjustment and preparation of the trailer for testing. The manufacturer/dealer shall abide by the terms and conditions set forth by the official testing agency.

4.3 Termination of Test

If the trailer malfunctions during the test, the test shall be terminated by the test engineer.

4.4 Tractor to be Used

The tractor to be used shall be compatible with the trailer in accordance with the manufacturer's specification of required power.

5 Test and Inspection

5.1 Verification of Manufacturer's Technical Data and Information

5.1.1 This investigation is carried out to verify that the mechanism and specifications conform to the list of technical data and information submitted by the manufacturer and to the specifications given in PAES 136.

5.1.2 The suggested minimum list of field test equipment and materials are given in Annex A and the items to be inspected and verified are given in Annex B.

5.2 Performance Test

5.2.1 This is carried out to test the performance of the trailer.

5.2.2 The tests shall be carried out on both paved and bare dirt roads where the test conditions are to be recorded.

5.2.3 The tests shall be conducted with at least three test trials.

5.2.4 Payload Test

5.2.4.1 This test is carried out to verify the payload of the trailer specified by the manufacturer.

5.2.4.2 The load to be applied (e.g. sand or stone), which is equal to 125% of the trailer's payload, shall be uniformly distributed on the loading platform.

5.2.4.3 The trailer with the applied load shall be operated for three hours at a speed range given in Table 1 for different ground surface.

Table 1 – Speed Limit of Tractor on Different Ground Surface

Tractor Type	Speed Limit on Paved Road kph	Speed Limit on Bare Dirt Road kph
Two-wheel tractor	8 to10	4 to 6
Four-wheel tractor	15 to 20	8 to 10

5.2.4.4 All parts of the trailer shall be inspected for any sign of breakage or deformation.

5.2.5 Braking Test on Paved Road

5.2.5.1 Over-run or Service Brake Test

5.2.5.1.1 The load to be applied on the trailer shall be equal to its payload.

5.2.5.1.2 The trailer shall be operated at a maximum speed of 20 kph for four-wheel tractor and 10 kph for two-wheel tractor.

5.2.5.1.3 The operating speed shall be verified based on the following procedure:

Two poles 20 m apart (A, B) are placed approximately in the middle of the test plot. On the opposite side also two poles are placed in similar position, 20 m apart (C, D) so that all four poles form corners of a rectangle, parallel to at least one long side of the test plot. (see Figure 1) The speed will be calculated from the time required for the tractor to travel the distance (20 m) between the assumed line connecting two poles on opposite sides AC and BD. The easily visible point of the tractor should be selected for measuring the time. The starting position shall be at a distance sufficient to attain and stabilize the desired speed from line AC to line BD. Tractor shall be operated at rated engine speed (rpm) and at gear shift setting determined during pre-trial.

5.2.5.1.4 The braking test on over-run or service brake shall be conducted. When the foremost end of the tractor is at line BD, lever/pedal pressure shall be applied on the trailer service or over-run brake along with the tractor service brake. The point at which the tractor-trailer combination fully stopped shall be marked and extended sideways resulting to the line EF. The distance from line BD to the line EF shall be measured and recorded as braking distance. (see Figure 1)

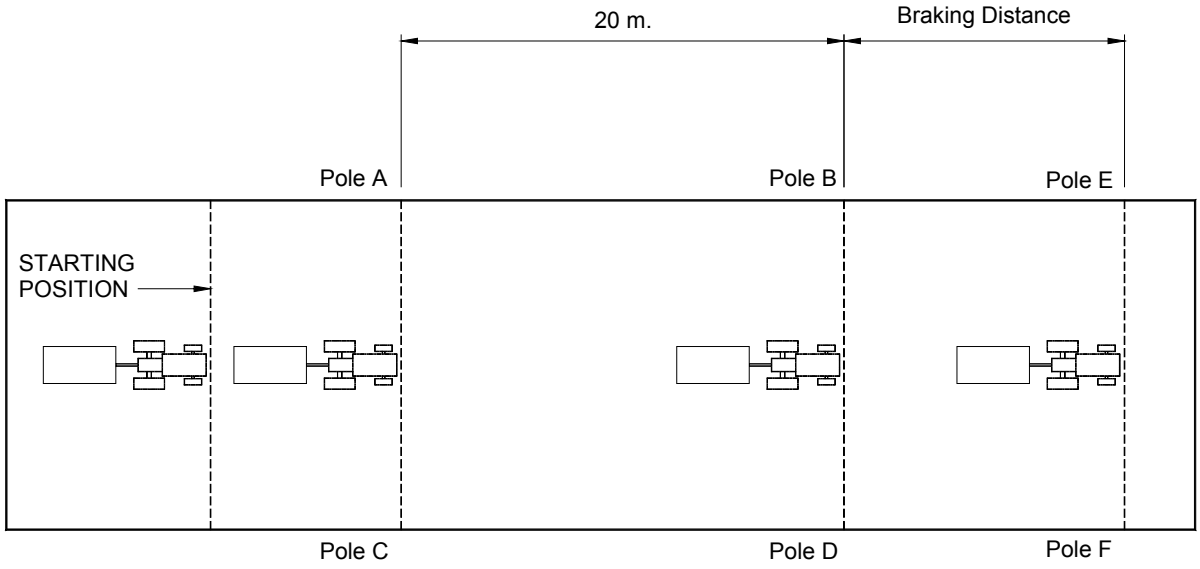

Figure 1 – Verification of Operating Speed and Over-run/Service Brake Test

5.2.5.2 Parking Brake Test

5.2.5.2.1 This test shall be carried out on test area or test ramp with 15˚ slope.

5.2.5.2.2 Upon applying pressure on the parking brake, it shall hold the fully laden trailer uphill and downhill.

5.2.6 The items to be observed, measured and recorded during the performance tests are given in Annex C.

6 Test Report

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

6.1 Name of testing agency

6.2 Test report number

6.3 Title

6.4 Summary

6.5 Purpose and scope of test

6.6 Methods of test

6.7 Description and Specifications of the Trailer

6.8 Results of Performance Test

6.9 Name and Signature of Test Engineers

Annex A

Suggested Minimum List of Test Equipment and Materials

Items	Quantity
A1 Equipment	
A1.1 Truck scale Capacity: 25 tons	1
A1.2 Timers Range: 0 to 60 minutes Accuracy: 1/10	2
A1.3 Steel tape, 50 m	1
A1.4 Metric tape, 7.5 m	1
A1.5 Vernier caliper	1
A1.6 Digital video camera	1
A1.7 Tractor: Four-wheel tractor, minimum: 65 kW Two-wheel tractor Diesel, minimum: 5 kW Gasoline, minimum: 7 kW	 1 1
A1.8 Parking brake test rig	1
A1.9 15° Test ramp	1
A2 Materials	
A2.1 Marking pegs/poles	6

Annex B

Inspection Sheet for Trailer

Name of Applicant : _____
Address : _____
Telephone No. : _____
Name of Distributor : _____
Address : _____
Name of Manufacturer : _____
Factory Address : _____

GENERAL INFORMATION

Brand :_____ Model :_____
Serial No. : _____Type : _____
Production date of trailer to be tested : _____

Items to be inspected

ITEMS	Manufacturer's Specification	Verification by Testing Agency
B1 Dimensions and weight		
B1.1 Trailer		
B1.1.1 Overall length, mm		
B1.1.2 Overall width, mm		
B1.1.3 Overall height, mm		
B1.1.4 Unladen mass, ton		
B1.1.5 Payload, ton		
B1.1.6 Gross load, ton		
B1.2 Platform		
B1.2.1 Material		
B1.2.2 Dimension (L x W x H), mm		
B1.2.3 Ground clearance, mm		
B1.2.4 Overhang (front), mm		
B1.2.5 Overhang (rear), mm		
B1.3 Pullbar		
B1.3.1 Material		
B1.3.2 Length, mm		
B1.3.3 Thickness, mm		
B1.4 Tires		
B1.4.1 Tire specification		
B1.4.1.1 Size, mm		
B1.4.1.2 Ply rating		
B1.4.1.3 Inflation pressure, kg/m^2		
B1.4.2 Wheel base, mm		
B1.4.3 Wheel tread, mm		
B1.5 Tractor-trailer combination		
B1.5.1 Overall length, mm		
B1.6 Safety/precautionary markings		

Annex C

Field Performance Test Data Sheet

Items to be Measured and Inspected

ITEMS	Trials			Average
	1	2	3	
C1 Test conditions				
C1.1 Condition of field				
C1.1.1 Location				
C1.1.2 Types of ground surface (e.g. paved or bare dirt road)				
C2 Measurements				
C2.1 Paved Road				
C2.1.1 Traveling speed, kph				
C2.1.2 Braking distance, m				
C2.2 Bare dirt road				
C2.2.1 Traveling speed, kph				

C3 Observations

A minimum of three persons (test engineer, manufacturer's representative and the operator) shall rate the following observations.

ITEMS	Rating*				
	1	2	3	4	5
C.3.1 Ease of handling and stability when turning					
C.3.2 Ability of the parking brake to hold the fully-laden trailer on 15˚ slope uphill or downhill.					
C.3.3 Ease in applying force to hand brake lever.					
C.3.4 Visible deformation during loading capacity test (i.e. cracks/breaks, etc)					
C.3.5 Other observations_____ _____ _____					

* 1 – Very Good
2 – Good
3 – Satisfactory
4 – Poor
5 – Very Poor