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भारतीय मानक मसौदा

कपास बीनने की मशीन के लिए परीक्षण संहिता - भाग 2 - कार्यकारिता परीक्षण

Draft
Indian Standard

TEST CODE FOR COTTON PICKER PART 2 PERFORMANCE TEST

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Farm Implements and Machinery Sectional Committee, FAD 21

FOREWORD

Picking is the operation of collecting cotton bolls from plant with the help of spindles.

Cotton Picker, commonly known as picker, is a machine designed for picking of the Cotton from the field while moving through the standing crop. It may be of self-propelled type or tractor - operated (trailed) type.

This Standard is being published in two Parts, Part 1 is for Terminology and Part 2 is for Performance Tests.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding-off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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Indian Standard

TEST CODE FOR COTTON PICKER
PART 2 PERFORMANCE TEST

1 SCOPE

This standard prescribes the methods of performance testing of cotton-picker (picker).

2 REFERENCES

The Indian Standards listed in Annex A contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated therein.

3 TERMINOLOGY

For the purposes of this standard, the definition of various terms as given in Test Code for Cotton Picker (Part 1) Terminology (*to be published*), shall apply.

4 GENERAL GUIDELINES

4.1 Specification Sheet

The applicant shall supply the specifications of the picker consisting of the items listed in the specimen report given in Annex B, as well as any additional data required to carry out the tests. The manufacturer shall also supply literature consisting of operational and maintenance manual, service manual and parts catalogue with the picker. The literature should be in Hindi/English.

4.2 Safety

The machine shall be in accordance with the safety requirements and/or protective measures as stated in IS 12239 (Part 1). The manufacturer shall also provide the information on safe working practices which eliminate or reduce the hazards arising from the intended use of these machines by operator in the course of normal operation and service

The note on safety device, such as slip clutches, shear pin, signal horns, indicator lights, provided for various systems shall be taken. Any other safety feature shall also be checked and reported.

4.3 Sampling

The picker shall either be selected at random (*see* IS 4905) from the production lot by the testing institute for commercial tests or shall be submitted by the applicant to the testing authority for confidential / initial commercial tests as the case may be. The picker selected or submitted for test shall be completed with its usual accessories and in a condition generally offered for sale. The picker shall be new and shall not be given any special treatment or preparation for test. The method of selection shall be as given in Annex C.

4.4 Fuel and Lubricants

The properties of fuel and lubricants used for testing shall conform to **5.3** of IS 12226.

4.4.1 The oil change-over period as given in the printed literature shall be followed at the testing institute.

4.5 Running-in

4.5.1 The picker shall be run-in at the testing institute by the applicant in collaboration with the testing institute, before the start of the test, under his responsibility and in accordance with his usual instructions. If this procedure becomes impractical for any reason, the testing institute shall run-in the picker, provided that the authority of the applicant or his representative, who will remain responsible for running-in, is obtained.

4.5.2 The duration of running-in, and place shall be indicated.

4.6 Servicing and Preliminary Settings after Running-in

4.6.1 After completion of running-in test the servicing/adjustments as per printed literature/ information supplied by the applicant / manufacturer shall be done. No adjustment shall be made unless it is recommended in the literature or specific recommendations are submitted before start of test. All the parts replaced shall be reported.

NOTE — However, the adjustment of fuel injection pump shall not apply to the picker randomly selected for test.

4.7 Repair and Adjustment during Test

The applicant during the course of test shall not make any major adjustment or introduce any major alterations or modifications which may affect the normal performance. However, normal operational adjustments, to suit crop and field conditions or as conformance to the specifications made available to the testing authority, can be made during the test. In case of picker submitted for confidential test, the testing authority at its discretion can permit major alterations or modifications on the request of the applicant.

4.8 Ancillary Equipment

For power tests, all power consuming devices may be disconnected only if it is practicable for the operator to do so as a normal practice in the work, in accordance with the operator's manual and without using tools, except as otherwise specified for a particular test. If not, they shall remain connected and operate at minimum load.

4.9 Fuel Consumption

The fuel measurement apparatus during laboratory tests shall be so arranged that the fuel pressure at the fuel transfer pump of the engine is equivalent to that which exists when the picker fuel tank is half full. The fuel temperature shall be comparable to that in the normal operation of the picker when fuel is taken from the picker fuel tank.

4.9.1 To obtain hourly fuel consumption by volume and the work performed per unit volume of fuel, conversion of unit of mass to unit of volume shall be made using the density value at 15°C.

4.9.2 When the fuel consumption is measured by volume, the specific fuel consumption shall be calculated using the density corresponding to the appropriate fuel temperature.

4.10 Atmospheric Conditions

The atmospheric pressure shall be minimum 96.6 kPa during laboratory tests. The pressure shall be noted at the beginning of the test. The temperature shall be, for power tests, the normal ambient temperature shall be (27 ± 7)° C. The temperatures for high ambient test shall be (43 ± 2)°C.

NOTE — No correction shall be made to the test results for atmospheric conditions.

4.11 Conditions for Checking of Dimensions

4.11.1 The picker shall be standing on a firm, level and horizontal surface.

4.11.2 The picker shall be stationary with its wheels and components in positions they would be, as if the picker was travelling in a straight line.

4.11.3 The pressure in pneumatic tires shall be adjusted to the value recommended by the applicant for field work. The tires shall be new. The measurement of height of lugs shall be made at the center line of tires.

4.11.4 Measurement conditions for various dimensions and characteristics as stipulated in Part 1 shall also be followed.

5 TESTS

The following laboratory and field tests shall be conducted.

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5.1 Laboratory Tests

a) Specification checking
b) Material analysis
c) Visual observations and checking of provision for adjustments
d) Power tests
e) Picking unit lifting test
f) Seed cotton container dumping Test
g) Moistening and Flushing Test
h) Noise level measurement
i) Vibration test
j) Operator's field of vision
k) Brake test
l) Air cleaner oil pull-over test
m) Turning ability test
n) Position of center of gravity
p) Components/Assembly inspection

NOTES
1. Tests indicated at (d), (h), (i) and (l) shall be conducted in self-propelled pickers only.
2. The laboratory tests shall preferably be conducted prior to taking up field tests. However, if the necessity arises the sequence of laboratory and field tests can be changed by the Testing Authority.
3. If test data can be submitted by manufacturer, consider stating use data from certified source.

5.2 Field Tests

a) Rate of work
b) Quality of work
    i) Efficiencies:
    1) Picking Efficiency
    ii) Losses:
    1) Post-harvest seed cotton ground loss
    2) Post harvest seed cotton plant loss
    iii) Trash in content
c) Output
    i) Seed cotton
d) Fuel consumption
e) Visual observations

6 LABORATORY TESTS

6.1 Specification Checking

The specifications of the picker given by the applicant (see **4.1**) shall be checked and reported in Annex B by the testing authority. While checking various dimensions, the conditions stipulated in **4.10** shall be followed

6.2 Material Analysis

The hardness and chemical analysis of critical components, such as spindle shall be made and reported in Annex D.

6.3 Visual Observations and Checking of Provision for Adjustments

The picker shall be subjected to thorough inspection with particular attention to bearings, drives and other moving parts, correctness of various adjustments, tightness of bolts and nuts, etc. The observation given in Annex E shall be recorded.

6.4 Power Tests

6.4.1 The following tests on the engine as per IS 12036 shall be conducted:
a) Maximum power (absolute) test (*see* **6.1.2** of IS 12036) .
b) Varying speed test at full load (*see* **6.1.3** of IS 12036).
c) Varying loads test (*see* **6.1.4** of IS 12036).

NOTE — If the engine speed recommended for field tests is different from rated engine speed, then tests at the recommended setting shall also be conducted.

6.4.2 *High Ambient Test*

The following tests on the engine under high ambient temperature (43 ± 2)°C shall be conducted.

6.4.2.1 *Varying speed test*

This test shall be carried out in accordance with 6.1.3 of IS 12036:1995.

6.4.2.2 *Five hour engine rating test*

The engine shall be run at 90 % of load corresponding to maximum power continuously for 4 h. During the fifth hour, the engine shall be run at a load corresponding to maximum power. During the test, all the parameters specified in 6.1.7 of IS 12036 shall be recorded after every 30 min during the first 4 h and after every 15 min during the fifth hour.

The coolant and lubricating oil consumption shall be recorded as under:
a) Coolant (percent of total coolant capacity), and
b) Lubricating oil (g/kWh).

6.4.3 The data shall be recorded in **F-1**.

6.5 Picking unit lifting test (If applicable)

This test shall be carried out as under:
a) The engine speed set at speed recommended for field operation.
b) The assemblies/sub-assemblies other than hydraulic system shall remain disengaged.

c) The cycle of lifting and lowering shall be kept continuous. This shall be done for 300 cycles.
d) Before test, the oil temperature shall be (65 ± 5)°C.

6.5.1 The data shall be recorded in **F-2**.

6.6 Seed cotton container dumping Test (If applicable)

This test shall be carried as under
a) The engine speed set at speed recommended for field operation.
b) This test is carried out using hydraulic system.
c) Use the control handle device to dump the seed cotton
d) The cycle of lifting and lowering shall be kept continuous. This shall be done for 300 cycles.
e) Before test, oil temperature shall be (65 ± 5)°C.

6.6.1 The data shall be recorded in **F-3**.

6.7 Moistening and Flushing Test

This test shall be carried out as under:
a) The engine speed set at speed recommended for field operation
b) Use the control handle device to actuate moistener flush system
c) Flush the system for 1 or 2 min and repeat the same 20 times .

6.7.1 The data shall be recorded in **F-4**.

6.8 Noise Level Measurements

6.8.1 The picker shall be operated at the recommended travel speed at full accelerator. All mechanisms in the picker shall be in working position. The picking unit shall be up to 150 mm above the ground level. The noise measurement at by-stander's position and driver's ear level shall be conducted in accordance with IS 12180 and data shall be recorded in proforma given in Annex G.

6.9 Vibration Measurement

6.9.1 The vibration measurement shall be made in accordance to IS 13548 The amplitude of mechanical vibration of those assemblies and components of the picker which are functionally important shall be measured with the help of suitable vibration measuring device. The picker shall be parked on level concrete surface.

6.9.2 The observations shall be recorded when the picker sub-assemblies are operating at no load engine speed recommended for field work. The inflation pressure in the tires shall be the same as recommended by the manufacturer for field operation. The picking unit shall be up to 150 mm above the ground level. The maximum horizontal displacement (HD) and vertical displacement (VD) due to vibration shall be measured by mounting the measuring device in related position and expressed in microns.

6.9.3 The vibration measurement shall be made and recorded in the points and the components as given in **F-5**.

6.10 Operator's Field of Vision

This test shall be carried out in accordance with IS 11442. During the test the picking unit and other system shall remain attached. The picking unit shall be up to 150 mm above the ground level.

6.10.1 The data shall be recorded in **F-6**.

6.11 Brake Performance Test (If applicable)

The cold and hot brake test shall be conducted in accordance with IS 12061 in a condition recommended for road transport.

6.11.1 *Parking Brake Test* (If applicable)
The parking brake test shall be conducted in accordance to IS 12061. The force, necessary to apply at the control of the parking braking device to hold the picker stationary when facing up and down on 12 % gradient in a condition recommended for road transport, shall be measured. The maximum actuating force shall not be more than 400 N for hand operated and 600 N for foot operated parking brake device.

6.11.2 The data shall be recorded in **F-7**.

6.12 Air Cleaner Oil Pull-Over Test

The test shall be carried out in accordance with **8** of IS 5994 in following conditions:
a) Picker parked in horizontal level position,
b) Picker tilted 10° to either side, and
c) Picker tilted 10° to forward and backward in relation to the direction of travel of the picker.

6.12.1 The data shall be recorded in the format given in Annex D of IS 5994.

6.13 Turning Ability Test

The test shall be carried out in accordance to IS 11859. During the test the picking unit shall remain attached and the picking unit shall be up to 150 mm above the ground level.

6.13.1 The data shall be recorded in **F-8**.

6.14 Position of Centre of Gravity

The test shall be conducted in accordance with IS 10743. However, during the test the Seed cotton container shall be fully filled with seed cotton, picking assembly fully raised.

6.14.1 The data shall be recorded in **F-9.**

6.15 Components/Assembly Inspection

The engine, transmission, brakes, front axle, starter motor, dynamo and other critical components (chain sprocket and belts, bearings, hydraulic pumps and cylinders) as may be decided by the testing authority, shall be partially dismantled after conducting all tests including field tests. The observations listed under **10.1.1** to **10.1.11** of IS 5994 shall be made and reported in the format given in Annex F of IS 5994.

7 FIELD TESTS

7.1 Field and Crop Conditions

The picker shall be operated and the field condition preferably meeting the requirements of **5.2.3.12** of Test Code for Cotton Picker Part 1 Terminology (*to be published*) for a minimum of 100 h.

NOTES
1. As far as possible, attempts should be made to complete the test in one year.
2. However part of work/test may be carried over to the following year if required range of conditions cannot be obtained in a single season.

7.1.1 In addition, picking shall also be carried out under following conditions, if such conditions exist in the field:

a) Weedy crops on rough hard ground and under soft ground condition (type of weed and weed intensity should also be reported);
b) Surfaces have pronounced ridges and furrows or similar undulations (height of bunds and ridges, their spacing and size should also be reported); and
c) Field having a slope of 5 % maximum.

7.2 General Condition for Operation

a) The picker shall be operated by an experienced operator. The applicant or his representative shall demonstrate the operation of the picker to the testing authority in actual field condition.
b) The testing shall not be carried out until the testing authority is satisfied that the machine is operating correctly.
c) Before starting the test, the picker shall be adjusted as per manufacturer's recommendations. This adjustment may be modified to obtain the highest possible output consistent with percentage of losses regarded as reasonable by the testing authority and the applicant's representative. Performance values obtained during preliminary adjustment need not be reported.
d) The picker may be adjusted for operational adjustments between successive test runs in order to maintain optimum performance at varying speeds. Manufacturer's recommendations for various adjustments shall be followed.
e) Some recommendations for better performance are given in Annex H.

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7.3 Field Operation

7.3.1 *Picking Efficiency Test*

7.3.1.1 The area from where the sample is to be collected shall preferably be 3 m to 5 m in direction of travel. Clear approximately 30 cm of row (plants) on both ends of test plot to isolate test plot Clean all debris from ground on both sides of test plot row within the marked area without undue vibrating the plants.

7.3.1.2 Remove bolls that cannot be picked (i.e. green bolls, immature bolls, and low bolls).

7.3.1.3 Count the number of bolls remaining in the plot. Enter this value in Annex K-1.

7.3.1.4 Collect 25-30 matured bolls from neighboring rows and count the total number of seeds from it. Enter this value in Annex K-1 to find out the average seeds per boll.

7.3.1.5 Make one last inspection of machine/row unit. Verify stain is off spindles. Flush if necessary.

7.3.1.6 Operate machine through test plot.

7.3.1.7 Remove any cotton left on plant and count the number of seeds. Enter this value in Annex K-1 to find out plant loss.

7.3.1.8 Remove any cotton left on ground and count the number of seeds. Enter this value in Annex K-1 to find out ground loss.

7.3.1.9 Calculate both Plant and Ground Loss. Add both plant and ground loss for Total Loss. Efficiency is expressed as percentage of Cotton removed (100 - Total Loss in percentage = Efficiency in percentage). Enter this value in Annex K-1.

7.3.1.10 The picker should be operated for at least 8 -10 m before recording the data to ensure uniform speed.

7.3.2 *Productivity Test*

7.3.2.1 Signals shall be given at the start and at the end of the test run to determine the time taken by the machine to cover the test run.

7.3.2.2 In each field the test shall be carried out at the same forward speed as used in the preliminary adjustment.

7.3.2.3 No change in the forward speed adjusted before the test and any stoppage during the test run shall be permitted. If this happens because of some unavoidable circumstances the test observations shall be repeated.

7.3.2.4 During and after the test run, the observations shall be recorded in Annex J.

7.3.2.5 From the observations made under Annex K-1 and Annex J, the following shall be calculated and the data should be recorded in Annex K-2.

a) Rate of work in ha/h;
b) Net seed cotton output in kg/h and kg/ha;
c) Trash (%).

7.3.3 *Test under difficult conditions*
If facilities exist, picker shall be operated in at least one test run under the conditions given in 7.1.1.

7.4 The picker shall be operated continuously for a minimum of 10 h duration. The behavior of various functional components of the picker shall be recorded.

7.4.1 During and after the operation, following observations shall be recorded:

a) Area covered;
b) Time of operation;
c) Time lost in turning (this may be recorded for at least one hour operation);
d) Time required to fill the Seed cotton container;
e) Time required to empty the Seed cotton container;
f) Fuel consumed;
g) Lubricating oil/grease consumed;
h) Coolant (water) consumed;
i) Operating speed;
j) Time for any stoppage;
k) Accessibility of controls;
l) No load and on load engine speed; and
m) Maximum temperature of engine oil/coolant, and ambient.
n) Spindle lubricant (grease) consumed
p) Spindle cleaner consumed

7.4.2 Following additional observations shall also be made and recorded.

7.4.2.1 *Night observations* (If applicable)
A night trial lasting for minimum of two hours shall be conducted to assess the intensity and suitability of the lighting equipment for the night work.

7.4.2.2 *Ease of operation and handling*
Observations shall be made on skill and intensity of effort required to operate various controls of the machine. Adequacy of accessibility of controls and visibility of the picking unit and instrumentation shall also be recorded. The note on operator's working condition, the ease of setting adjustment, routine maintenance and other similar features shall also be made.

7.4.2.3 *Soundness of construction*

Observations shall be made of these features which adversely affect the operation and efficiency of machine in the field. All the breakdowns and defects occurring during the course of field evaluation period shall be recorded. The modification which could bring about improvement in the quality of rate of work shall also be noted.

ANNEX A
(*Clause* **2**)

LIST OF REFERRED INDIAN STANDARDS

IS No	*Title*
4905 :1968	Methods for random sampling
5994 : 1998	Agricultural tractors - Test code (*third revision*)
8132 : 1999	Tractors and machinery for agriculture and forestry, Powered Lawn and Garden Equipment - Operator's manuals - Contents and presentations (*second revision*)
10743 : 1983	Method for determination of Centre of Gravity of Agricultural Tractors
11442 : 1996	Agricultural tractors - Operator's field of Vision - Test Procedures (first revision)
11859 : 2004	Agricultural tractors - Turning and clearance diameters - Methods of tests
12036 : 1995	Method of test for power take-off and belt pulley performance of agricultural tractors
12061 : 1994	Test code for method for braking performance test for agricultural tractors
12180 : 1987	Method for noise measurement of agricultural tractors
12226 : 1995	Agricultural tractors — Power tests for drawbar — Test procedure
12239 : 1996 (Part 1)	Guide for Safety and Comfort of Operator of Agricultural Tractors and Power Tillers – Part 1 : General Requirements
13548 : 1992	Agricultural Wheeled Tractors and Field Machinery – Measurement of Whole-body Vibration of the Operator
14683 : 1999	Agricultural Tractors and Machinery - Lighting Devices for Travel on Public roads

ANNEX B
(*Clauses* **4.1***and* **6.1**)

SPECIFICATION SHEET FOR COTTON PICKER

B-1 GENERAL

a) Name and address of manufacturer
b) Make
c) Model
d) Type
e) Year of manufacture
f) Serial number

B-2 PRIME MOVER

B-2.1 General
a) Make
b) Model
c) Type
d) Serial number
e) Engine speed (Manufacturer's recommended setting) (rpm)
    1) Maximum speed at no load
    2) Rated speed
    3) Low idle speed
f) Location
g) Mounting
j) Safety

B-2.2 Cylinder and Cylinder Head
a) Number
b) Disposition
c) Bore/Stroke (mm)
d) Capacity as specified by the applicant (cu.cm)
e) Compression ratio
f) Type of cylinder head
g) Type of cylinder liners
h) Arrangement of valves
j) Type of combustion chamber
k) Valve clearance in cold/hot (mm)
    1) Inlet valve
    2) Exhaust valve

B-2.3 Fuel System

B-2.3.1 *Type of Fuel System*

B-2.3.2 *Fuel Tank*

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a) Capacity (l)
b) Location
c) Provision for draining of sediments/water

B-2.3.3 *Fuel Feed Pump*
a) Type
b) Make
c) Model
d) Provision of sediment bowl

B-2.3.4 *Fuel Filters*
a) Make
b) Model
c) Number
d) Type of elements
e) Capacity of final stage filter (l)

B-2.3.5 *Injection Pump*
a) Make
b) Model
c) Type
d) Sl No.
e) Method of drive

B-2.3.6 *Fuel Injectors*
a) Make
b) Model
c) Type
d) Manufacturer's production pressure setting, MPa
e) Injection timing
f) Firing order

B-2.4 Governor
a) Make
b) Model
c) Type
d) Governed range of engine speed (rpm)
e) Rated engine speed (rpm)

B-2.5 Pre-cleaner
a) Make
b) Type
c) Number
d) Location
e) Height of pre-cleaner top above ground level (mm)

B-2.6 Air Cleaner
a) Make

b) Type
c) Number
d) Location
e) Size of dry filter element ID/OD Length
f) Range of suction pressure, kPa (mm of Hg)
g) Oil capacity (l)
h) Oil change period

B-2.7 Exhaust
a) Type of silencer
b) Position of silencer outlet
c) Range of exhaust gas pressure kPa (mm of Hg)
d) Provision of spark arresting device

B-2.8 Lubricating System

B-2.8.1 *Type*

B-2.8.2 *Filters*
a) Type
b) Number
c) Oil sump capacity (l)
d) Oil change period

B.2.8.3 *Pump*
a) Type
b) Method of drive
c) Pressure release setting kPa (kgf/sq.cm)
d) Minimum permissible pressure, kPa (kgf/sq.cm)
e) Method of oil cooling

B-2.9 Details of Heat Exchanger

a) Type
b) Make
c) Model
d) Number of tubes
e) Size of tube (mm)
f) Capacity (l)
    1) Oil
    2) Water

B-2.10 Cooling System

B-2.10.1 General
a) Type
b) Details of pump

c) Details of fan
d) Means of temperature control

B-2.10.2 *Radiator*
a) Effective size of radiator (mm):
b) Number of tubes
c) Type of radiator grill
d) Means of grill cleaning
e) Method of mounting
f) Type of radiator cap
g) Radiator cap pressure kPa (kgf/sq.cm)
h) Bare radiator capacity (l)
j) Total coolant capacity (l)

B-2.11 Starting System

a) Type
b) Aid for cold starting
c) Any other device provided for easy starting

B-2.12 Electrical System

B-2.12.1 *Battery*
a) Make
b) Number and type
c) Capacity and rating
d) Location

B-2.12.2 *Starter*
a) Make
b) Model
c) Type
d) Capacity and rating

B-2.12.3 *Alternator*
a) Make
b) Model
c) Type
d) Output rating
e) Location
f) Method of drive

B-2.12.4 *Voltage Regulator*
a) Make
b) Type
c) Capacity

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B-2.12.5 *Detail of Lights* (as per IS 14683)

Description	Number and capacity of bulb	Height above ground to the centre beam (mm)	Size of Beam (mm)	Distance from centre of the beam to outside edge of picker (mm)
Head lights				
Front working light				
Centre working light				
Front side light				
Front side indicator light				
Tail light-cum-brake light				
Rear side indicator light for unloading				
Rear work light				
Engine inspection light				
Side inspection light				
Flasher light (Red)				
Dash board light				
Main switch details				
Light switch details				

B-2.12.6 *Horn*
a) Make
b) Type
c) Location

B-2.12.7 *Fuse Box*

B-2.12.8 *Details of Other Electrical Accessories*

B-2.13 Operational Mass of Prime mover (kg)

B-3 PICKER

B-3.1 Wheel Equipments

B-3.1.1 *Driving Wheels*
a) Make
b) Type
c) Location
d) Number and size
e) Track width (mm)

f) Recommended tire pressure, kPa

B-3.1.2 *Steering Wheel*
a) Make
b) Type
c) Location
d) Number and size
e) Track width (mm)
f) Recommended tire pressure, kPa

B-3.1.3 *Wheel Base* (mm)

B-3.2 Transmission System

B-3.2.1 *Clutch*
a) Make
b) Type
c) Size (mm)
d) Number of friction discs
e) Location
f) Method of operation

B-3.2.2 *Gear Box and Differential*
a) Make
b) Type
c) Location
d) Number of speed
e) Method of drive
f) Method of gear shifting
g) Oil capacity (l)
h) Oil changing period

B-3.2.3 *Final Drive*
a) Type
b) Reduction ratio
c) Location
d) Oil capacity (l)
e) Oil changing period

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B-3.2.4 *Nominal Speed*

Movement	Gear No	No. of engine revolutions for one revolution of driving wheel	Nominal speed at rated engine speed when fitted with size____ tire at an inflation pressure of ____ kpa and rolling radius of ____ mm (kmph)
Forward	1		
	2		
	3		
Reverse	R		
	1		
	2		
	3		

B-3.3 Brakes

B-3.3.1 *Service Brake*
a) Make
b) Type
c) Location
d) Area of liners (sq.cm)
e) Thickness of liner (mm)
f) Method of operation

B-3.3.2 *Parking Brake*
a) Make
b) Type and location
c) Method of operation

B-3.4 Steering System
a) Make and model
b) Type
c) Method of operation
d) Diameter of steering control wheel (mm)
e) Location

B-3.5 Hydraulic System

B-3.5.1 *Pump*
a) Type
b) Make
c) Model
d) Number
e) Method of operation
f) Location

B-3.5.2 *Hydraulic Tank*
a) Type
b) Location
c) Size (mm)
d) Capacity (l)
e) Oil change period (h)
f) Number and type of oil filters

B-3.5.3 *Hydraulic Oil Cooler*
a) Type
b) Make
c) Model
d) Location
e) Number of tubes
f) Size of tube (mm)
g) Capacity (l)

B-3.5.4 *Number and location of Hydraulic Cylinders*

B-3.6 Row Units
a) Number of Rows
b) Recommended row Spacing
c) Method of adjustment of row spacing

B-3.6.1 Picking Units
a) Units Available
b) No of Drums per unit
c) Speed of Drum corresponding to rated engine speed (rpm)
d) No of Bars per Drum
e) Speed of Bars corresponding to rated engine speed (rpm)
f) No of Spindles per Bar
g) Speed of spindles corresponding to rated engine speed (rpm)
h) Arrangement for raising and lowering the picking unit
j) Arrangement for tilting the picking unit
k) Type of picking unit drive
l) Safety arrangement if any

B-3.6.2 Doffer Assembly
a) Type
b) No of doffer columns per drum
c) No of doffers per column
d) Speed of operation corresponding to rated engine speed (rpm)
e) Safety arrangement, if any

B-3.6.3 Pressure plates
a) Type

b) Pressure plate clearance range
c) Method of operation
d) Location
e) Safety arrangements

B-3.6.4 Moistening column
a) Type
b) No of moistening columns per drum
c) Type of spray head
d) No of moistener pads per column

B-3.7 Moistener System
a) Make
b) Location
c) Solution tank capacity (l)
d) Solution pressure
e) Water Pump
    1) Type
    2) Make
    3) Model
    4) Number
    5) Method of operation
    6) Location

B-3.8 Arrangement for Locking the Picker unit in Raised Position

B-3.9 Blower
a) Dia (mm)
b) Effective width (mm)
c) Number and type of blade
d) Size of blade (mm)
    1) Length
    2) Width
e) Type of drive
f) Speed corresponding to rated engine speed for field work (rpm)
    1) Minimum
    2) Maximum

B-3.10 Seed cotton container
a) Location
b) Capacity
    1) Volume basis (cu.m)
    2) Mass (Seed Cotton) basis (kg)
c) Size of Seed cotton container opening at dumping (mm)
d) Dumping height (mm)
e) Type of drive
f) Safety device

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B-4 SAFETY DEVICES PROVIDED ON THE MACHINE

B-5 OPERATING CONTROLS, GAUGES AND INSTRUMENTS

B-5.1 On the Panel Board

B-5.2 Controls on RHS of the Operator

B-5.3 Controls on LHS of the Operator

B-6 OPERATOR'S SEAT

a) Make
b) Type
c) Type of suspension
d) Type of dampening
e) Longitudinal adjustment (mm)
f) Adjustment of back rest

B-7 HELPER'S SEAT

a) Make
b) Type
c) Adjustments
d) Location

B-8 CANOPY

a) Type
b) Size (mm)
c) Height from operator's platform (mm)

B-9 OVERALL DIMENSIONS OF COTTON PICKER (MM)

B-9.1 In working position

a) Length
b) Width
c) Height

B-9.2 In transport position

a) Length
b) Width
c) Height

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B-10 MASS
It is the mass of cotton picker with coolant, fuel, lubricants (full) and 75 kg mass on the operator's seat

B-10.1 Without seed cotton in the Seed cotton container
1) Total
2) Front
3) Rear

B-10.2 With seed cotton in the Seed cotton container
1) Total
2) Front
3) Rear

B-11 MINIMUM GROUND CLEARANCE (mm)

B-12 TOTAL NUMBER OF LUBRICATING POINTS

a) Greasing
b) Oiling

B-13 COLOUR OF PICKER

B-14 DETAILS OF STANDARD ACCESSORIES AVAILABLE WITH THE PICKER

B-14.1 Standard Accessories

B-14.2 Optional Accessories

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ANNEX C
(Clause 4.3)

RANDOM SELECTION OF COTTON PICKER FOR COMMERCIAL TESTTNG

C-1 DATE OF SELECTION

C-2 PLACE

C-3 SELECTED BY

C-4 DESIGNATION

C-5 Picker selected out of ___ Nos. of Picker

Picker bearing Sl No. ___

C-6 OBSERVATION ON COTTON PICKER SELECTED

Sl No.	Component	Make	Model/ Size	Serial No
1	Cotton Picker			
2	Engine			
3	F.I. pump			
4	Governor			
5	Gear box			
6	Hydraulic pump			
7	Self starter			
8	Generator/alternator			
9	Front tires			
	i) L.H.			
	ii) R.H.			
10	Rear Tires			
	i) L.H.			
	ii) R.H			
11	Trailer tires			
	i) L.H.			
	ii) R.H			
12	Engine hour meter reading :___ h.			

C-7 COTTON PICKER ASSEMBLY TO BE SEALED

1) Tappet cover	Yes/No
2) Fuel injection pump coupling, mounting bolts	Yes/No
3) F.I. Pump and governor screw	Yes/No
4) Injectors	Yes/No
5) Engine sump	Yes/No
6) Engine bell housing	Yes/No

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7) Starter motor	Yes/No
8) Dynamo	Yes/No
9) Hydraulic pump - Nos. (One/Two)	Yes/No
10) Gear box front cover	Yes/No
11) Final drive assembly, LHS and RHS	Yes/No
12) Rear wheel axle	Yes/No
13) Picker Unit	Yes/No
14) Blower assembly	Yes/No
15) Any other component/assembly (Please specify)	Yes/No

ANNEX D
(Clause 6.2)

D-1 DATA SHEET FOR MATERIAL OF CONSTRUCTION

Sl. No	Elements of composition	Spindle (%)	Any other part
1	Carbon		
2	Manganese		
3	Phosphorus		
4	Sulphur		
5	Silicon		
6	Copper		
7	Nickel		
8	Chromium		
9	Tin		
10	Molybdenum		

D-2 Hardness of Spindle (HRC)

a) Hardened zone
   1) Minimum
   2) Maximum

b) Remainder zone
   1) Minimum
   2) Maximum

ANNEX E
(Clause 6.3)

DATA SHEET FOR VISUAL OBSERVATIONS AND PROVISION FOR ADJUSTMENTS

E-1 OBSERVATIONS

a) Adequacy of marking of inlets and outlets
b) Adequacy of protection of bearing against the ingress of dust
c) Adequacy of safety arrangements, especially at moving points
d) Provision of lubrication of moving parts
e) Provision for easy changing of components requiring frequent replacement
f) Provision for easy replacement and cleaning of spindles
g) Tightness of bolts and nuts and other fasteners
h) Provision of belt tightening
j) Other observations

E-2 PROVISION FOR ADJUSTMENTS

a) Picking unit tilting
b) Moistener Columns height
c) Moistener Columns position
d) Doffer Height
e) Doffer column Height
f) Doffer column Tilt
g) Pressure Plate Clearance
h) Pressure Plate Spring Tension
j) Setting Automatic Height Control
k) Setting for wheel spacing
l) Belt Tensions
m) Stalklifters
n) Grid bars
p) Moistener system pressure
q) Plant guides

Testing Engineer

ANNEX F

(*Clauses 6.4.3, 6.5.1, 6.6.1, 6.7.1, 6.9.3, 6.10.1, 6.11.2, 6.13.1 and 6.14.1*)

DATA SHEET FOR LABORATORY TESTS

F-1 POWER TEST

a) Date and place of test
b) Type of dynamometer used
c) Fuel used:
    i) Type
    ii) Density at 15°C
d) Engine oil used:
    i) Type
    ii) Grade
e) Transmission oil used
f) No load maximum engine speed, rev/min
g) Engine oil consumption during rating test in kg/h under high ambient conditions
h) Engine performance test data sheet given in **F-10**

F-2 PICKING UNIT LIFTING TEST

a) Date of test
b) Make and model of picker
c) Operating condition
d) Temperature of hydraulic fluid after each 50 cycles
e) Hydraulic oil leakage from any point
f) Abnormality, if any
g) Any other

F-3 Seed cotton container DUMPING TEST

a) Date of test
b) Make and model of picker
c) Operating condition
d) Temperature of hydraulic fluid after each 50 cycles
e) Hydraulic oil leakage from any point
f) Abnormality, if any
g) Any other

F-4 MOISTENING AND FLUSHING TEST

a) Date of test
b) Make and model of picker
c) Operating condition
d) Flow of solution after each 5 cycles

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e) Abnormality, if any
f) Any other

F-5 VIBRATION MEASUREMENT

a) Date and location of test
b) Type of accelerometer
c) Test data:

Sl. No	*Measuring Points*	*Vibration Microns Picker Parked* HD	VD
i)	Foot rest, left		
ii)	Foot rest, right		
iii)	Gear shifting lever		
iv)	Picker control handle		
v)	Brake pedal, left		
vi)	Brake pedal, right		
vii)	Hydraulic lever for platform		
viii)	Clutch pedal		
ix)	Steering control wheel		
x)	Seat back, bottom		
xi)	Accelerator lever		
xii)	Cabin		
xiii)	Door hand (cabin)		
xiv)	Head lights		
xv)	Back lights		
xvi)	Parking lights		
xvii)	Signal lights		
xviii)	Any other control lever		

F-6 OPERATOR'S FIELD OF VISION

a) Non-visible space in front ____ m and____ times the wheel base of picker.
b) Non-visible space on left side ___ m and _____ times the track of picker.
c) Non-visible space on right side___ m and ___ times the track of picker.
d) List of major components creating obstruction

F-7 BRAKE TEST

F-7.1 Data Sheet (Service Brake Performance Test):

a) Make and model of picker
b) Tire inflation pressure (kPa) :
    i) Drive wheel:
    ii) Steering wheel:
c) Picker mass (kg)

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d) Type of test
e) Method of heating the service: Self braking brake
f) Travel speed before application of brakes (km/h) :
g) Force required to achieve 2.5 m/s/s deceleration (N) :

Test Data

Sl No	Observation	1	2	3
i	Force on brake pedal (N)			
ii	Mean deceleration (m/s/s)			
iii	Stopping distance (m)			

F-7.2 Parking Braking Device Test

Picker Mass: Refer above

Test Observations

Observations	*12 % Slope*	
	Parking Braking Device Facing up Slope	Parking Braking Device Facing Down Slope
Parking device control force (kgf/N) Whether rolling of braking wheels noticed	Yes/No	Yes/No
Efficacy of brakes		

F-8 TURNING ABILITY

a) Details of wheels equipment:
b) Wheel track, mm
    i) Drive wheel
    ii) Steering wheel
c) Size and pressure of tires:
    i) Drive wheel
    ii) Steering wheel
d) Type of drive:
    i) 2 wheel
    ii) 4 wheel
e) Wheel base, mm
f) Test data

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Description	*Minimum Turning Diameter*		*Minimum Turning Space Diameter*	
	Right Hand, m	Left Hand, m	Right Hand, m	Left Hand, m
With brakes applied				
With brakes released				

F-9 LOCATION OF CENTRE OF GRAVITY

a) Height above ground, mm.
b) Forward distance from the vertical plane containing the axis of the rear wheels, mm.
c) Distance from the median plane parallel to the longitudinal axis of picker bisecting the driving wheel track, mm.

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F-10 ENGINE PERFORMANCE TEST
Data Sheet

Brake Power kW (Ps)	Crank *Shaft Torque* N-m (kgf-m)	*Engine Speed* (rpm)	*Fuel Consumption*		*Specific Energy* kWh/l (bhph/l)	*Temperature °C*				*Pressure*			*Atmospheric Condition*		
			Hourly kg/h (l/h)	Specific kg/kWh (kg/bhph)		Engine Oil	Coolant (water)	Exaust Gas	Intake Air	Intake Air kPa (mm of Hg)	Exhaust Gas kPa (mm of Hg)	Lub Oil kPa (kgf/sq.cm)	Temp. deg. (C)	R.H. (%)	Pressure kPa (mm of Hg)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
TEST –A Varying speed test **a) Maximum power and fuel consumption**															
b) Power at rated engine speed															
c) Maximum torque															
TEST – B Maximum power — 2 hours															
TEST – C) Part loads: at full throttle: **i) Torque corresponding to maximum power**															
ii) 85% of the torque obtained at maximum power															
iii) 75% of the torque defined in (i)															
iv) 50% of the torque defined in (i)															
v) 25% of the torque defined in (i)															
vi) Minimum load:															
TEST – D) Part loads: at part throttle setting (no load rpm corresponding to the speed recommended for field work (rpm) **i) Torque corresponding to maximum power**															

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ii) 85% of the torque obtained at maximum power															
iii) 75% of the torque defined in (i)															
iv) 50% of the torque defined in (i)															
v) 25% of the torque defined in (i)															
vi) Minimum load:															
Five hours rating test **1) At load corresponding to 90% of maximum power**															
2) At load corresponding to maximum power during fifth hour															

ANNEX G
(Clause 6.8)
DATA SHEET FOR NOISE MEASUREMENT

G-1 AT DRIVER'S EAR LEVEL

G-1.1 Brief Description of the Silencing System:

G-1.2 Background Noise Level:

G-1.3 Detail of the Test Site:

G-1.4 Type of Sound Level Meter:

G-1.5 Type of Octave Filter and Frequency Analyser, if used:

G-1.6 Date of Test:

G-1.7 Atmospheric Conditions

a) Temperature, °C
b) Pressure, kPa
c) Relative humidity, %

G-1.8 Test Data

Sl. No	Gear Used	Travelling Speed Km/h	Sound Level	
			dB	Sones

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G-2 AT BYSTANDER'S POSITION

G-2.1 Brief Description of the Silencing System:

G-2.2 Background Noise Level:

G-2.3 Detail of the Test Site:

G-2.4 Type of Sound Level Meter:

G-2.5 Type of Octave Filter and Frequency Analyser, if used:

G-2.6 Date of Test:

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G-2.7 Atmospheric Conditions

a) Temperature, °C

b) Pressure, kPa

c) Relative humidity, %

G-2.8 Test Data

Sl. No	Gear Used	Travelling Speed Km/h	Sound Level	
			dB	Sones

Testing Engineer

ANNEX H
(Clause 7.2)

RECOMMENDATIONS FOR PICKER PERFORMANCE

H-1 PICKER ADJUSTMENT

Consult the operator manual for machine set up

H-1.1 Forward Speed

Speed range should be as per manufacturer's recommendation.

H-1.2 Picking Unit Adjustment

The horizontal positioning should be such that the height sensing shoes just contact the ground surface.

H-2 CROP CONDITIONS

H-2.1 Ensure proper defoliation before the picking of cotton

H-2.2 Ensure manufacturer's recommendation head land availability for turning of picker

ANNEX J
(Clause 7.3.2.4)
DATA SHEET FOR FIELD TESTING

J-1 FIELD CONDITIONS

a) Topography such as sloped / level / uneven
b) Surface conditions
c) Type of soil
d) Frequency and size of bunds
e) Weed type and its extent (space / average / dense)
f) Size of field
g) Shape of field

J-2 CROP CONDITIONS

a) Weeds present
b) Height of cotton plant
c) Width of cotton plant
d) Cotton variety
e) Type of irrigation
f) Row to row spacing
g) Plant to plant spacing

J-3 BRIEF SPECIFICATION OF COTTON PICKER

J-4 PERFORMANCE OF PICKER

a) Steering (easiness)
b) Whether engine stalls at momentary overloads
c) Can the picking unit be adjusted from operators seat
d) Stability of picker
e) Effectiveness of different systems
f) Effectiveness of defoliation
g) Defects and breakdown, if any
h) Accessibility of control
j) Presence of undue knocking or rattling sound
k) Any marked vibration
l) Slippage of belts
m) Smooth running of shaft in their bearing clogging in
n) Turning space required
p) Wheel sinking
q) Safety and comfort for operator
r) Seed cotton container capacity (kg):

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J-5 ANY OTHER DETAIL:

J-6 AREA COVERED

Observations made by :
Recorded by :
Signature :

Checked by :
Signature :
Date :

J-7 DATA SHEET FOR FIELD TEST

Date: Gear used:
Place of test: Cotton Variety:
Time of start: Time of end: Picker: Model: Height of plant
Supervisor: Operator: Tractor: H.P. : Boll Moisture

A) Data Table J-7-1

Sl No	Time	Time taken to full the Seed cotton cont-ainer	Hour of Day	Humidity (RH %)	Temperature				Atmos-pheric Pres-sure (mm of Hg)
					Fuel ºC	Eng. ºC	Coolant ºC	Trans. ºC	
1									
2									
Average									

B) Data Table J-7-2: Observations

Sl No	Observation	Value
1	Engine speed (No load)	rpm
2	Engine speed (On load)	rpm
3	Forward speed	kmph
4	Duration of test	h
5	Total time stopped	h

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6	Net time	h
7	Average time loss at corners	h
8	Fuel consumption a) Per hour b) Per hectare	l l
9	Time required per ha	h
10	Average No. of bolls/plant	
11	Number of plants/Area	
12	Lubricating oil consumed	l
13	Coolant (water) consumed	l
14	Spindle lubricant (grease) consumed	kg
15	Spindle cleaner consumed	l
16	Time required to fill the Seed cotton container	h
17	Time required to unload the seed cotton	s
18	Number of persons required for handling cotton picker	

C) Data Table J-7-3: Instances observations, if any

Time (min/ sec)	Hour meter reading	Instance	Cause

ANNEX K-1
Picking Efficiency Data Sheet
(Clauses 7.3.1.3, 7.3.1.4, 7.3.1.7, 7.3.1.8, and 7.3.1.9)

Plot No	Total Seeds in 25 Bolls				Avg. Seeds Per Boll		No Of Bolls Per Plot		No of Seeds Per Plot	Plant Loss Seeds		No of Seeds Per Plot		Plant Loss Percent	Ground Loss Seeds		No of Seeds Per Plot		Ground Loss Percent	Total Efficiency
		/	25	=		X		=			/		=			/		=		
		/	25	=		X		=			/		=			/		=		

ANNEX K-2
Field Test Analysis Data Sheet
(Clause 7.3.2.5)

Test No	Date of Test	Duration of Test (h)	Travel Speed (kmph)	Rate of Work			Trash contents (%)
				Plot Area Covered (ha/h)	Seed Cotton Output (kg/h)	Seed Cotton Output (kg/ha)	