

འཕུལ་སྒྲུང་རྒྱུང་བ། གཞི་རྒྱུ་དགོས་མཁོ། གོ་ཁྲིམ་ , བ།

**BHUTAN STANDARDS**

**Mini Power Tillers (Less than 10.5hp) – Basic Requirements (Part 1)**



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**BHUTAN STANDARDS BUREAU**

The National Standards Body of Bhutan  
THIMPHU 11001

**Price group.....**

འཕུལ་སྒྲུང་རྒྱུང་བ། གཞི་རྟེན་དགོས་མཁོ། གོ་འཕྲིམ་ , བ།

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## FOREWORD

This Bhutan Standards for Rice Mill – Basic Requirements (Part 1) was adopted by Bhutan Standards Bureau after the draft finalization by the Mechanical Engineering Technical Committee and endorsed by BSB Board.

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## BHUTAN STANDARD

### Mini Power Tillers (Less than 10.5hp) – Basic Requirements (Part 1)

#### Scope

This standard specifies the general requirements for mini tillers and shall applies to pull type, tilling type and dual-purpose types of power less than 10.5hp (7.8kw).

#### Normative References

The following documents, in whole or part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced documents (including amendments) applies.

1. IS 9935:2002 Power tillers: - Test Code (Second Revision). Food and Agriculture Division Council, Bureau of Indian Standards.
2. ISO 15550:2016 Internal Combustion Engines: - Determination and method for the measurement of engine power – General requirements.
3. ISO 3046-1:2002 Reciprocating Internal Combustion Engines: - Performance, Part 1: Declarations of power, fuel and lubricating oil consumptions, and test methods – Additional requirements for engines for general use.
4. ISO 5349-1: 2001 Mechanical vibration- Measurement and evaluation of human exposure to hand transmitted vibration- Part 1: General requirements
5. ISO 11449:1994 Walk – behind powered rotary tillers Definitions, Safety requirements and test procedures. International Organization for Standardization.
6. Farm machinery testing No: 3- National test code for the agricultural tractors (walking type). Institute of Agriculture Machinery, Bio-Oriented Technology Research Advancement Institution.
7. BHUTAN. MINISTRY OF INFORMATION AND COMMUNICATION. Road safety and transport regulations 1999. Road Safety and Transport Authority, Thimphu
8. BHUTAN. MINISTRY OF AGRICULTURE AND FOREST. Technical guidelines for the constructions of farm roads 2009. Department of Agriculture, Thimphu

#### Definitions

##### 3.1 Mini tiller

A prime mover having single axle in which the direction of travel and its control in the field operation is performed by the operator walking behind. It is also known as hand or walking behind type tractor.

##### 3.2 Type of mini tiller

The mini tiller which can be used for a number of farm operations, including the types defined under.

##### 3.2.1 Pull type

This type is used for pull type implements and trailer.

##### 3.2.2 Tiling type

This type is used for rotary tiller or other tilling implements.

**3.2.3 Dual purpose type**

This type is used for both pull type implements and rotary tillers.

**3.3 Rated engine power output**

The power available at the crankshaft which is measured at the rated speed as specified by manufacturers is called the rated engine power output.

**3.4 Rated speed**

The number of revolutions of the crank shaft in a given period of time as specified in the specification is called the rated speed.

**3.5 Structure**

It is a fixed constructed object or parts which functions as part of some mechanized process or which performs mechanized processes independently.

**3.6 Power Take Off**

It is a device which transfers mechanical power from an engine to the implements.

**3.7 Service brake**

It is a brake located at trailer and it is usually applied while in the travelling.

**3.8 Parking brake**

It is a brake located on the mini tiller, trailer attached with hand brake and it is usually used for keeping the power tiller stationary.

**3.9 Rotary tiller**

Pedestrian controlled (walk behind) powered rotary tiller whose ground traction is provided by the drive wheels or rotary tiller implements and whose rotating member is substantially behind or in front of the drive wheels.

**3.10 Load Capacity**

It is the maximum load permissible on the trailer excluding the weight of the trailer to be specified /indicated by manufacturer.

**The general requirements of the mini tiller shall cover;**

- 4.1. Safety
- 4.2. Structure
- 4.3. Engine performance
- 4.4. Operation
- 4.5. Brake
- 4.6. Water proof
- 4.7. Test Sample

**4.1 Safety requirements****4.1.1 Safety signs**

- 4.1.1.1. All safety symbols and labels shall be illustrated and clearly visible to operator.
- 4.1.1.2. The instruction or operation manuals, specification sheet shall be equipped in English

**4.1.2 Rotary tillers**

4.1.2.1. The mini tiller with engine of 8.5 hp and above shall be equipped with a device that automatically stops the rotary motion of the rotor when engage in reverse.

**4.1.3. Parking brake**

4.1.3.1 The dual type mini tiller with engine of 8.5 hp and above shall be equipped with a parking brake.

4.1.3.2. The trailer shall be equipped with a parking brake.

**4.1.4 Load capacity**

4.1.4.1 Load capacity of mini tiller's trailer shall be maintained as per the manufacturers' indication.

**4.1.5 Protection from moveable and hot components.**

4.1.5.1 There shall be safety guard for all moving parts which are prone to injury. The guard shall be placed in between the moving parts and operator at appropriate safe distance.

4.1.5.2 The guard shall have enough strength and durability under normal operational condition.

4.1.5.3 The hot parts of mini tiller should be placed at a safe distance from the fuel system.

**4.2. Structure requirements**

4.2.1. The parts of mini tiller shall not be abnormal or broken.

4.2.2. There should not be oil leakage.

4.2.3. The operator should not have difficulty in mounting or dismounting implement of exchanging and adjusting parts.

4.2.4. There should not be any defects that may affect the operator.

4.2.5 The steering clutch shall be equipped.

**4.3 Requirement of engine performance**

4.3.1 The rated output power for petrol engine shall not decrease by more than 40% when tested at 2250±50 meters above mean sea level.

4.3.2 The rated output power for diesel engine shall not decrease by more than 30% when tested at 2250±50 meters above mean sea level.

**4.4 Requirement at the operator's level****4.4.1. Noise level**

The noise level for mini tiller should not exceed 100 dBA for 2 hours of continuous operation.

**4.4.2. Vibration level**

The vibration level of mini tiller shall not exceed 15 m/s<sup>2</sup> at normal field operation.

**4.5. Braking requirements****4.5.1 Servicing brake**

The mini tiller attached with loaded trailer and when operated at maximum speed on a horizontal paved road, should stop within 5 meters when the brake is applied.



**4.5.2. Parking brake**

No rotation/movement of the wheels is observed when the mini tiller with specified trailer load is placed on a slope of 18% facing up and down.

**4.6. Water proof**

Water should not enter the transmission and axle case when the wheels are submerged 20cm for 2 hours of continuous operation.

**4.7 Test Sample**

The test sample shall be on new machines and it shall be adjusted as per the manufacturer specification.

The engine test shall be conducted at  $2250 \pm 25$  meters above mean sea level.

**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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