

BHUTAN STANDARD

Power Tillers – Test Code (Part 2)

1 Scope

This test code specifies the test methods of power tillers and shall apply to pull type, power tilling type and dual purpose types with engine power ranging from 10.5-14.0 hp.

2 Normative References

The following document is indispensable for application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BTS 34: 2017, Power Tillers- Basic Requirements (Part 1)

3 Definitions

For the purposes of this standard, the definitions given in BTS 34:2017 and the following apply.

3.1 Others

Any additional verifications that may be required to be undertaken for enhancing the precision of any test items.

3.2 Water Splashing

Water splashing is a condition verified during the water proof test. When the power tiller is operated in the water tank designed for water proof test as per the requirement of operation test procedures, water will be splashed from wheel and rotary unit to axle and transmission. This phenomenon is termed as water splashing.

4 General conditions of the test

4.1 The power tiller subjected to the test shall be run as per the manufacturer's recommendations and specifications.

4.2 The power tiller subjected to the test shall be adjusted as per the manufacturer's recommendation.

4.3 The fuel and lubricants used for the tests shall be selected from those recommended by the manufacturer.

4.4 All measuring instruments used for the test shall be calibrated with relevant agencies or certification body.

5 Test Items and Methods

5.1 Safety Test

The objective of this test is to ascertain the safety features of the power tiller. It shall be performed by;

- a) Verifications of safety devices
- b) Inspection of caution labels
- c) Availability of the instruction and operation manuals.

5.2 Verification of Structure

The objective of this test is to confirm the specifications of a power tiller given by the manufacturer. The items shall be verified as per the annex A.

5.3 Engine power test

The objective of this test is to confirm the output power of the power tiller engine. It shall be performed by;

- a) Setting the governor control lever to maximum position.
- b) Measuring output power from the engine only.

5.3.1 The items to be measured or investigated are:

- a) Atmospheric condition
- b) Torque of the loaded shaft.
- c) Revolutions per minute of loaded shaft
- d) Fuel consumption
- e) Temperature of important parts
- f) Mechanical trouble or failure.
- g) Others

5.4 Operation test

The objective of this test is to assess the ease of operation and adaptability to field condition. It shall be performed under two different operations;

- a) Field operation with plough, rotavator and available implements
- b) Road operation with attachment of trailer if available.

5.4.1 Following conditions shall be maintained to perform this test;

- a) The manufacturer's specification and instruction manual shall be followed for fitting the accessories and any other adjustments.
- b) For ploughing and rotary tilling, agriculture fields of appropriate size shall be used.
- c) For transportation, the trailer shall be loaded as per the manufacturer's recommendation.
- d) The power tiller shall be tested at least two operators.

5.4.2 The items to be measured or investigated are:

- a) Field condition
- b) Ease of hitching implements
- c) Travelling speed of the power tiller
- d) Working depth of the implements
- e) Working width of the implement
- f) Field efficiency

- g) Brake performance
- h) Ease of operation
- i) Noise and vibration
- j) Others

5.5 Water proof test

The objective of this test is to confirm water proof performance of the power tiller. It shall be performed under the following conditions;

- a) The power tiller shall be equipped for puddling
- b) The test shall be conducted in a water tank designed for test
- c) The base of the wheel shall be submerged about 20cm below the water surface
- d) Wheel speed shall be set equivalent to about 3km/h in forward travelling speed and tilling shaft speed shall be set to maximum
- e) The test shall be conducted continuously for 2 hours.

5.5.1 Items to be investigated are:

- a) Water splashing
- b) Inspection of the transmission oil in transmission and axillary case
- c) Waterproof system
- d) Others

6 Inspection after disassembling

If any abnormalities are observed during any of the above tests, causes may be investigated by disassembling the specific parts.

Annex A (Normative)

(Clause 5.2)

Specification Sheet for Power Tillers

A.1 Power tiller

- a) Model:
- b) Make:
- c) Serial number:
- d) Overall dimensions (mm)
 - 1) Length:
 - 2) Width:
 - 3) Height:

A.2 Engine

- a) Type:
- b) Number of cylinders:
- c) Type of Combustion:
- d) Make:
- e) Model:
- f) Serial number:
- g) Year of manufacturer:
- h) Rated engine power: (.....kW/.....rpm)

A.3 Fuel system

- a) Type of fuel feed system:
- b) Fuel tank capacity :
- c) Types of fuel:

A.4 Air cleaner

- a) Type:

A.5 Exhaust System

- a) Outlet direction:

A.6 Lubrication System

- a) Oil Sump Capacity:

A.7 Cooling System

- a) Type (Air or water):

A.8 Electrical System

- a) Lights (watt, voltage):

A.9 Power Transmission System

- a) Main Clutch:
- b) Steering Clutch:
- c) Number of speeds
 - Forward:
 - Reverse:
- d) Nominal speed at rated engine speed at the highest gear (km/h):

A.10 parking brake

- a) Type:

A.11 Tyre

- a) Size:
- b) Ply rating:

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Bibliography

1. Institute of Agriculture Machinery, Bio-oriented Technology Research Advancement Institution, Tsukuba International Center: Farm Machinery Testing No:3 – National Test Code for the Agricultural Tractors (Walking type)
2. Bureau of Indian Standards, Food and Agriculture Division Council: IS 9935:2002 Power Tiller:- Test Code (second revision)
3. International Organization for Standardization, International standard, ISO 11449:1994 –Walk Behind Powered Rotary Tillers – Definitions, Safety requirements and Test Procedures

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