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"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड़ नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 5994 : 1998

Indian Standard

AGRICULTURAL TRACTORS — TEST CODE

( Third Revision )

ICS  65.060.10

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

September 1998

Price Group  7
FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Agricultural Tractors and Power Tiller Sectional Committee had been approved by the Food and Agriculture Division Council.

Agricultural tractors are being increasingly used for mechanizing agricultural operations and the tractor industry has developed as one of the major engineering industries in the country. The increase in the manufacture and use of tractors has necessitated application of standardized tests for evaluation of their performance on a uniform and rationalized basis.

This standard was originally published in 1970. On the basis of experience gained in testing of tractors, it was revised in 1979 and 1987. This standard is revised again to incorporate various modifications suggested by testing authorities and aligning various other requirements with ISO/OECD test code.

In the preparation of this standard assistance has been derived from the following:

- Test procedure followed at Central Farm Machinery Training and Testing Institute (Ministry of Agriculture), Budni

In reporting the result of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (revised).'
Indian Standard

AGRICULTURAL TRACTORS — TEST CODE

(Third Revision)

1 SCOPE

This standard covers the terminology, general guidelines and tests to be conducted on agricultural tractors. The standard also covers methodology for testing of air cleaner oil pullover, vibration and inspection of components/assemblies.

2 REFERENCES

The Indian Standards listed in Annex A contain provisions which through reference in this text, constitute provision 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.

3 TERMINOLOGY

For the purpose of this standard, the following definitions in addition to those given in IS 9939 shall apply.

3.1 Drawbar Power

(see 3.4 of IS 12226)

3.2 Maximum Drawbar Pull

(see 3.5 of IS 12226)

3.3 Tyre Rolling Radius

The effective radius corresponding to the average distance travelled by the tractor in one rotation of the driving wheels (that is, this distance divided by 2π). When the tractor is driven without drawbar load at a speed of approximately 2 km/h.

3.4 Confidential Test

The tests conducted for providing confidential information on the performance of tractors whether ready for commercial production or not, or to provide any special data that may be required by the manufacturer/applicant.

3.5 Commercial Test

The tests conducted for establishing performance characteristics of tractors that are ready for commercial production or already in production.

3.5.1 Initial Commercial Test

The tests conducted on indigenous or imported prototype of tractor ready for commercial production.

3.5.2 Batch Test

The tests conducted on tractors which have already undergone initial commercial test and/or being manufactured commercially in the country.

4 GENERAL GUIDELINES

4.1 Specification Sheet

The tractor manufacturer/applicant shall supply the specification of the tractor consisting of the items listed in the specimen report given in Annex B, as well as any other information required by the testing authority to carry out the tests. The manufacturer/applicant should also supply all literature, operational, maintenance and service manual, and parts catalogues.

4.2 Conditions for Checking of Dimensions

4.2.1 The tractor shall be without any wear on tyres and placed on a firm horizontal surface.

4.2.2 Unless otherwise stated by the manufacturer/applicant, the tractor shall be stationary with its wheels and components in the positions they would be, if the tractor was travelling in a straight line.

4.2.3 The pressure in pneumatic tyres shall be adjusted to the value recommended by the tractor manufacturer for field work.

4.3 Selection

The tractor, if under production, should be selected at random (see IS 4905) from the production line complete with its standard accessories and in a condition as generally offered for sale. The tractor shall be new and should not be given any special treatment or preparation for test. The method of selection should be reported in the proforma given in Annex C.

4.4 Running-In

The manufacturer/applicant shall run-in the tractor before the test, under his responsibility and in accordance with his usual instructions. The running-in shall be carried out in collaboration with the testing
authority. If this procedure is impracticable due to the tractor being an imported model, the testing authority may itself run-in the tractor in accordance with the procedure prescribed or agreed to with the manufacturer/applicant.

4.4.1 The place and duration of the running-in shall be reported in the proforma given in Annex C.

4.5 Servicing and Preliminary Setting After Running-In

4.5.1 After completion of running-in, servicing and preliminary settings should be done according to the printed literature supplied by the manufacturer/applicant. The following may be carried out, wherever applicable:

a) Change of the engine oil;
b) Change of air cleaner oil (if provided with an oil-bath type air cleaner);
c) Change of hydraulic and transmission oil;
d) Change of oil, fuel and hydraulic oil filters;
e) Greasing/oiling of all the lubricating points;
f) Adjustment of valve clearance, injection pressure and checking of compression pressure without and with oil;
g) Tightening the nuts and bolts;
h) Checking and adjusting the tension of belts and chains;
j) Checking and adjustment of safety devices, if any; and
k) Any other checking or adjustment recommended by the manufacturer after the running-in period, and included in the printed literature of the tractor.

4.5.2 The manufacturer/applicant may make adjustments in fuel injection pump, governor, fuel injector and any other adjustments during the period the tractor is prepared for tests. These adjustments should conform to the values specified by the manufacturer/applicant for agricultural use in the printed literature/specification sheet. No adjustment shall be made, unless it is recommended in the literature. All the parts replaced shall be reported in the test report.

NOTE — Adjustment of fuel injection pumps except for low/high idling speed shall not be permitted under commercial test.

4.6 Ballasting

The ballast mass, which are commercially available and approved by the manufacturer for use in agriculture, may be fitted. For wheeled tractors, liquid ballast in the tyres may also be used. The overall static load on each tyre (including liquid ballast in the tyres and 75 kg mass added to the tractor to represent the driver), and the inflation pressures shall be within the limits specified by the tyre manufacturer or load limit of axle, whichever is lower. Measure inflation pressure with the tyre valve in the lowest position.

NOTE — In case of tractors provided with a device for transfer of implement load to tractor, the ballasting including weight transfer shall not exceed the load limits specified by the tractor/tyre manufacturer.

4.7 Repairs and Adjustments During Tests

All repairs and adjustments made during the tests shall be reported, together with comments on any practical defects or shortcomings in Annex C. This shall not include those maintenance jobs and adjustments which are performed in conformity with the manufacturer’s recommendations.

4.8 Fuel and Lubricants

Fuel and lubricants for the tests shall conform to 5.3 of IS 12226.

4.9 Auxiliary Equipments

For all power tests, accessories such as hydraulic lift pump or any other power consuming device like air compressor may be disconnected only if it is practicable for the operator to do so as a normal practice during work in accordance with the operator’s manual without using any tool. If not, they shall remain connected and operate at minimum load.

4.10 Fuel Consumption

The fuel measurement apparatus shall be so arranged that the fuel pressure at the fuel transfer pump is equivalent to that which exists when the tractor fuel tank is half full. The fuel temperature shall be comparable to that in the normal operation of the tractor when fuel is taken from the tractor fuel tank. Efforts shall be made to limit the temperature variations throughout the tests.

4.10.1 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.

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

5 MEASURING TOLERANCES

The measuring apparatus shall be such that the following items shall have the tolerances within the limits shown against each:

- a) Rotational speeds, rev/min ± 0.5 percent
- b) Time, s ± 0.2 s
- c) Distance, m or mm ± 0.5 percent
- d) Force, N and torque, N.m ± 1.0 percent
- e) Mass, kg ± 0.5 percent
- f) Atmospheric pressure, kPa ± 0.2 kPa
- g) Tyre pressure, kPa ± 5 percent

2
h) Hydraulic pressure, kPa ± 2.0 percent
j) Temperature of fuels, etc, °C ± 2°C
k) Wet and dry bulb thermometers, °C ± 0.5 °C
ii) Fuel consumption (overall for the apparatus used):  
   1) Drawbar test, kg ± 2.0 percent  
   2) PTO, belt and engine test, kg ± 1.0 percent

6 TESTS

Various tests to be conducted on an agricultural tractor are given in Table 1. The implementing authority shall decide about the tests and their frequency to be carried out during initial commercial and batch testing (see 3.5).

<table>
<thead>
<tr>
<th>No.</th>
<th>Tests</th>
<th>Ref to</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>Checking of the specification</td>
<td>See 7</td>
<td></td>
</tr>
<tr>
<td>ii)</td>
<td>PTO performance</td>
<td>IS 12036</td>
<td>To be conducted if desired by the manufacturer or PTO test has not been conducted</td>
</tr>
<tr>
<td>iii)</td>
<td>Belt-pulley performance</td>
<td>IS 12036</td>
<td></td>
</tr>
<tr>
<td>iv)</td>
<td>Drawbar performance</td>
<td>IS 12226</td>
<td></td>
</tr>
<tr>
<td>v)</td>
<td>Test for hydraulic power and lifting capacity</td>
<td>IS 12224</td>
<td></td>
</tr>
<tr>
<td>vi)</td>
<td>Turning ability</td>
<td>IS 11859</td>
<td></td>
</tr>
<tr>
<td>vii)</td>
<td>Centre of gravity</td>
<td>IS 10743</td>
<td></td>
</tr>
<tr>
<td>viii)</td>
<td>Operator’s field of vision</td>
<td>IS 11442</td>
<td></td>
</tr>
<tr>
<td>ix)</td>
<td>Brake test</td>
<td>IS 12061</td>
<td></td>
</tr>
<tr>
<td>x)</td>
<td>Test for air cleaner</td>
<td>See 8</td>
<td></td>
</tr>
<tr>
<td>xi)</td>
<td>Smoke measurement</td>
<td>IS 12062</td>
<td></td>
</tr>
</tbody>
</table>
| xii) | Noise measurement  
   a) At operator’s position | 3 of IS 12180 |         |
   b) At bystander position | 4 of IS 12180 |         |
| xiii) | Vibration measurement | See 9 |         |
| xiv) | Safety | 8 of IS 12239 (Part1) |         |
| xv) | Field test | 2 of IS 9253 |         |
| xvi) | Haulage test | 3 of IS 9257 |         |
| xvii) | Component/assembly inspection | See 10 |         |
| xviii) | Special characteristic | See 11 | If required by the manufacturer and with the mutual agreement of manufacturer and testing station |

7 CHECKING OF SPECIFICATIONS

7.1 The information given by the manufacturer/applicant in the specification sheet (see 4.1) shall be verified by the testing authority and reported. Details of the components and assemblies which do not conform to the relevant Indian Standards shall also be reported. The adequacy or otherwise of the literature shall be indicated.

7.2 While checking the dimensions, the conditions laid down in 4.2 shall be followed.

8 AIR CLEANER OIL PULL-OVER TEST

8.1 The tractor shall be parked on a level ground. The air-cleaner shall be cleaned and filled up to a level of 5 percent (on mass basis) over the specified level with an oil of viscosity recommended by the manufacturer. The engine shall then be operated at full governed speed for 15 minutes. This shall be followed by sudden accelerations and decelerations made after every 30 seconds for a period of 15 minutes. The air-cleaner assembly shall be weighed before and after the test. The loss of mass of oil, both in grams and in percentage of mass, shall be reported.

NOTE — Before starting the test, the engine shall be run for one hour.

8.1.1 The air cleaner Oil Pull-Over test shall be carried out in the following positions:
   a) In horizontal position.
   b) In the case of wheeled tractors, the tests shall be repeated with the tractor tilted 15° to either side and then 15° forward and backward in relation to the direction of travel of the tractor.
   c) In the case of crawler tractors, the forward and backward tilt shall be 30°.

8.2 The data shall be recorded in accordance with Annex D.

9 VIBRATION MEASUREMENT

9.1 The amplitude of mechanical vibration of these assemblies and components of the tractor, which are functionally important, shall be measured with the help of suitable vibration-measuring device.

9.2 The tractor shall be parked on a level concrete surface and operated at rated speed at no-load and at load corresponding to 85 percent of maximum PTO power. The maximum horizontal displacement (HD) and vertical displacement (VD) in microns shall be measured by mounting the measuring device in related positions. Inflation pressure of tyres shall be as given in 4.2.3.

9.3 The data shall be recorded in accordance with Annex E.

10 COMPONENT/ASSEMBLY INSPECTION

10.1 The engine, transmission, brakes, front axles, starter motor and dynamo shall be partially dismantled after conducting all the tests. The following measurement/observations shall be made and reported.
10.1.1 Cylinder Bore

The cylinder bore shall be measured on the thrust side and perpendicular to it at the top, middle and at the bottom position of the liner.

10.1.2 Piston Diameter

The piston diameter shall be measured on the thrust side and perpendicular to it at the top above the gudgeon pin and at the skirt.

10.1.3 Ring End Gap

The ring end gap for all compression and oil rings shall be measured at the top, middle and bottom position of the liner.

10.1.4 Ring Groove Clearance

The ring groove clearance shall be measured for all compression and oil rings.

10.1.5 Clearances of Main and Big End Bearing

The radial and axial clearance of main and big end bearings shall be measured. The radial clearance shall be measured after tightening the crankshaft bolts with the torque specified by the manufacturer.

10.1.6 Valves, Guides, Tappets and Timing Gear

The valve shall be inspected for overheating signs and pitting of the seats. The timing gear cover shall be opened and the gears inspected for damage to gear teeth. Stiffness of spring and clearance between valve guide and valve stem shall be measured.

10.1.7 Clutch

The clutch shall be opened and inspected for condition of the clutch-release bearing, pilot bearing, springs, and fingers. Clutch friction plate wear should be determined by measuring the thickness. The clutch housing shall be inspected for the entry of dust, mud, water and oil.

10.1.8 Gear Box

The top cover of the gear box shall be opened and inspected for visual damage to the gear teeth.

10.1.9 Brakes

The brake housing shall be opened and inspected for the entry of dust, mud, water and oil. The wear of brake lining shall be determined by measuring the thickness.

10.1.10 Front Axle

The king pin and stub axle shall be dismantled and inspected for the entry of dust, mud, water and oil. Clearances between king pin and bushes as well as between centre pin and bush shall be measured. The condition of thrust bearings, bearings for stub axle and seals for stub axle as well as king pins shall also be examined for entry of dust. For track-laying tractors, wear of sprocket, pin, grouser plate and idler shall be inspected.

10.1.11 Starter, Motor and Dynamo

These shall be dismantled and inspected for entry of dust, mud, water and oil. The condition of the bearings shall also be examined.

NOTE — The observations covered under 10.1.7 to 10.1.11 shall be made after cleaning, washing and greasing as recommended by the manufacturer in printed literature.

10.2 The data shall be recorded in Annex F.

11 SPECIAL CHARACTERISTICS

Supplementary measurements to determine any special characteristics of the tractor may be carried out depending on requirements.

12 REPORTING THE RESULTS

The test results of tractor shall be reported on the basis of proforma included in various standards dealing with the testing of tractors. While preparing the test report, the provisions of IS 12207 shall also be kept in view.
### ANNEX A

**(Clause 2)**

**LIST OF REFERRED INDIAN STANDARDS**

<table>
<thead>
<tr>
<th>IS No.</th>
<th>Title</th>
<th>IS No.</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>9939:1981</td>
<td>Glossary of terms relating to agricultural tractors and power tillers</td>
<td>12207:1987</td>
<td>Recommendations on selected performance characteristics of agricultural tractors</td>
</tr>
<tr>
<td>11442:1996</td>
<td>Method of test for operator’s field of vision of agricultural tractors <em>(first revision)</em></td>
<td>12226:1995</td>
<td>Agricultural tractors — Power tests for drawbar—Test procedure <em>(first revision)</em></td>
</tr>
<tr>
<td>12036:1995</td>
<td>Agricultural tractors — Test procedures — Power tests for power take off <em>(first revision)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12061:1994</td>
<td>Agricultural tractors — Braking performance — Method of test <em>(first revision)</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ANNEX B

(Clause 4.1)

SPECIFICATION SHEET FOR AGRICULTURAL TRACTORS

B-1 TRACTOR

a) Name and address of the manufacturer
b) Name and address of the applicant for test
c) Make/Type/Model
d) Serial number
e) Year of manufacture

B-2 ENGINE

a) Type/make/model
b) Serial number
c) Engine speed (manufacturer's recommended setting):

<table>
<thead>
<tr>
<th>Number</th>
<th>Disposition</th>
<th>Bore/Stroke, mm</th>
<th>Capacity, cm³</th>
<th>Compression ratio</th>
<th>Compression pressure, kPa (kgf/cm²)</th>
<th>Type of cylinder head</th>
<th>Type of cylinder liners</th>
<th>Type of combustion chamber</th>
<th>Arrangement of valves</th>
<th>Tappet clearance (hot/cold)</th>
<th>Maximum Speed at No Load, rev/min</th>
<th>Low Idle Speed, rev/min</th>
<th>Speed at Max Torque, rev/min</th>
<th>Rated speed, rev/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Inlet valve</td>
<td>2) Exhaust Valve</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B-3 CYLINDERS AND CYLINDER HEAD

a) Number
b) Disposition
c) Bore/Stroke, mm
d) Capacity, cm³
e) Compression ratio
f) Compression pressure, kPa (kgf/cm²)
g) Type of cylinder head
h) Type of cylinder liners
j) Type of combustion chamber
k) Arrangement of valves
m) Tappet clearance (hot/cold)

B-4 FUEL SYSTEM

a) Type of fuel feed system
b) Fuel tank
   1) Capacity, litres
   2) Location
   3) Provision for draining of sediments/water
c) Fuel filters
   1) Make/model/type
   2) Number
   3) Capacity of final stage filter
d) Fuel transfer pump
   1) Type/make/model
e) Fuel injectors
   1) Make/model/type
   2) Manufacturer's production setting (valve opening pressure), kPa (kgf/cm²)
f) Injection timing
g) Firing order
h) Magneto, coil and distributor
   1) Make/model/type
j) Injection pump
   1) Make/model/type
   2) Serial number
   3) Pump setting:
<table>
<thead>
<tr>
<th>Adjustments</th>
<th>Pump Shaft Speed, rev/min</th>
<th>Number of Strokes</th>
<th>Metering and Tolerable Difference cm³ at 0°C</th>
<th>Rate of Displacement g</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low idle setting</td>
<td>Full load setting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**B-5 GOVERNOR**

- Make/model/type
- Governed range of engine speed, rev/min
- Rated engine speed, rev/min

**B-6 PRE-CLEANER**

- Make/model/type
- Location of air intake

**B-7 AIR CLEANER**

- Make/model/type
- Location of air intake (in case of no pre-cleaner)
- Oil capacity, litres
- Oil change period, h

**B-8 EXHAUST**

- Type of silencer
- Position of silencer w.r.t. SIP
- Details of spark arresting device, if fitted

**B-9 LUBRICATING SYSTEM**

- Type
- Filters
  - Type
  - Number
- Oil capacity, litres
- Oil changing period, hours
- Pump
  - Type
  - Capacity at rated speed, l/min (at...°C)
  - Pressure release setting, kPa (kgf/cm²)
  - Method of drive and cooling device (if any)

**B-10 COOLING SYSTEM**

- Type
- Details of pump and fan
- Capacity of pump in l/min at ...rev/min
- Means of temperature control
- Bare radiator capacity, litres
- Total coolant capacity, litres
- Pressure details, kPa (kgf/cm²)
- Method of drive

**B-11 ELECTRICAL SYSTEM**

- Starting system
  - Make/type
  - Aid for cold starting
  - Any other device provided for easy starting
  - Method of drive
- Battery
  - Make/type
  - Number
  - Capacity and rating
  - Location
- Starter
  - Make/model/type
  - Capacity and rating
  - Serial number
- Generator
  - Make/model/type
  - Serial number
  - Output rating
- Voltage regulator
  - Make/Type
  - Capacity and setting
f) Details of lights:

<table>
<thead>
<tr>
<th>Description</th>
<th>Height Above Ground of Centre (mm)</th>
<th>Size (mm)</th>
<th>Distance from Centre of the Beam to Outside Edge of Tractor at Standard Rear Track Setting (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
</tbody>
</table>

Headlights

Sidelights

Rearlights

Reflectors

Plough Light

g) Switches—Main light and other (Type and Position)

h) Horn—type and location

j) Details of other electrical accessories

B-12 INSTRUMENT PANEL DETAILS

B-13 TRANSMISSION SYSTEM

a) Clutch

<table>
<thead>
<tr>
<th>Gear Number</th>
<th>Number of Engine Revolutions for One Revolution of Driving Wheel or Sprocket</th>
<th>Nominal Speed at Rated Engine Speed when Fitted With... Size Tyre, at an Inflation Pressure of ... and Rolling Radius of..., km/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
</tbody>
</table>

Forward

1
2
3
4
etc

Reverse

1
2
etc

c) Rear axle and final drive

<table>
<thead>
<tr>
<th>Make/Type</th>
<th>Differential lock</th>
<th>Reduction in final drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Method of operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>ii)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Make/Type</th>
<th>Oil capacity of final drive, litres</th>
</tr>
</thead>
<tbody>
<tr>
<td>(3)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oil changing period, hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>(4)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Details of transmission if used other than those given in (a), (b) and (c) above</th>
</tr>
</thead>
<tbody>
<tr>
<td>(5)</td>
</tr>
</tbody>
</table>
B-14 POWER TAKE-OFF (PTO) SHAFT

a) Location
b) Number of splines
c) Speed, rev/min
d) Size, mm
e) Standard to which it conforms
f) Height above ground, mm
g) Proportional engine speed at standard speed .. rev/min of PTO rev/min
h) Direction of rotation (viewed from driving end)
i) PTO speed at rated engine speed, rev/min
j) Details of other PTO, if any

B-15 THREE POINT LINKAGE

a) Upper hitch points
   1) Dia of hitch pin hole
   2) Width of ball
b) Lower hitch points
   1) Dia of hitch pin hole
   2) Width of ball
c) Lateral distance from lower hitch point to centre line of tractor
d) Lateral movement of lower hitch point
e) Distance from end of power take-off to centre of lower hitch point (lower links in horizontal position)
f) Transport height
g) Power range
h) Levelling adjustment range
i) Lower hitch point height
j) Zone of clearance around each hitch point, spherical radius

B-16 BELT PULLEY

a) Make/Type
b) Diameter, mm
c) Face width, mm
d) Location
e) Oil capacity, litres
f) Reduction ratio
g) Linear speed at rated speed .. rev/min of engine, m/min
h) Rotational speed at rated speed ... rev/min of engine, rev/min
i) Direction of rotation
j) Method of cooling provided, if any
k) Designed maximum torque capacity, kN.m (kgf.m)
l) Rated maximum power at rated speed, kW (hp)
m) Make and type of pump
d) Location and drive
f) Number and type of filters
g) Lifting capacity, kN (kgf)
   1) At lower links
   2) At standard frame
h) Oil change period
j) Hydraulic oil capacity (l)
k) Provision for external tapping
m) Details of control levers
n) Method of draft sensing

B-18 DRAWBAR

B-18.1 Linkage Drawbar/Swinging Drawbar

a) Type
b) Location
c) Height above ground level, mm
   1) Maximum
   2) Minimum
d) Method of changing position
e) Distance from rear axle, mm
f) Position relative to PTO shaft, mm
g) Lateral adjustment to either side, mm
h) Pivot position relative to rear wheel or centre of sprocket, mm
i) Standard to which it conforms

B-19 TOWING HITCH (FRONT/REAR)

a) Type
b) Height above ground level, mm
c) Type of adjustment
d) Distance of hitch point (mm)
   1) From rear axle centre
   2) From PTO shaft end

B-20 STEERING

a) Make/Type
b) Location
c) Method of operation
d) Diameter of control wheel, mm
e) Steering housing oil capacity, litres

B-21 BRAKES

a) Service brake
   1) Make/Type
   2) Location
   3) Area of liners, cm²
   4) Material of liners
   5) Method of operation
b) Parking brake
   1) Make/Type
   2) Method of operation

B-22 WHEEL EQUIPMENT

a) Steering wheel
   1) Make
2) Number
3) Size
4) Type of tyre
5) Ply rating
6) Maximum permissible loading capacity of each tyre at \( \ldots \text{kPa (kgf/cm}^2 \) pressure, kN (kgf)
7) Recommended inflation pressure, kPa (kgf/cm\(^2\))
   i) For field work
   ii) For transport
8) Track width, mm
9) Method of changing track width

h) Driving Wheel
1) Make
2) Number
3) Size
4) Type of tyre
5) Ply rating
6) Maximum permissible loading capacity of each tyre at \( \ldots \text{kPa (kgf/cm}^2 \) pressure
7) Recommended inflation pressure, kPa (kgf/cm\(^2\))
   i) For field work
   ii) For transport
8) Track width, mm
9) Method of changing track width, range and number of steps

c) Wheel base, mm
d) Method of changing wheel base, if any and range

B-23 TRACK-LAYING EQUIPMENT

a) Track Plate
   1) Type
   2) Number
   3) Width, mm
   4) Surface hardness and depth of hardness
   5) Grouser height, mm
   6) Track pitch, mm
   7) Size of pins, mm
   8) Track gauge, mm
   9) Length of track in ground contact, mm
   10) Nominal pressure, kPa (kgf/cm\(^2\))
   11) Method of track tensioning
   12) Type of links

b) Driving Sprockets
   1) Pitch circle diameter, mm
   2) Number of teeth
   3) Face width, mm

c) Type of Suspension

d) Idler Wheel
   1) Diameter, mm
   2) Face width, mm
   3) Method of fixing
   4) Lubrication

e) Carrier Rollers
   1) Number
   2) Diameter
   3) Surface hardness
   4) Depth of hardness
   5) Type of bearing
   6) Service schedule

f) Track Rollers
   1) Number
   2) Diameter, mm
   3) Surface hardness
   4) Depth of hardness
   5) Type of bearing
   6) Service schedule

B-24 SEAT

a) Make/type
b) Type of suspension
c) Type of damping
d) Range of adjustment, mm
   1) Vertical
   2) Lateral
   3) Horizontal

B-25 BALLAST

Re-write as under:

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Ballast Mass as Used (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Front</td>
</tr>
<tr>
<td></td>
<td>C.I. Weight on Water</td>
</tr>
<tr>
<td></td>
<td>Water</td>
</tr>
</tbody>
</table>

i) During drawbar performance test
ii) During field performance test
   a) Dry land
   b) Wet land
iii) During haulage test
### B-26 MASS OF TRACTOR (TRACTOR WITHOUT DRIVER BUT WITH LUBRICANT, FUEL AND COOLANT FULL)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Mass of tractor, kg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Front (2)</td>
</tr>
<tr>
<td>(1) Without ballast</td>
<td></td>
</tr>
<tr>
<td>With commercial ballast</td>
<td></td>
</tr>
<tr>
<td>With ballast</td>
<td></td>
</tr>
<tr>
<td>i) During drawbar performance test</td>
<td></td>
</tr>
<tr>
<td>ii) During field performance test</td>
<td></td>
</tr>
<tr>
<td>iii) During haulage test</td>
<td></td>
</tr>
</tbody>
</table>

### B-27 OVERALL DIMENSIONS

<table>
<thead>
<tr>
<th>Condition</th>
<th>Length</th>
<th>Width</th>
<th>Height, mm</th>
<th>Ground Clearance, mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mm</td>
<td>mm</td>
<td>With Exhaust Pipe (4)</td>
<td>Without Exhaust Pipe (5)</td>
</tr>
<tr>
<td></td>
<td>(2)</td>
<td>(3)</td>
<td></td>
<td>(6)</td>
</tr>
<tr>
<td>(1) Without ballast</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With commercial ballast</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### B-28 FUEL AND LUBRICANTS RECOMMENDED

a) Fuel
   1) Type
   2) Grade
   3) Specific gravity at 15°C
   4) Viscosity
   5) Octane or cetane number
   6) Standard to which it conforms

b) Lubricants

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Location (2)</th>
<th>Type (3)</th>
<th>Grade (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) i) Engine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii) Air cleaner</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii) Clutch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv) Transmission</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v) Final drive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vi) Steering gear</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vii) Hydraulic</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

c) Number of external lubricating points
   1) Oiling
   2) Greasing

### B-29 ADDITIONAL INFORMATION

a) Whether the tractor is suitable for:
   1) Belt pulley work and if so maximum power rating
   2) Puddling (if suitable for puddling indicate features, such as water sealing, etc., provided)

b) Recommended throttle setting for:
   1) Field operation
   2) Belt pulley work
   3) Puddling

4) Road haulage

c) Standard accessories and fittings

d) Optional accessories and fittings

e) Safety features, if any

f) Any special feature of the tractor

NOTES

1. Delete the items not applicable to a tractor.
2. Add any additional details, of the tractor, if present.
3. Conformity or otherwise of a component, assembly or item with the relevant Indian Standard should be stated, wherever applicable.
## ANNEX C

(Clauses 4.3, 4.4.1 and 4.7)

**PROFORMA FOR SELECTION, RUNNING-IN AND REPAIRS**

1) Name of the manufacturer
2) Address
3) Submitted for test by
4) Selected by
5) Method of selection
6) Place of running-in
7) Duration and schedule of running-in
8) Repairs and adjustments made during running-in

## ANNEX D

(Clause 8.2)

**AIR-CLEANER OIL PULL-OVER TEST**

1) Type of oil used
2) Viscosity at 98.9°C, mm²/s (cSt)
3) Atmospheric conditions
   - Temperature, °C
   - Pressure, kPa (kgf/cm²)
   - Relative humidity, percent
4) Mass of oil before test (with 5 percent excess on mass basis)
5) Test data

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Position of Tractor</th>
<th>Starting Time</th>
<th>Stopping Time</th>
<th>Mass of Oil Before Test</th>
<th>Mass of Oil After Test</th>
<th>Loss of Oil</th>
<th>Engine Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>g</td>
<td>g</td>
<td>(%)</td>
<td>kPa (kgf/cm²)</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1)</td>
<td>2)</td>
<td>3)</td>
<td>4)</td>
</tr>
<tr>
<td>i)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>iii)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>iv)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ \text{Percentage of Loss} = \frac{\text{Loss of oil, g}}{\text{Mass of oil before test, g}} \times 100 \]
# ANNEX E

*(Clause 9.3)*

**VIBRATION MEASUREMENT**

1) Date and location of test
2) Type of accelerometer
3) Test data

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Measuring Points</th>
<th>At No-Load</th>
<th>Vibration, Micron</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>At Load Corresponding to 85 percent of Maximum PTO Power</td>
</tr>
<tr>
<td>(1)</td>
<td>(2)</td>
<td><strong>HD</strong></td>
<td><strong>VD</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>HD</strong></td>
<td><strong>VD</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5)</td>
<td>(6)</td>
</tr>
</tbody>
</table>

i) Foot rest, left
ii) Foot rest, right
iii) Steering wheel
iv) Seat, back
v) Seat, bottom
vi) Mud-guard, left
vii) Mud-guard, right
viii) Head light, left
ix) Head light, right
x) Battery base, centre
xi) Tail light, right
xii) Ploughing light
xiii) Gear shifting lever
xiv) Accelerator lever, foot
xv) Accelerator lever, hand
xvi) Brake pedal, left
xvii) Brake pedal, right
xviii) Clutch pedal
xix) Hydraulic control lever
xx) PTO engaging lever
xxi) Differential lock lever

*1) If a helper's seat is provided on mud-guard.*
ANNEX F

(Clauses 10.2)

DATA SHEET FOR COMPONENT/ASSEMBLY INSPECTION

F-1 CYLINDER BORE DIAMETER

<table>
<thead>
<tr>
<th>Cylinder No.</th>
<th>Position</th>
<th>Measured Diameter After Test</th>
<th>Maximum Permissible Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Thrust Side (mm)</td>
<td>Perpendicular to Thrust Side (mm)</td>
</tr>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
</tbody>
</table>

Top

1  Middle

Bottom

e tc

F-2 PISTON

<table>
<thead>
<tr>
<th>Piston No.</th>
<th>Piston Diameter (mm)</th>
<th>Maximum Permissible Play Between Piston and Cylinder Liner at the Skirt of the Piston (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top (above compression ring)</td>
<td>At Skirt</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thrust Side Non-thrust Side</td>
<td>Thrust Side Non-thrust Side</td>
</tr>
</tbody>
</table>

F-3 RING END GAP

<table>
<thead>
<tr>
<th>Type of Ring</th>
<th>Cylinder No.</th>
<th>Ring No.</th>
<th>Measured Clearance (mm)</th>
<th>Maximum Permissible Clearance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
</tbody>
</table>

Compression

1  1  2

2

3

e tc

Oil

1  1

2

3

e tc

e tc
### F-4 RING GROOVE CLEARANCE

<table>
<thead>
<tr>
<th>Type of Ring</th>
<th>Cylinder No.</th>
<th>Ring No.</th>
<th>Measured Clearance mm</th>
<th>Maximum Permissible Clearance mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>etc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>etc</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### F-5 RADIAL AND AXIAL CLEARANCE OF CRANKCASE BEARINGS

<table>
<thead>
<tr>
<th>Bearing No.</th>
<th>Type of Clearance</th>
<th>Measured Clearance After Test mm</th>
<th>Maximum Permissible Clearance mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Radial</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Axial</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>etc</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### F-6 VALVES, GUIDES, TAPPETS AND TIMING GEAR

a) Any marked sign of over heating  
   b) Pitting of seat  
   c) Any damage to the teeth of timing gear  
   d) Spring stiffness, N/mm (kgf/mm)  
   e) Clearance between valve guide and valve stem, mm  

### F-7 CLUTCH

a) Any marked wear in clutch friction plate  
   b) Condition of clutch release bearings  
   c) Condition of pilot bearing  
   d) Condition of springs and fingers  
   e) Presence of oil and water in clutch housing  
   f) Thickness of clutch plate  

### F-8 BRAKE

<table>
<thead>
<tr>
<th>Type of Brake</th>
<th>Initial Thickness of Brake Lining mm</th>
<th>Measured Thickness of Lining After Test mm</th>
<th>Minimum Permissible Thickness mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15
F-9  GEAR BOX (Any damage, pitting and chipping of the gear teeth)

F-10  FRONT AXLE

a) Clearance between king pin and bushes, mm
b) Clearance between centre pin and bush, mm
c) Condition of thrust bearing
d) Condition of bearings for stub axle
e) Condition of seals for stub axle and king pin

f) Presence of dust
g) Any marked wear in sprockets, pin, grouser plate and idler (in case of laying tractor)

F-11  STARTER MOTOR AND DYNAMO

a) Presence of dust in housing
b) Condition of bearings
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