BHUTAN STANDARD & TEST CODE

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1. MINI TILLER **(Less than 10.5 hp)**

I. BTS 42_2019 Mini Tiller – Basic Requirement (Part 1)

II. BTS_43 Mini Tiller – Test Code (Part 2)

The general requirements of the mini tiller shall cover:

1. Safety
2. Structure
3. Engine performance
4. Operation
5. Water proof
6. Test Sample

General Conditions of the Test

1. The mini tiller subjected to the test shall be run as per the manufacturer's recommendations and specifications.
2. The manufacturer's specification and instruction manual shall be followed, while fitting the accessories and any other adjustments.
3. The appropriate size of agriculture fields shall be used for ploughing and rotary tilling.
4. The fuel and lubricants used for the test shall be selected from those recommended by the manufacturer.
5. All measuring instruments used for the test shall be calibrated with relevant agencies or certification body.
6. The mini tiller shall be tested by skilled operators.

Test Item 1: Safety Requirement

Objective: *The objective of this test is to ascertain the safety features as per the manufacturer's specification*

Items	**Safety Requirements**	**Complied / Not complied.**
Moving parts	There shall be safety guard for all moving parts.	
Safety distance	The guard shall be placed in between the moving parts and operator at appropriate safe distance.	
Strength of guard	The guard shall have enough strength and durability under normal operational condition.	
Safety Device	The mini tiller shall be equipped with a device that automatically stops the rotary motion of the rotor during the reverse.	
Hot parts	The hot parts of power tiller should be placed at safe distance from the fuel system.	
PTO shaft	The shaft shall be provided with a durable cap when not in use.	
Parking Brake	The dual type power tiller shall be equipped with a parking brake.	
Safety signs	All safety symbols and labels shall be illustrated and clearly visible to operator.	

Test Item 2: Verification of structure and requirement

Objective: *The objective of this test is to confirm the manufacturer's specification and verify the structure*

- The parts of mini tiller shall not be abnormal or broken
- There should not be oil leakage.
- The operator should not have difficulty in mounting or dismounting implement of exchanging and adjusting parts.
- There should not be any defects that may affect the operator.
- The steering clutch shall be equipped.
- Verification of structure shall be done as per Annex A

SL/No	Particular
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 manufacture: h) Rated engine power: (.....HP/KW.....rpm)
A.3	Fuel system a) Type of fuel feed system: b) Fuel tank capacity: c) Types of fuel: d) Type of carburetor
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:
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 Size (wheel tread): Ply rating:

Test Item 3: Engine Test

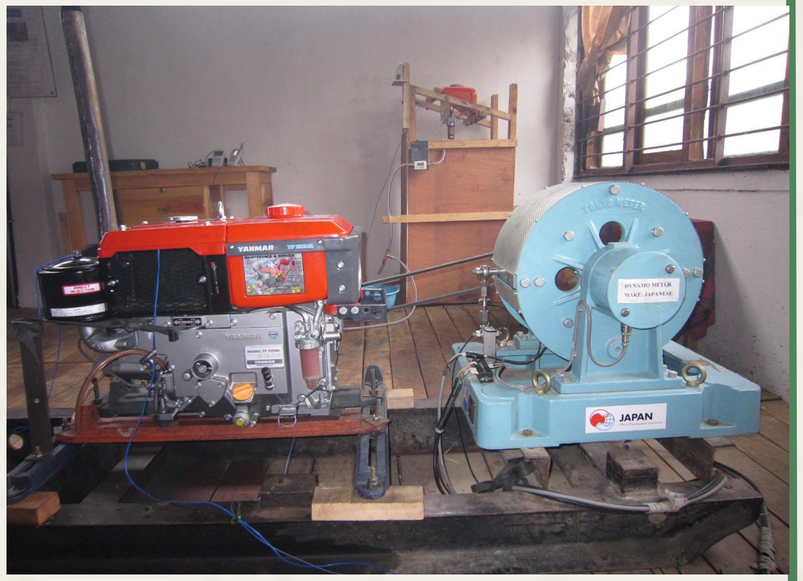
Objective: *The objective of this test is to confirm the power reduction of engine as per the clause 4.3 (Requirement of Engine Performance), Bhutan Standard Bureau.*

Requirement of Engine Performance:

- The rated output power for petrol engine shall not decrease by more than 40% when tested at 2250 ± 50 meters above mean sea level.
- The rated output power for diesel engine shall not decrease by more than 30% when tested at 2250±50 meters above mean sea level.

It shall be performed by:

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



Engine Test

Test Item 4: Sound Level

Objective: *The objective of this test is to confirm the **sound** as per the Clause 4.4.1 Bhutan Standard*

- **BTS standard: Sound Level shall be <100dB (A) both during Field Test and Laboratory Test for 2 hours of continuous operation**

Test Item 4: Sound Level Test

Test shall be carried under following conditions:

a) At operator's position

i) Controlling the throttle position (Idle, rated and maximum throttle state)

ii) Shall be measured at a position of 50 mm away from operator's ear.

The following conditions shall be maintained to perform this test

a) The measurement shall be made without load in a sufficiently silent and open zone.

b) Ambient noise shall not exceed 10 decibels

Test Item 5: Vibration Level Test

Objective: *The objective of this test is to confirm the **vibration** as per the Clause 4.4.2 Bhutan Standard*

- **Standard Requirement:**

Vibration Level shall be ≤ 15m/sec² both during Field Test and Laboratory Test

3-Axis (Tri-axial) Accelerometer (VM-54)

Test Item 6: Operation test

Objective: 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, rotator and available implements
b) Road operation with a1`ttachment of trailer if available

The items to be measured or investigated are:

a) Field condition
b) Ease of hitching implements
c) Travelling speed
d) Working depth
e) Working width
f) Field efficiency
g) Brake performance
h) Ease of operation
i) Others

Test Item 7: Braking requirements

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.

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.

Test Item 8: Water Proof Test

Objective: *The objective of this test is to confirm water proof Performance of the power tiller.*

The items to be measured or investigated are as follows:

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

Test Sample

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

2. Portable Brush Cutter

I. BTS 364_2022: Basic Requirement (Part 1)

II. BTS_365: Test Code (Part 2)

Scope

- This standard specifies the basic requirement of Portable Brush Cutter for harvesting of cereal grains such as paddy, wheat, barley, finger millet and buckwheat and inclusive of grasses. It excludes the test methods of Portable Brush Cutter.

Test Item 6: Operation test

Objective: The objective of this test is to assess the ease of operation and adaptability to field condition.

Requirement of Operation Performance:

The machine shall function smoothly under normal condition. The total grain loss shall not be more than 3% from manual test value.

Note 1- The test under clause 4.3 shall not be applicable for cutting grasses.

Following condition shall be maintained;

a) The manufacturer's specification, instruction and operation manuals shall be followed for fitting the accessories and any other adjustments.
b) b) The test shall be conducted for relevant cereal crops.
c) c) The portable brush cutter shall be operated by at least two experienced operators for confirmation of handling.
d) The reference test by manual harvesting shall be conducted to evaluate the efficiency of the portable brush cutter.

The items to be measured or investigated

1) Field capacity
2) Total grain loss
3) Ease of operation
4) Noise and vibration level
5) Others (if it is necessary)

Protection range of protective cover (blade guard) against scattering

- The objective of this test is to confirm the safety zone for scattering of materials from cutting blade.

It shall be performed by:

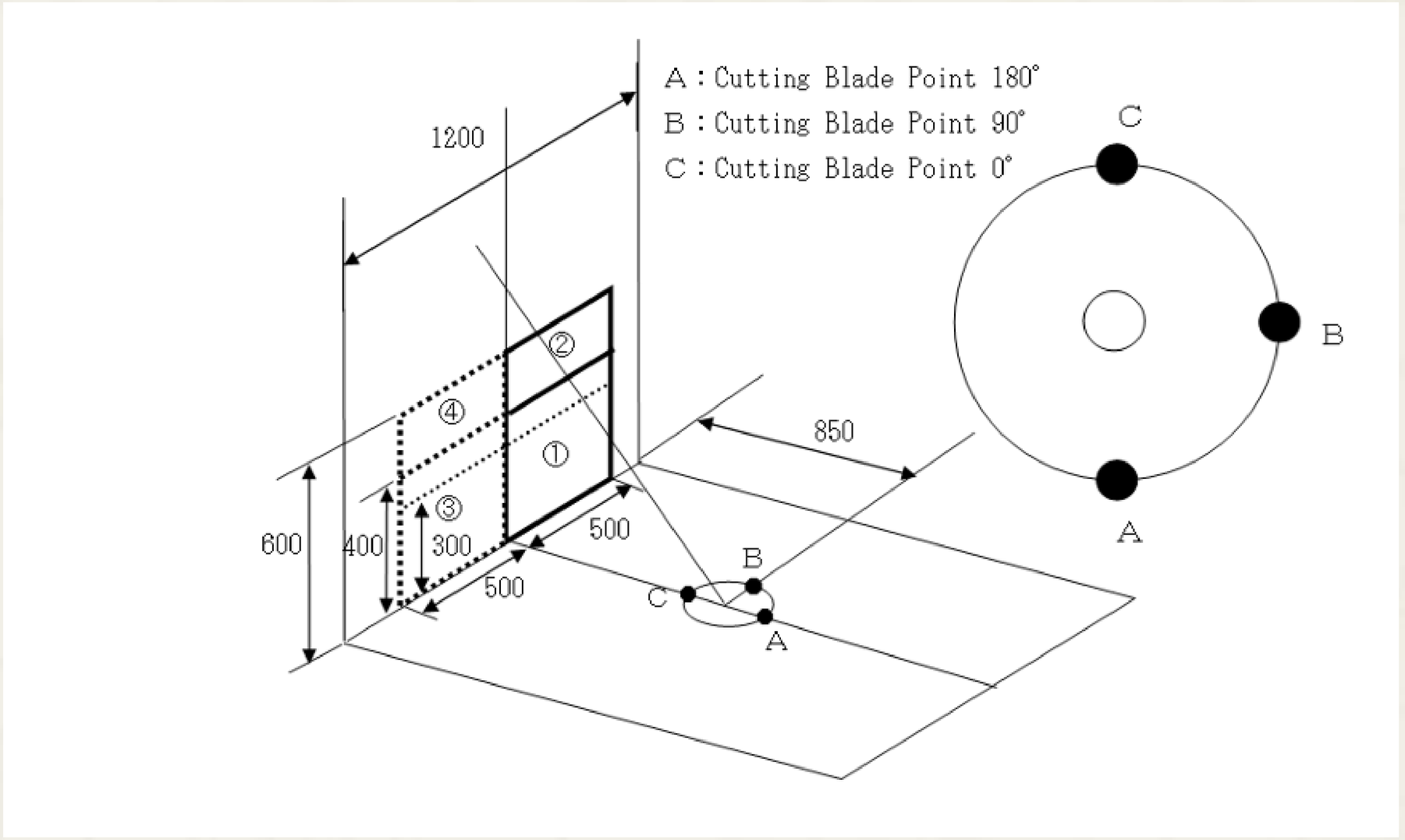
a) Portable brush cutter shall be placed at operating position.

b) Safety standard screen shall be placed at 850 mm distance from center of blade in the direction of main pipe axis.

c) Protective cover should hide zone1, (500 mm wide, and height of 400mm from the ground).

d) When the screen is seen from point (A) and (B) on the blade for harvester operated from right-hand side of the body, or the range (3) for the harvester operated from left-hand side.

e) When the screen is seen from points (B) and (C) on the blade, the protective cover should hide the range (2) (500mm wide at the height of 600mm from the ground) (range (4) for harvester operated on the left-hand side of the body).


A : Cutting Blade Point 180°
B : Cutting Blade Point 90°
C : Cutting Blade Point 0°
1200
600
400
300
500
500
850
①
②
③
④
A
B
C
A
B
C

3. Rice Mill

1. BTS 38_2019: Basic Requirement (Part 1)

Scope: This standard specifies the general requirements for Rice Mill and shall apply to De husker, Polisher and Combined types.

2. BTS_39: 2019 Test Code (Part 2)

Scope: This standard specifies the test code of small-scale Rice Mill.

Test Items:

1. Safety
2. Structure requirement
3. Operation test

Test Item 1: Safety

Test Methods:

1. Verify of safety devices
2. Check the caution labels
3. Check the instruction manual.
4. Others

Food Grade Material: Any material when it comes in contact with food does not contaminate the food beyond the limit of prohibited substances given in annex A, table 1.

Table A.1 Prohibited substances in food contact parts.

Sl. No	Elements	Limit Value
1	Lead (Pb)	< 0.1%
2	Antimony (Sb)	< 5 %
3	Cadmium (Cd)	< 0.01 – 0.04 %
4	Mercury (Hg)	< 0.1 %
5	Cyanide	0

Test Item 2: Operation Test

Requirement of Operational Performance:

1. Milling recovery index should not be lower than 0.9.
2. Head rice recovery index should not be lower than 0.75.
3. The noise level for rice mill should not exceed 100dBA for 2 hours of continuous operation.

Test Methods for Operation test:

1. The rice mill shall be well equipped with the manufacturer’s specifications.
2. The rice mill shall be loaded with paddy by weight of hopper capacity as per the manufacture Instruction.
3. The rice mill shall be operated by experience operators in normal way.
4. Milling operation should be repeated until milling state.
5. Laboratory husker and laboratory polisher should be operated with paddy and brown rice for finding milling recovery index.

The items to be measured or investigated:

1. Test paddy condition
2. Mechanical condition
3. Operating condition
4. Milling recovery
5. Milling capacity
6. Power consumption
7. Ease of handling
8. Noise
9. Finishing condition of grain
10. Others