



**INTERNATIONAL TRACTORS LIMITED,
SONALIKA INTERNATIONAL DI - 750 III SUPER TRACTOR**



सत्यमेव जयते

भारत सरकार

कृषि एवं किसान कल्याण मंत्रालय
(कृषि, सहकारिता एवं किसान कल्याण विभाग)

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE

(DEPARTMENT OF AGRICULTURE, CO-OPERATION AND FARMERS WELFARE)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

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T-1105/1631/2017

INTERNATIONAL TRACTORS LIMITED,
SONALIKA INTERNATIONAL DI-750 III SUPER TRACTOR
Batch Test -Commercial



Manufacturer

: M/s. International Tractors Limited.
VIII. Chack Gujran, P.O. Piplanwala,
Jalandhar Road,
HOSHIARPUR- 146 022 (Punjab)

Month: September

Test Report No. T-1105/1631/2017

Year : 2017



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| | |
|---------------------|--|
| Type of Test | : Commercial (Batch) Test |
| Test code/Procedure | : IS: 5994-1998 (Reaffirmed in 2009) IS: 9253-2001(Reaffirmed in 2012) and IS: 12207-2014. |
| Period of Test | : January, 2017 to July, 2017 |
| Test Report No. | : T-1105/1631/2017 |
| Month/Year | : September, 2017 |

- i) The results reported in this report are observed values and no corrections have been applied for atmospheric and site conditions.
- ii) The data given in this report pertain to the particular machine submitted by the applicant for test.
- iii) The results presented in this report do not in any way attribute to the durability of the machine.
- iv) This report should not be reproduced in part or full without prior permission of the Director, Central Farm Machinery Training and Testing Institute, Budni (M.P.).
- v) This is a batch test report and, should be read in conjunction with the Test Report of ICT bearing No. T- 825/1334/2012, (April) 2012.

SELECTED CONVERSIONS

| Sl. No | Units | Conversion Factor |
|--------|-----------------------|----------------------------------|
| 1. | Force: | |
| | 1 kgf | 9.80665 N 2.20462 lbf |
| | | |
| 2. | Power: | |
| | 1 hp | 1.01387metric hp (Ps) 745.7 W |
| | 1 Ps | 735.5 W |
| | 1 kW | 1.35962 Ps |
| 3. | Pressure: | |
| | 1 psi | 6.895 kPa |
| | 1 kgf/cm ² | 98.067 kPa = 735.56 mm of Hg |
| | 1 bar | 100 kPa = 10 N/cm ² |
| | 1 mm of Hg | 1.3332 m-bar |

| A B B R E V I A T I O N S | |
|---------------------------|------------------------------------|
| apa | As per applicant |
| TDC | Top Dead Centre |
| IS | Indian Standard |
| LHS/RHS | Left Hand Side/ Right Hand Side |
| Hg | Mercury |
| Temp. | Temperature |
| N.R. | Not recorded |
| rpm | Revolutions per minute |
| O.D/I.D | Outer diameter/ Inner diameter |
| N.A. | Not available/ Not applicable |
| PTO | Power take-off |
| R.H. | Relative Humidity |

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| | |
|--|---|
| Manufacturer | : M/s. International Tractors Limited, VIII. Chack Gujran, P.O. Piplanwalan, Jalandhar Road, HOSHIARPUR- 146 022 (Punjab) |
| Test requested by | : M/s. International Tractors Limited, VIII. Chack Gujran, P.O. Piplanwalan, Jalandhar Road, HOSHIARPUR- 146 022 (Punjab) |
| Place of running-in | : CFMT&TI, Budni,(M.P) |
| Duration of said running-in, (h): | |
| - Engine | : 35 |
| - Transmission | : Nil |
| Method of Selection | : The test sample was selected randomly out of five tractors from the production line by the representative of testing authority. |

1. SPECIFICATION

| | |
|---|---|
| 1.1 Tractor: | |
| Make | : International Tractors Limited |
| Model | : Sonalika International DI-750 III Super |
| Brand name | : SONALIKA |
| Variants if any | : None |
| Type | : Four wheeled, rear-wheel driven, general purpose agricultural tractor. |
| Year of manufacture | : 2016 |
| Chassis Serial number | : AZZDF547290S3 |
| Country of Origin | : India |
| 1.2 Engine: | |
| Make | : International Tractors Ltd. |
| Model | : 4100 IL (apa) |
| Type | : Four stroke, naturally aspirated, water cooled, direct injection, diesel engine. |
| Serial number | : 4100DL63C542623F9 |
| Year of manufacture | : 2015 (apa) |
| Engine speed (Manufacturer's recommended production setting),(rpm) : | |
| - Maximum speed at no load | : 2350 to 2450 |
| - Low idle speed | : 650 to 750 |
| - Speed at max. torque | : 1200 to 1400 |
| Rated speed, (rpm): | |
| - For PTO use | : 2200 |
| - For drawbar use | : 2200 |
| 1.3 Cylinder & Cylinder Head: | |
| Number | : Four |
| Disposition | : Vertical, in-line |
| Bore/stroke, (mm), (apa) | : 100 / 118 |
| Capacity as specified by the applicant, (cc) | : 3707 |
| Compression ratio, (apa) | : 18.5 (± 0.2) :1 |



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| | | |
|--------------|---|---|
| | Type of cylinder head | : Individual, inline |
| | Type of cylinder liners | : Wet, replaceable |
| | Type of combustion chamber | : Direct injection, re-entrant cavity on piston crown |
| | Arrangement of valves | : Overhead, Inline |
| | Valve clearance (cold/hot): | |
| | - Inlet valve, (mm) | : 0.20- 0.30 |
| | - Exhaust valve, (mm) | : 0.20- 0.30 |
| 1.4 | Fuel System: | |
| | Type of fuel feed system | : Gravity & force feed |
| 1.4.1 | Fuel tank: | |
| | Capacity, (l) | : 61.7 |
| | Location | : Above clutch housing |
| | Provision for draining of sediments/ water | : Provided |
| | Material of fuel tank | : Metallic |
| 1.4.2 | Water separator : | |
| | Make | : DEC |
| | Type | : Inverted funnel gravity separation. |
| | Location | : On LHS of engine in between fuel tank & feed pump. |
| | Capacity (l) | : 0.44 |
| 1.4.3 | Fuel feed pump: | |
| | Make | : Bosch, India |
| | Type | : Plunger |
| | Model/Group combination No. | : FP/KE 22AD 48/2, 9 440 030 011 |
| | Provision of sediment bowl | : Provided (Metallic) |
| | Method of drive | : Through cam shaft of fuel injection pump. |
| 1.4.4 | Fuel filters: | |
| | Make | : Bosch, India |
| | Model/Group combination No. | : F002 H20 109 |
| | Number | : Two |
| | Type of elements: | |
| | - Primary | : Cloth |
| | - Secondary | : Paper |
| | Capacity of final stage filter, (l) | : 0.41 |
| 1.4.5 | Fuel injection pump: | |
| | Make | : Bosch, India |
| | Model/Group combination No. | : F002 A0Z 693, PES4A90D320RS3500 |
| | Type | : Inline, Plunger |
| | Serial number | : 52024450 |
| | Method of drive | : Through timing gears |
| 1.4.6 | Fuel injectors: | |
| | Make | : Bosch, India |
| | Model/Group combination No. | : F 002 C70 552 |
| | Injector nozzle No. | : DSLA 148P 1549, 617 280 550 |
| | Type | : Multi-holes (five holes) |
| | Manufacturer's production pressure setting, (MPa) | : 25.0 + 0.8 |
| | Injection timing | : 12 ± 1 degree before TDC |
| | Firing order | : 1 - 3 - 4 - 2 |



| | | |
|--------------|--|--|
| 1.4.7 | Governor: | |
| | Make | : Bosch, India |
| | Model/Group combination No. | : RSV 325... 1100A5C 1572R |
| | Type | : Mechanical, centrifugal, variable speed |
| | Rated engine speed, (rpm) | : 2200 |
| | Governed range of engine speed (rpm) | : 650 to 2450 |
| 1.5 | Air Intake system: | |
| 1.5.1 | Pre-cleaner | |
| | Make | : Sonalika |
| | Type | : Centrifugal with transparent dust collector |
| | Location | : Above main air cleaner Inlet tube, outside the bonnet. |
| 1.5.2 | Air cleaner: | |
| | Make | : Pratibha Engg. & Fabrication |
| | Type | : Oil bath |
| | Location | : In front of radiator, under the bonnet. |
| | Oil capacity (l) | : 0.90 |
| | Range of suction pressure at maximum power, (kPa) | : 4.4 to 4.5 |
| | Oil change period | : After 50 hours of operation. |
| 1.6 | Exhaust: | |
| | Type of silencer | : Updraft, (Elliptical) |
| | Position of silencer outlet with respect to SIP, (mm): | |
| | - Upward | : 915 |
| | - Longitudinal | : 1600 |
| | - Lateral | : 505 (RHS) |
| | Range of exhaust gas pressure at maximum power, (kPa) | : 14.4 to 15.1 |
| | Provision of spark arresting device | : None |
| | Details of EGR system | : A M.S. pipe of 13.2/18.9 (ID/OD) mm is connected to exhaust manifold and 14.5/18.9 (ID/OD) mm is connected to intake manifold for exhaust gas recirculation. |
| | Provision against entry of rain water | : A bend is provided at the top of silencer |
| 1.7 | Lubricating system: | |
| | Type | : Forced feed-cum-splash |
| | Oil sump capacity, (l) | : 10.50 |
| | Total lube oil capacity, (l) | : 11.46 |
| | Oil change period | : First change after 35 hours and subsequently after every 250 hours of operation. |
| | Cooling device, (if any) | : None |
| 1.7.1 | Filters: | |
| | Type | : Full flow, spin on throw away |
| | Number | : One |
| 1.7.2 | Pump: | |
| | Make | : SAMARTH |
| | Type | : Gear |
| | Method of drive | : Through timing gears |
| | Pressure release setting, (kPa) | : 392 ± 49 (apa) |



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| | Minimum permissible pressure, (kPa) | : 250 ± 50 (apa) |
| 1.8 | Cooling system: | |
| | Type | : Forced circulation of liquid |
| | Name & brand name of coolant | : Not specified |
| | Coolant water ratio | : Not specified |
| | Details of pump | : Centrifugal, semi open impeller of 89.7 mm dia. having twelve vanes and driven through crankshaft pulley by a cogged 'V'-belt common to alternator. |
| | Details of fan | : Suction type having six numbers of metallic blades of 395 mm diameter and mounted on water pump shaft. |
| | Means of temperature control | : Thermostat |
| | Bare radiator capacity, (l) | : 5.00 |
| | Capacity of expansion flask (l) | : 1.00 |
| | Total coolant capacity, (l) | : 11.92 |
| | Radiator cap pressure, (kPa) | : 89 |
| 1.9 | Starting System: | |
| | Type | : 12 V DC, Electrical |
| | Aid for cold starting | : None |
| | Any other device provided for easy starting. | : None |
| 1.10 | Electrical System: | |
| 1.10.1 | Battery: | |
| | Make and Model | : Amaron & TRA550D31R |
| | Type | : Lead Acid |
| | Capacity and rating | : 12V, 88 Ah at 20 hours discharge rate |
| | Location | : RHS of clutch housing fitted in a separate metallic box. |
| 1.10.2 | Starter: | |
| | Make | : Lucas TVS |
| | Model | : M 14 |
| | Type | : Pre-engaging solenoid operated |
| | Capacity and rating | : 12V and not available |
| | Serial Number | : 26024094A |
| 1.10.3 | Generator: | |
| | Make | : Lucas TVS |
| | Model | : Not available |
| | Type | : Alternator |
| | Serial number | : Not Available |
| | Output rating | : Not Available |
| | Method of drive | : Through a cogged 'V'-belt common to water pump from crank shaft pulley. |
| 1.10.4 | Voltage regulator | : In-built in alternator |



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1.10.5 Details of lights:

| Description | No. & capacity of bulbs | Height of the centre of beam above ground level, (mm) | Size of beam, (mm) | Distance between centre of the beam and outside edge of tractor at standard rear track setting, (mm) |
|------------------------------------|-----------------------------|---|--------------------|--|
| 1 | 2 | 3 | 4 | 5 |
| Front Lights: | | | | |
| - Head lights | 1, 12V, 60/55W | 1070 | 130 Ø | 552 |
| - Parking lights | 2, 12V, 5W | 1385 | 65 x 65 | 260 |
| - Turn Indicators-cum-hazard light | 2, 12V, 21W | 1385 | 75 x 65 | 195 |
| Reflectors | 2 | 1385 | 30 x 55 | 305 |
| Rear lights: | | | | |
| -Parking cum brake light | 2, 12V, 21/5W | 1355 | 65 x 65 | 270 |
| - Turn Indicators-cum-hazard light | 2, 12V, 21W | 1355 | 75 x 65 | 205 |
| Reflectors (Red) | 2 | 1355 | 30 x 55 | 315 |
| Registration plate light | Part of rear light assembly | | | |
| Plough light | 1, 12V, 35 W | 1540 | 125 Ø | 455 |

1.10.6 Main switch : Key turn type, having three position viz:
i) OFF
ii) ON
iii) START

1.10.7 Light switch : Rotary type having five positions viz.
i) OFF
ii) Parking lights + dash board lights
iii) Head lights (short beam) + (ii)
iv) Head lights (long beam) + (ii)
v) Horn push button

1.10.8 Horn :
Make : Addon
Type : 12V, 2B, Electromagnetic vibrator operated
Location : In front of the engine, under the bonnet

1.10.9 Fuse box : Contains 8 number of fuses of following capacities:-

| Capacity | 10A | 15A |
|----------|-----|-----|
| Number | 5 | 3 |

1.10.10 Details of other electrical accessories:

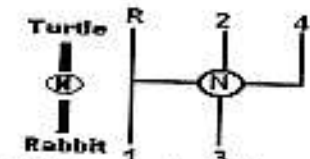
1.10.10.1 Flasher Unit:

Make : VI-50N
Capacity:
- Turn signal : 12V, 21W x 2 + 2W x 1
- Hazard signal : 12V, 21W x 4 + 2W x 2
Flashes/Min. : 85

1.10.10.3 Starting safety switch : Provided in high/low range lever

1.10.10.4 Seven pin socket for trailer lights : Provided.

| | |
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- 1.11 Instrument panel details:**
- i) Engine speed cum-cumulative run hour meter (0-25 x 100 rpm)
 - ii) Coolant temperature gauge (with colour zones)
 - iii) Fuel level gauge (with colour zones).
 - iv) Lubricating oil pressure gauge (with colour zones)
 - v) Main switch (key-turn type)
 - vi) Light switch (Rotary type)
 - vii) Switch for turn indicators
 - viii) Hazard light switch
 - ix) Turn-cum-hazard indicator
 - x) Battery charging gauge (with colour zones) and indicator
 - xi) Head lamp (Long beam) 'ON' indicator
 - xii) Horn push button
 - xiii) Hand accelerator lever
 - xiv) Steering control wheel
 - xv) Engine stop knob
 - xvi) Mobile charging socket
 - xvii) Rear view mirror
- 1.12 Transmission System:**
- 1.12.1 Clutch:**
- | | |
|----------------------------|--|
| Make | : Luk India |
| Type | : Mechanical, diaphragm, dual dry friction type |
| -Transmission | : Dry friction pads |
| - PTO | : Dry friction plate |
| No. of friction plate, (s) | : 02 |
| Size, [OD/ID (mm)]: | |
| -Transmission | : 279.4/164.6 and 28.0 cm ² contact area of each pad having five pads, 280.0/165.5 |
| -PTO | |
| Method of operation | : Operated by clutch pedal, which disengages the main transmission when depressed to half way; whereas PTO will get disengaged when clutch pedal is depressed fully. |
- 1.12.2 Gear box:**
- | | |
|--------------------------------------|---|
| Make | : Sonalika |
| Model | : Not available |
| Type | : Constant mesh Gears |
| No. of speeds: | |
| - Forward | : 08 |
| - Reverse | : 02 |
| Location of main gear shifting lever | : Main gear shifting lever on RHS & low-high range selection lever on LHS of operator's seat. |
| Gear shifting pattern | :  |
| Oil capacity, (l) | : 54.40 (common with hydraulic, differential, rear axle & final drive and brake system) |
| Oil changing period | : After every 1000 hours of operation and subsequent after every 1800 hours of operation |



1.12.3 Nominal Speed:

| Movement | Gear No. | No of engine revolutions for one revolution of driving wheel | Nominal speed at rated engine speed when fitted with 16.9-28 size tyres of 670 mm radius index. (kmph) |
|----------|----------|--|--|
| Forward | L1 | 197.40 | 2.82 |
| | L2 | 138.35 | 4.02 |
| | L3 | 87.63 | 6.34 |
| | L4 | 64.68 | 8.59 |
| | H1 | 49.17 | 11.30 |
| | H2 | 34.54 | 16.09 |
| | H3 | 21.87 | 25.41 |
| | H4 | 16.13 | 34.44 |
| Reverse | LR | 149.04 | 3.73 |
| | HR | 37.05 | 15.00 |

1.12.4 Rear differential unit :

- Type : Crown wheel & pinion with differential unit accommodated inside the differential housing.
- Reduction through crown wheel & pinion : 3.167 : 1 (38/ 12T)
- Oil capacity (l) : 54.40 (Common with gear box, hydraulic, rear axle & final drive and brake system)
- Oil changing period : Change after every 1000 hours of operation and subsequent after every 1800 hours of operation
- Differential lock:** : **Not provided**

1.12.5 Rear axle & final drive:

- Type : Bull gear & pinion type final reduction unit, accommodated inside the differential housing.
- Reduction through final drive : 5.090 :1 (56/11T)
- Oil capacity of final drive, (l) : 54.40 (common with gearbox, differential, hydraulic and brake system)
- Oil changing period : After every 1000 hours of operation and subsequently after every 1800 hours of operation.

1.13 Power lift (Hydraulic system):

- Make : Sonalika
- Type : Open centre, Live, ADDC
- No. and type of cylinder : One, single acting
- Type of linkage lock for transport : Hydraulic, response control valve in its fully closed position acts as transport lock.

1.13.1 Hydraulic pump:

- Make : Eaton
- Type : Gear
- Location & drive : On RHS of engine & driven through timing gears.
- No. & type of filters : Two,
i) Wire mesh strainer on suction line and
ii) Spin-on throw away filter on return line.
- Hydraulic oil capacity, (l) : 54.40 (common with gearbox, differential, rear axle & final drive and brake system)
- Oil change period : First change after 1000 hours and subsequently after every 1800 hours of operation.



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- Provision for external tapping : Provided
- Details of control levers : i) Position control lever (Black)
ii) Draft control lever (Red)
iii) Response control valve
- Method of draft sensing : Through top link

1.13.2 Three point linkage:

| S. No. | Observations | As per IS: 4468- (Part-1) -1997, (Cat.I / Cat.II), (mm) | As measured (mm) | Remarks |
|--------|---|---|------------------|---------------------|
| I. | Upper hitch points: | | | |
| | a) Dia of hitch pin hole | 19.30 to 19.50 / 25.70 to 25.90 | 19.31 | Conforms to cat. I |
| | b) Width of ball | 44.0 (max.) / 51.0 (max.) | 42.5 | Conforms |
| II. | Lower hitch points: | | | |
| | a) Dia of hitch pin hole | 22.40 to 22.65 / 28.70 to 29.00 | 28.75 | Conforms to cat. II |
| | b) Width of ball | 34.8 to 35.0 / 44.8 to 45.0 | 44.9 | Conforms to cat. II |
| III. | Lateral distance from lower hitch point to centre line of tractor | 359 / 435 | 364 | Does not conform |
| IV. | Lateral movement of lower hitch points | 100 (min) / 125 (min) | 110 | Conforms to cat. I |
| V. | Distance from end of power take-off to centre of lower hitch point (lower links in horizontal position) | 450 to 575 / 550 to 625 | 520 | Conforms to cat. I |
| VI. | Transport height | 820 (min) / 950 (min) | 880 | Conforms to cat. I |
| VII. | Power range (without force) | 560 (min) / 650 (min) | 570 | Conforms to cat. I |
| VIII. | Leveling adjustment | 100 (min) / 100 (min) | 300 | Conforms |
| IX. | Lower hitch point clearance | 100 (min) / 100 (min) | 180 | Conforms |
| X. | Lower hitch point height | 200 (max) / 200 (max) | 200 | Conforms |

1.13.3 Linkage geometry dimensions [Refer Fig.-1(a)]:

The following are dimensions observed, corresponding to 670 mm as tyre dynamic radius index:

| S. No. | Parameter | Notation | Dimension or range, (mm) | Setting used during test. (mm) |
|--------|--|----------|--------------------------|--------------------------------|
| (1) | (2) | (3) | (4) | (5) |
| 1. | Length of lower link | A | 765 | 765 |
| 2. | Length of lift arm | B | 235 | 235 |
| 3. | Length of lift rods | C | 595 to 680 | 645 |
| 4. | Length of top link | D | 460 to 670 | 500 |
| 5. | Distance of lift rod connection point from pivot point of lower link | E | 290, 355, 415 | 355 |
| 6. | Distance of lower link pivot point from rear wheel axis: | | | |
| | -Horizontally | F | 110, behind | 110, behind |
| | -Vertically | G | 150, below | 150, below |
| 7. | Distance of upper link pivot point from rear wheel axis: | | | |
| | -Horizontally | H | 370, behind | 370, behind |
| | -Vertically | J | 265, 305 & 340, above | 305, above |
| 8. | Distance of lift arm pivot point from rear wheel axis: | | | |
| | -Horizontally | K | 25, forward | 25, forward |
| | -Vertically | L | 360, above | 360, above |
| 9. | -Height of lower hitch points relative to the rear wheel axis: | | | |
| | - In high position | M | 50 to 210 above | 100, above |
| | - In low position | N | -635 to -245 below | 470, below |
| 10. | Height of lower link hitch points when locked in transport position | | 100, above | |

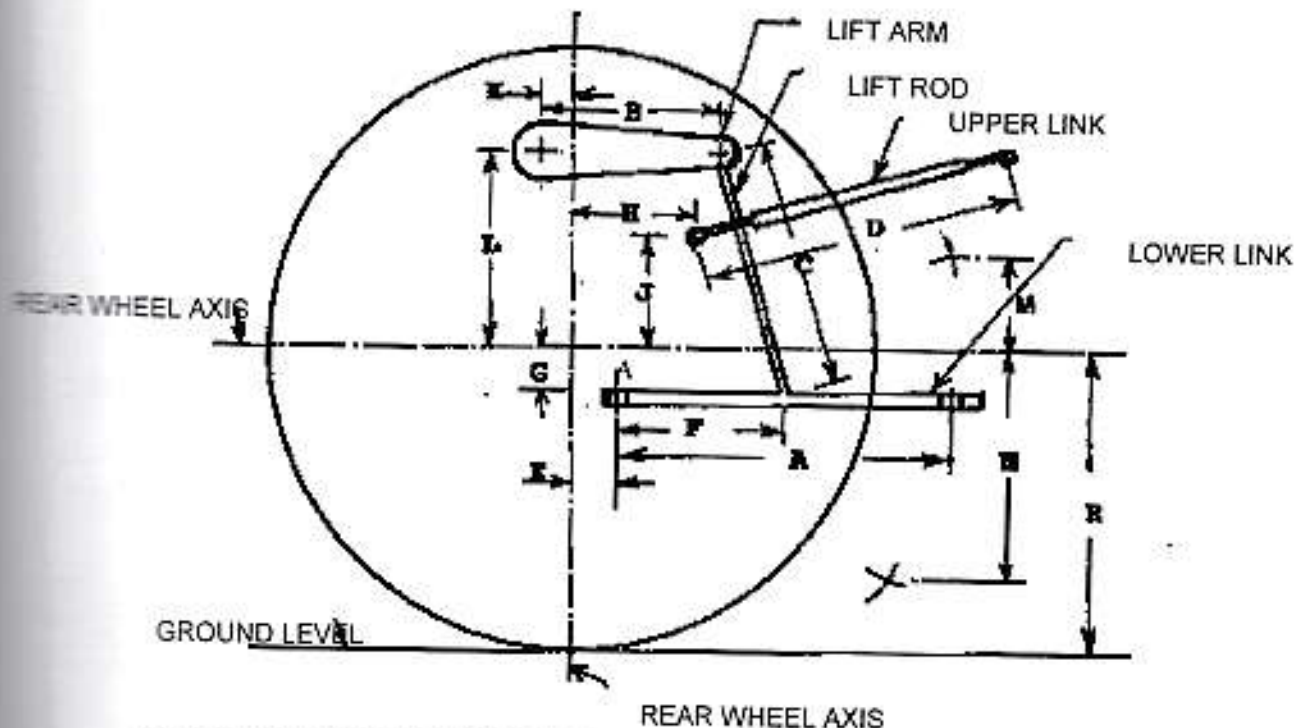
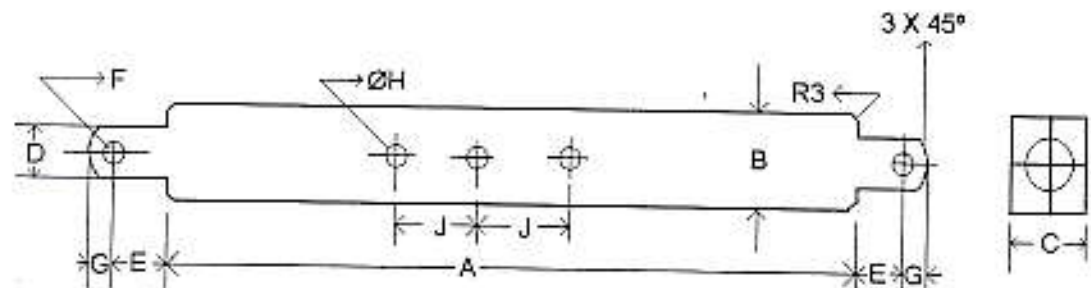


Fig. 1 (a): DIMENSIONAL NOTATIONS FOR TABLE OF LINKAGE GEOMETRY

**1.13.4 Drawbar:
1.13.4.1 Linkage Drawbar [Refer Fig.1(b)]:**

| Notation | As per IS: 12953-1990 (Cat.I)/ (Cat. II), (mm) | As measured, (mm) | Remarks |
|---------------|--|-------------------|-------------------------|
| A | 683 ± 1.5/825 ± 1.5 | 684.0 | Conforms to Cat. I |
| B | 75 (min)/75 (min) | 76 | Conforms |
| C | 30 (min) / 30 (min) | 28.3 | Does not conform |
| D \emptyset | 21.79 to 22.0/27.79 to 28.0 | 27.8 | Conforms to Cat. II |
| E | 39.0 (min)/49.0 (min) | 62 | Conforms |
| F \emptyset | 12.0 (min)/12.0 (min) | 12.0 | Conforms |
| G | 15.0 (min)/15.0 (min) | 22.0 | Conforms |
| H \emptyset | 25 ± 1/25 ± 1 | 25 | Conforms |
| J | 80 ± 1.5/80 ± 1.5 | 80.0 | Conforms |
| No. of holes | 7/9 | 07 | Conforms to Cat. I |


Fig. 1 (b): DIMENSIONAL NOTATIONS FOR LINKAGE TYPE DRAWBAR
1.13.4.2 Swinging drawbar : Not provided
1.14 Power take-off shaft:

| | |
|--|---|
| Type | : Type-I, Independent |
| Method of engaging | : By a hand lever located on LHS of operator's seat |
| No. of shaft,(s) | : One |
| PTO speed corresponding to rated engine speed, (rpm) | : Dual speed, 550 and 1100 |
| Distance behind rear axle, (mm) | : 355 |
| Engine to PTO speed ratio | : 3.111 : 1 |
| Whether the PTO shaft is capable of transmitting full power of the engine. | : Yes |

1.14.1 Specifications of Power Take-Off Shaft: [See Fig. 2]

| Specification | As per IS: 4931-1995 (Type-I) | As observed | Remarks |
|-----------------------|--|---|----------|
| | 2 | 3 | 4 |
| Nominal speed, (rpm) | 540 ± 10 | 540 rpm of PTO shaft corresponds to 1680 rpm of engine. | Conforms |
| No. of splines | 6 | 6 | Conforms |
| Direction of rotation | Clockwise | Clockwise | Conforms |
| Location | The position of the centre of the end of PTO shaft shall be within 50 mm to right or left of the centre line of the tractor. | In centre | Conforms |

| | |
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| 1 | 2 | 3 | 4 |
|---------------------------------------|----------------------|-----------------|----------|
| Dimensions, (mm) (See Fig. 2): | | | Conforms |
| D \varnothing | 34.79 \pm 0.06 | 34.79 | Conforms |
| d \varnothing | 28.91 \pm 0.05 | 28.96 | Conforms |
| B \varnothing | 29.4 \pm 0.1 | 29.4 | Conforms |
| A \varnothing (optional) | 8.3 | N.A. | -- |
| W | 8.69 - 0.09 -0.16 | 8.59 | Conforms |
| a | 7 | 7 | Conforms |
| b(optional) | 25 \pm 0.5 | N.A. | -- |
| c | 38 | 38 | Conforms |
| X | 30 ^p | 30 ^p | Conforms |
| B | 76 (min) | 83 | Conforms |
| h | 450 to 675 | 670 | Conforms |

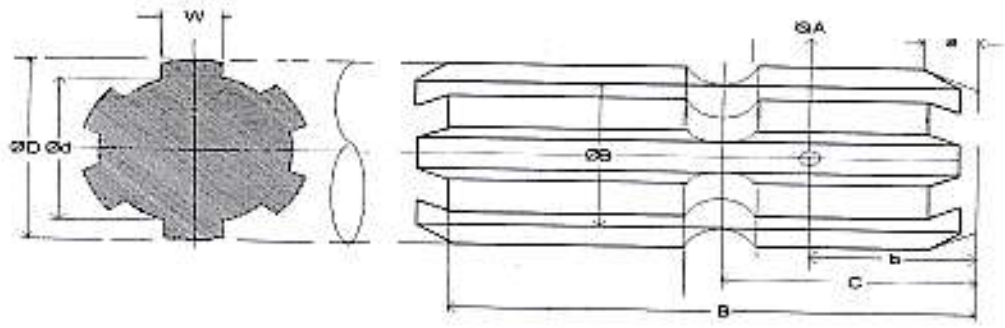


Fig. 2: DIMENSIONAL NOTATIONS FOR PTO SHAFT

- 1.14.2 Power Take-off Master Shield : Not provided**
- 1.15 Towing hitch:**
- 1.15.1 Front:**
- Type : Clevis
 - Location : Front of engine support
 - Height above ground level, (mm) : 725
 - Type of adjustment : Fixed
 - Width of clevis, (mm) : 105.4
 - Dia of pin hole, (mm) : 28.8
- 1.15.2 Rear:**
- Type : Clevis
 - Location : At rear of transmission housing
 - Height above ground level, (mm):**
 - Maximum : 820
 - Minimum : 570
 - No. of positions : 05
 - Type of adjustment : By changing hitch position on its mounting bracket
- Distance of hitch point, (mm):**
- From rear wheel centre : 505
 - From power take-off shaft end : 150
 - Dia of pin hole, (mm) : 41.4
 - Width of clevis, (mm) : 73.1



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- 1.16 Steering:**
Make : ZF (apa)
Type : Mechanical, worm & screw with single drop arm.
Location : Above clutch housing
Method of operation : Manually through steering control wheel.
Diameter of steering control wheel, (mm) : 435
Steering oil capacity, (l) : 0.47
Lubricant change period : First change after 250 hours of operation and subsequent after every 1000 hours of operation
- 1.17 Brakes:**
1.17.1 Service Brake:
Make : JMI
Type : Mechanical, oil immersed multiple disc brake
Location : On half axle of bull pinion shaft outside the differential housing
No. of disc(s) : Four (each wheel side)
Area of liners, (cm²) : 915.1 (each wheel side)
Material of liners : Organic material (apa)
Method of operation : Independent or combined pedal operation by right foot.
- 1.17.2 Parking Brake:**
Type : Pawl & latch arrangement for locking service brakes.
Location & method of operation : Services brake pedals when locked in position by a hand lever provided on right side of operator's seat.
- 1.18 Wheel Equipment:**
1.18.1 Steered Wheel(s):
Make : Apollo
Number(s) : Two
Type of tyre : Pneumatic, ribbed
Size : 7.50-16
Ply rating : 8
Maximum permissible loading capacity of each tyre at 250 kPa pressure, kgf : 605 (apa)
Recommended inflation pressure, (kPa) :
- For field work : 200
- For transport : 200
Track width, (mm) : 1360(std.), 1370, 1440, 1480, 1540, 1620, 1640 and 1740
Method of changing track width : By interchanging the wheels and adjusting the telescopic front axle
Make & size of wheel rim : WIL, & 5.50F x 16
- 1.18.2 Drive wheel(s):**
Make : Apollo
Number : Two
Type of tyre : Pneumatic, traction
Size : 16.9 - 28
Ply rating : 12



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- Maximum permissible loading : 1760 (apa)
capacity of each tyre at 120 kPa
pressure, (kgf)
- Recommended inflation pressure, (kPa):**
- For field work : 110
- For transport : 120
- Track width, (mm) : 1450(std.),1580,1590, 1670,1870 and 1970
Method of changing track width : By reversing the wheel disc and changing the
position of wheel disc on off-set rim lugs.
- Make & size of wheel rim : AMW W15L x 28
- 1.18.3 **Wheel base, (mm)** : 2100
Method of changing wheel
base, if any, and range : None
- 1.19 **Operator's seat:**
Make : Sonalika (apa)
Type : Cushioned with back rest
Type of suspension : Two helical coil springs
Type of dampening : Hydraulic shock absorber
- Range of adjustment of Operator's seat (mm):**
Vertical (back rest only) : Nil
Lateral : Nil
Longitudinal : ± 55
- 1.20 **Provision for safety and comfort of operator:**
- 1.20.1 **Operator's Seat:**
All parameters meets the requirements of IS: 12343-1998, (Re-affirmed in March, 2009), except the following:
i) Angle of inclination of back rest
ii) Longitudinal distance from SIP to centre of steering control wheel
- 1.20.2 **Conformity with IS: 6283 (Part 1)-2006**
All the controls are identifiable with symbols as per IS: 6283(Part 1) -2006, except the following:
Oil and lubricant frequency has not been provided
- 1.20.3 **Conformity with IS: 6283 (Part 2)-2007**
All the displays are identifiable with colour codes as per IS: 6283(Part 2) -2007.
- 1.20.4 **Conformity with IS : 8133-1983 (Re-affirmed in March, 2009), except the following:**
i) Fuel shut-off knob does not remain in "STOP" position without application of sustained manual effort.
ii) Provision of differential lock
- 1.20.5 **Conformity with IS:12239 (Part-1)-1996 (Re-affirmed in March,2007) :**
Meets the requirements of IS: 12239 (Part-1) – 1996, except the following:
i) Height of first step from ground level.
ii) Provision of spark arresting device in exhaust system.
- 1.20.6 **Conformity with IS:12239 (Part-2)-1999 (Re-affirmed in March, 2009):**
Meets the requirements of IS:12239 (Part-2)-1999, except the following:
The working clearance around the hydraulic position control lever.
- 1.20.7 **Conformity with IS: 14683 – 1999 (Re-affirmed in March, 2009):**
Lighting meets the requirements of IS: 14683 – 1999.
- 1.20.8 **Rear view mirror:**
Rear view mirror has been provided.



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1.21 Labelling of tractor [As per IS:10273-1987 (Re-affirmed in March, 2009)]:
 The labeling plate riveted on outer side of LHS mudguard provides the following information:

| | |
|---|---|
| Name of Manufacturer | : INTERNATIONAL TRACTORS LIMITED |
| Make | : INTERNATIONAL TRACTOR LTD. |
| Model | : SONALIKA INTERNATIONAL DI-750 III SUPER |
| Year of manufacture | : 2016 |
| Engine Serial Number | : 4100DL63C542623F9 |
| Chassis Serial Number | : AZZDF547290S3 |
| Maximum PTO Power, Kw (Ps) | : 32.5 (43.6) |
| Specific fuel consumption, g/kWh | : 263 (196) |

1.22 Ballast Mass, (kg):

| Particulars | | As used during drawbar test | As used during field test | | As used during Haulage test |
|-------------|---------------------------|-----------------------------|---------------------------|----------|-----------------------------|
| | | | Dry land | Puddling | |
| Front | C.I. weight | NIL | NA | NA | 80 |
| | Water | 80 | NA | NA | NIL |
| Rear | C.I. weight | 408 | NA | NA | NIL |
| | Water | 200 | NA | NA | NIL |
| | Additional weight, if any | NIL | NA | NA | NIL |

1.23 Masses:

| Particulars | | Mass of the tractor without operator but with all the liquid reservoirs full, (kg) | | |
|-------------|---|--|------|-------|
| | | Front | Rear | Total |
| i) | Without ballast | 915 | 1445 | 2360 |
| ii) | With ballast as used during drawbar performance test | 965 | 2075 | 3040 |
| iii) | With ballast as used during dry land field test (other than rotavation operation) | NA | NA | NA |
| iv) | As used during wet land cultivation | NA | NA | NA |
| v) | With ballast as used during haulage test with trailer hitch, canopy and drawbar. | 1000 | 1450 | 2450 |

1.24 Overall dimensions:

| Condition | Length, (mm) | Width, (mm) | Height, (mm) | | Ground Clearance, (mm) |
|-----------------|--------------|-------------|-------------------|-------------------|---|
| | | | with exhaust pipe | At steering wheel | |
| Without Ballast | 3720 | 1905 | 2370 | 1760 | 455, below tie rod and differential housing |

1.25 Number of external lubricating points:

- Oiling : Nil
- Grease cups : 02
- Grease nipples : 24

1.26 Colour of tractor:

- Chassis & Engine : Black

Sheet metal:

- Bonnet : Blue
- Mudguard : Blue
- Wheel rims & discs : Silver gray

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2. FUEL AND LUBRICANTS

- 2.1 Fuel** : The High-speed diesel oil supplied by M/s Indian Oil Corporation Limited having density of 0.836 g/cc at 15°C was used.

2.2 Lubricants:

| Sl. No. | Particulars | As recommended by the manufacturer | As used during the test |
|---------|--|------------------------------------|--|
| 1. | Engine oil | SAE 20 W 40 | As recommended |
| 2. | Transmission, brake & steering systems | SAE-EP- 80 | Oil originally filled in the tractor was not changed |
| 3. | Hydraulic system | SAE-EP- 80 | --do-- |
| 4. | Grease | Multipurpose Grease | As recommended |

3. PTO PERFORMANCE TEST

- Date(s) of test : 18.02.2017 & 21.02.2017
 Tractor run at the Institute prior to start : 39.48
 of PTO test (h)
 Type of dynamometer bench : ESF 1000 S Eddy current

- 3.1** The results of power take-off performance are tabulated in **Table-1** and graphically represented in Fig. 3, 4 and 5.

Table - 1

| Power, (Kw) | Speed, (rpm) | | Fuel consumption | | | Specific energy, (kWh/l) |
|--|--------------|--------|------------------|--------|---------------------|--------------------------|
| | P.T.O. | Engine | (l/h) | (kg/h) | Specific, (kg/ kWh) | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| a) Maximum power – 2 hours test: | | | | | | |
| 31.9 | 707 | 2198 | 10.71 | 8.95 | 0.281 | 2.98 |
| 30.6 | 707 | 2198 | 10.37 | 8.67 | 0.283 | 2.95* |
| b) Power at rated engine speed (2200 rpm): | | | | | | |
| 31.9 | 707 | 2198 | 10.71 | 8.95 | 0.281 | 2.98 |
| 30.9 | 707 | 2199 | 10.43 | 8.72 | 0.282 | 2.96* |
| c) Power at standard power take-off speed (540 ± 10 rpm): | | | | | | |
| 29.2 | 540 | 1680 | 8.68 | 7.26 | 0.249 | 3.36 |
| 27.9 | 540 | 1680 | 8.35 | 6.98 | 0.250 | 3.34* |
| d) Varying loads at rated engine speed: | | | | | | |
| i) Torque corresponding to maximum power available at rated engine speed: | | | | | | |
| 31.9 | 707 | 2198 | 10.71 | 8.95 | 0.281 | 2.98 |
| ii) 85% of the torque obtained in (i) : | | | | | | |
| 28.0 | 731 | 2274 | 9.94 | 8.31 | 0.297 | 2.82 |
| iii) 75% of the torque obtained in (ii): | | | | | | |
| 21.3 | 739 | 2299 | 8.25 | 6.9 | 0.324 | 2.58 |
| iv) 50% of the torque obtained in (ii) : | | | | | | |
| 14.3 | 747 | 2324 | 6.79 | 5.68 | 0.397 | 2.11 |
| v) 25% of the torque obtained in (ii): | | | | | | |
| 7.2 | 752 | 2339 | 5.45 | 4.56 | 0.633 | 1.32 |
| vi) Unloaded: | | | | | | |
| 1.8 | 756 | 2360 | 4.27 | 3.57 | 1.983 | 0.42 |



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| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--|-----|------|------|------|-------|------|
| e) Varying loads at standard PTO speed (540 ± 10 rpm): | | | | | | |
| i) Torque corresponding to maximum power at rated engine speed/ Standard PTO speed: | | | | | | |
| 29.2 | 540 | 1680 | 8.68 | 7.26 | 0.249 | 3.36 |
| ii) 85% of the torque obtained in (i): | | | | | | |
| 25.1 | 546 | 1699 | 7.58 | 6.34 | 0.253 | 3.31 |
| iii) 75% of the torque obtained in (ii): | | | | | | |
| 19.1 | 553 | 1720 | 6.18 | 5.17 | 0.271 | 3.09 |
| iv) 50% of the torque obtained in (ii): | | | | | | |
| 12.9 | 560 | 1742 | 4.86 | 4.06 | 0.315 | 2.65 |
| v) 25% of the torque obtained in (ii): | | | | | | |
| 6.6 | 569 | 1770 | 3.65 | 3.05 | 0.462 | 1.81 |
| vi) Unloaded: | | | | | | |
| 1.3 | 583 | 1814 | 2.72 | 2.27 | 1.746 | 0.48 |

*Under High ambient conditions

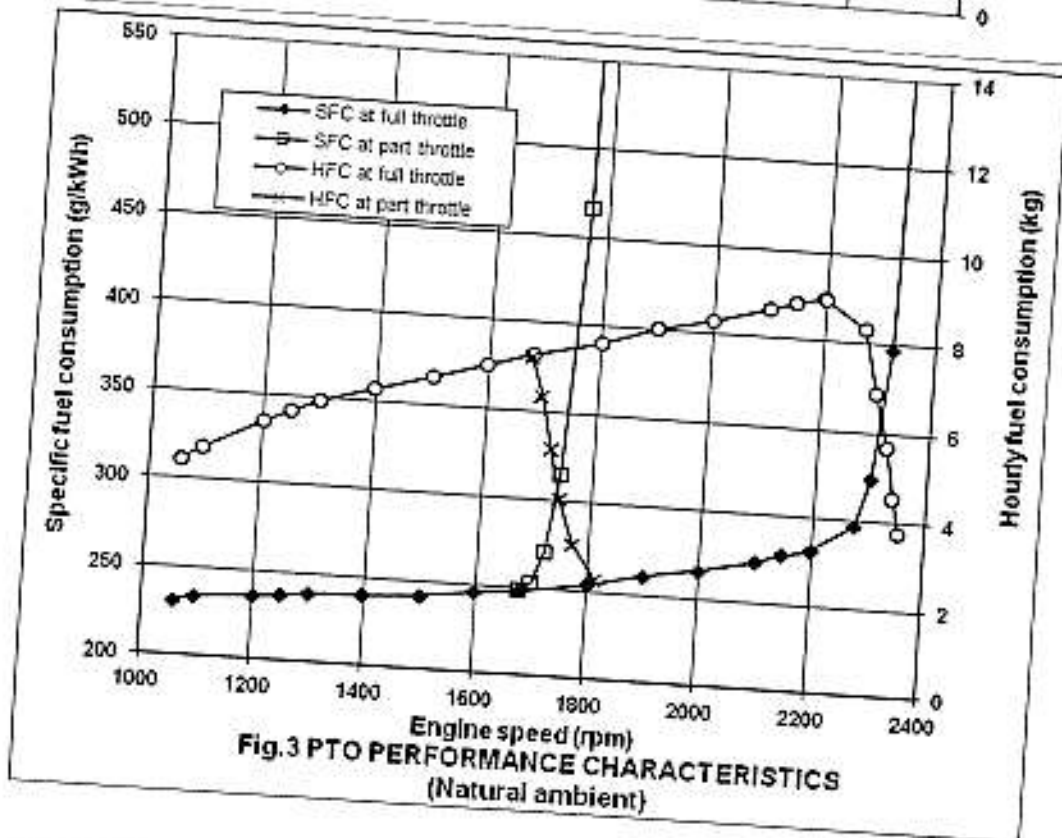
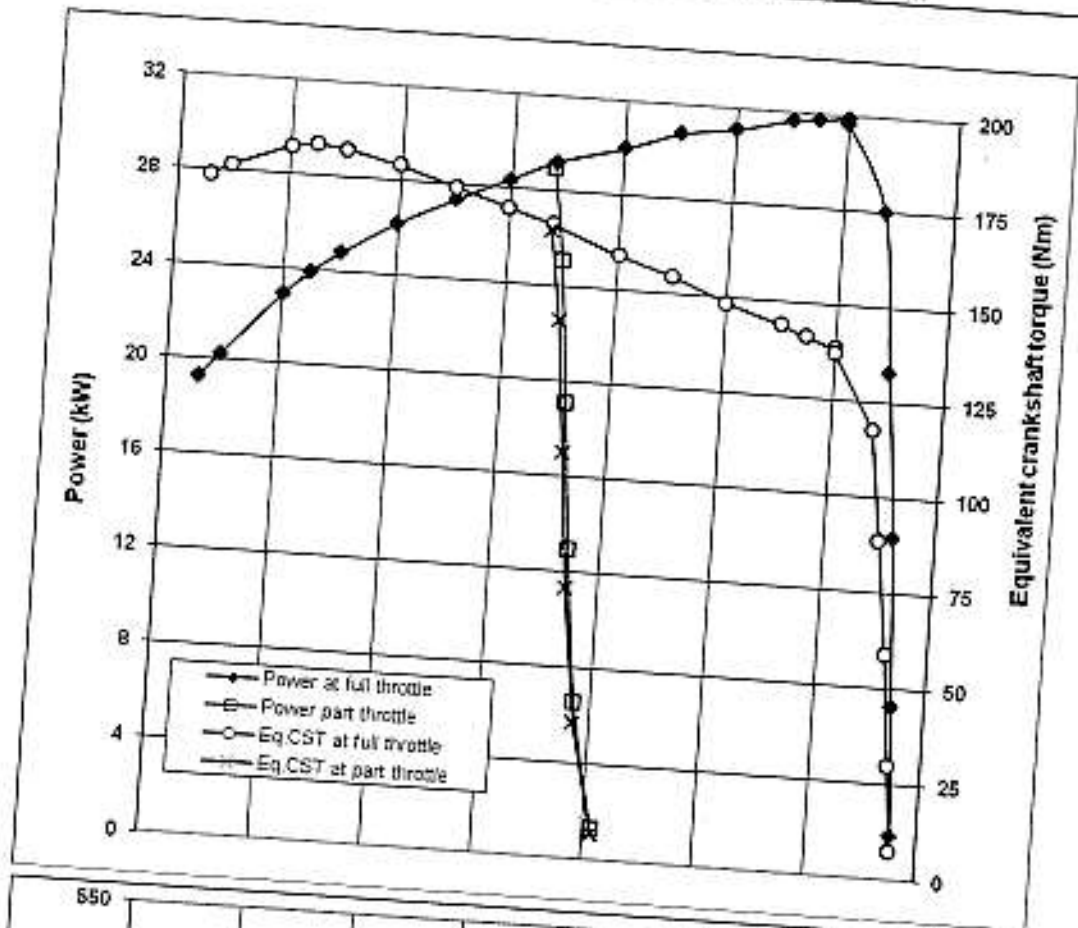


Fig.3 PTO PERFORMANCE CHARACTERISTICS
(Natural ambient)

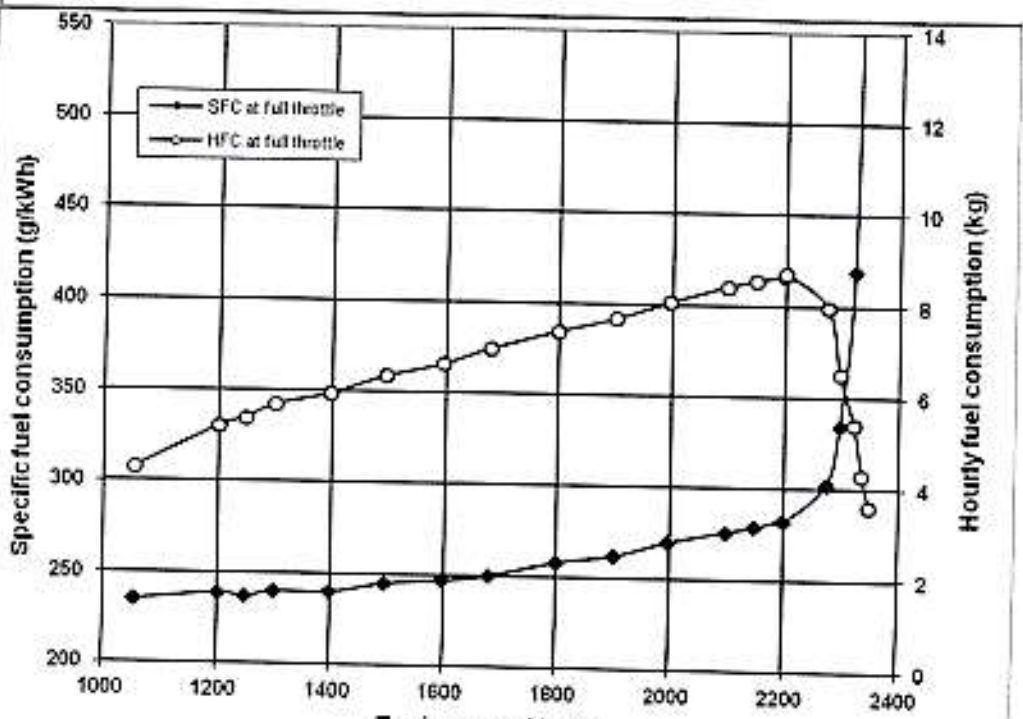
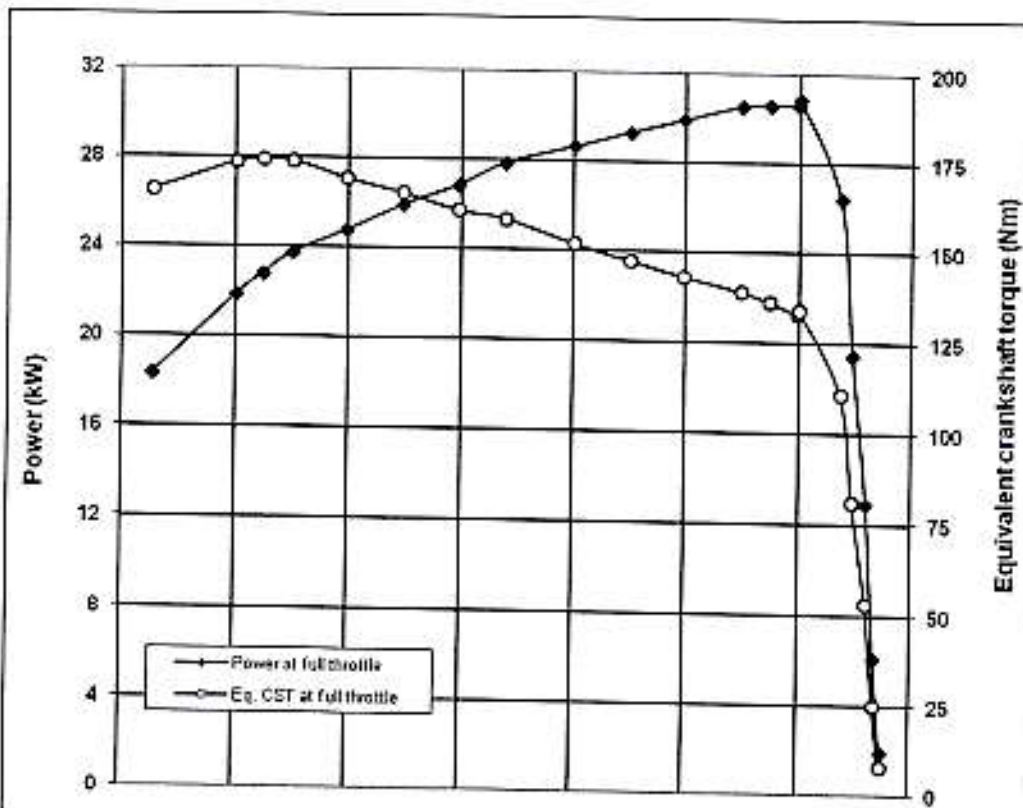
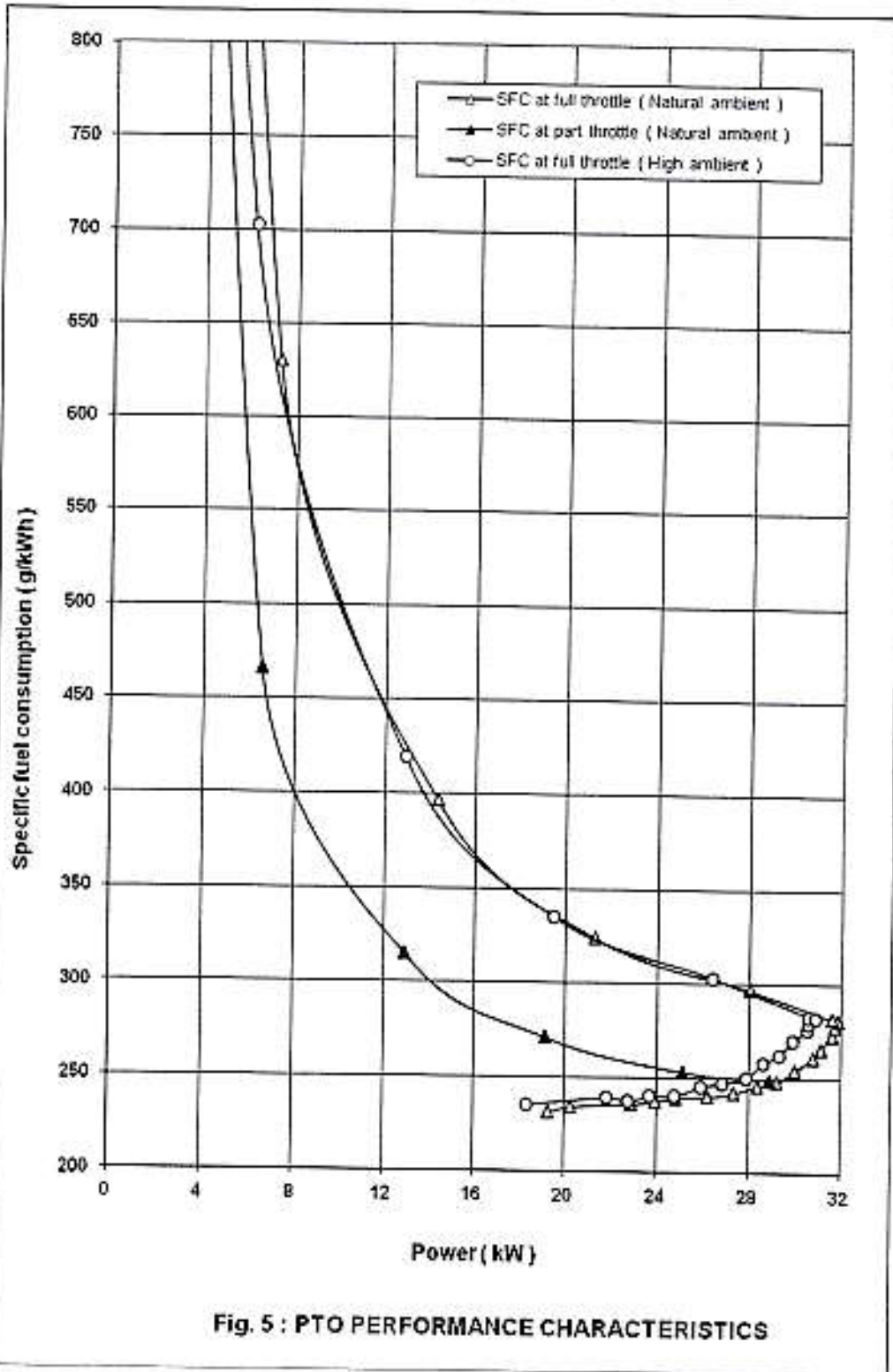


Fig. 4 PTO PERFORMANCE CHARACTERISTICS (High ambient)





| | <u>Natural ambient</u> | <u>High ambient</u> |
|---|------------------------|---------------------|
| -No load maximum engine speed, (rpm) : | 2360 | 2349 |
| -Equivalent crankshaft torque at maximum power, (Nm) : | 138.5 | 133.0 |
| -Maximum equivalent crankshaft torque, (Nm) : | 183.2 | 174.3 |
| -Engine speed at maximum Equivalent crankshaft torque, (rpm) : | 1248 | 1248 |
| - Backup torque (%) : | 32.3 | 31.1 |
| Smoke level , maximum light absorption coefficient (per meter) : | 0.18 | - |
| Range of atmospheric conditions: | | |
| - Temperature, (deg.C) : | 25 to 31 | 42 to 44 |
| - Pressure, (kPa) : | 98.6 to 100.2 | 99.6 to 101.1 |
| - Relative humidity, (%) : | 32 to 53 | 16 to 25 |
| Maximum temperatures (°C): | | |
| - Engine oil : | 98 | 107 |
| - Coolant : | 82 | 86 |
| - Fuel : | 45 | 59 |
| - Air intake : | 40 | 48 |
| - Exhaust gas : | 537 | 526 |
| Pressure at maximum power: | | |
| - Intake air, (kPa) : | 4.4 to 4.5 | 4.5 |
| - Exhaust gas, (kPa) : | 14.4 to 15.1 | 15.2 to 15.3 |
| Consumptions: | | |
| - Lub. Oil, (g/kWh) : | -- | 0.69 |
| - Coolant , (% of total coolant capacity) : | -- | 0.42 |

4. DRAWBAR PERFORMANCE TEST

| | | |
|--|---|---|
| Date(s) of test | : | 30.05.2017, 01.07.2017, 02.07.2017 & 05.07.2017 |
| Tractor run at the Institute prior to start of drawbar performance test, (h) | : | 74.44 |
| Type of track | : | Concrete |
| Height of drawbar, (mm): | | |
| - Without ballast | : | 600 |
| - With ballast | : | 570 |

- 4.1 The results of drawbar performance test consisting of maximum power and pull without ballast / with ballast and ten hours test are tabulated in **Table – 2** The results of the tests with ballast, are also represented graphically in **Fig. 6 & 7**.

Table - 2

DRAWBAR PERFORMANCE TEST

| Gear | Travel Speed, (km/h) | Draw-bar power, (kW) | Draw-bar pull, (kN) | Engine Speed, (rpm) | Wheel Slip, (%) | Fuel consumption | | Specific Energy, (kWh/l) | Atmospheric conditions | | | Temperature (°C) | | | Max. sustained pull, (kN) | |
|--|----------------------|----------------------|---------------------|---------------------|-----------------|------------------|-------|--------------------------|------------------------|-----------------|----------|------------------|------------|------------------|---------------------------|-------------|
| | | | | | | (kg/kWh) | (l/h) | | Temp (°C) | Pre-ssure (kPa) | R.H. (%) | Fuel | Trans. oil | Cool-ant (water) | | Eng-ine oil |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| i) Maximum power test (Tractor un-ballasted): | | | | | | | | | | | | | | | | |
| L1 | 2.50 | 13.5 | 18.88 | 2298 | 14.8 | 0.465 | 7.51 | 1.80 | 30 | 97.6 | 65 | 39 | 63 | 77 | 95 | 19.09 |
| L2 | 3.63 | 18.7 | 18.53 | 2273 | 15.0 | 0.402 | 8.99 | 2.08 | 32 | 97.6 | 61 | 40 | 64 | 80 | 97 | 19.29 |
| L3 | 6.00 | 25.4 | 15.23 | 2205 | 8.1 | 0.349 | 10.60 | 2.40 | 30 | 97.7 | 30 | 37 | 59 | 82 | 96 | 18.33 |
| L4 | 8.36 | 27.4 | 11.79 | 2198 | 5.2 | 0.320 | 10.49 | 2.61 | 30 | 97.7 | 60 | 37 | 55 | 82 | 94 | 15.80 |
| H1 | 11.15 | 26.9 | 8.67 | 2202 | 4.1 | 0.332 | 10.68 | 2.52 | 30 | 97.7 | 66 | 38 | 52 | 82 | 93 | 11.43 |
| ii) Maximum power test (Tractor ballasted): | | | | | | | | | | | | | | | | |
| L1 | 2.57 | 17.8 | 24.89 | 2335 | 15.4 | 0.444 | 9.45 | 1.88 | 31 | 97.6 | 52 | 39 | 64 | 79 | 96 | 26.27 |
| L2 | 3.54 | 24.5 | 24.90 | 2248 | 15.1 | 0.363 | 10.64 | 2.30 | 31 | 97.7 | 59 | 39 | 63 | 82 | 97 | 26.27 |
| L3 | 5.92 | 26.9 | 16.35 | 2202 | 8.1 | 0.326 | 10.49 | 2.56 | 30 | 97.7 | 58 | 39 | 59 | 82 | 97 | 21.12 |
| L4 | 8.51 | 26.4 | 22.85 | 2265 | 6.0 | 0.344 | 10.86 | 2.43 | 28 | 97.7 | 62 | 37 | 53 | 81 | 94 | 15.37 |
| H1 | 10.87 | 27.9 | 9.23 | 2201 | 5.2 | 0.315 | 10.51 | 2.65 | 28 | 97.7 | 64 | 35 | 38 | 80 | 90 | 11.58 |

Contd.. Table-2



Contd..Table-2

| Gear | Travel Speed, (km/h) | Draw-bar power, (kW) | Draw-bar pull, (kN) | Engine Speed, (rpm) | Wheel Slip, (%) | Fuel consumption | | Specific Energy, (kWh/h) | Atmospheric conditions | | | | Temperature (°C) | | | Max. sustained pull, (kN) |
|--|----------------------|----------------------|---------------------|---------------------|-----------------|------------------|-------|--------------------------|------------------------|-----------------|----------|----------|------------------|-----------------|-------------|---------------------------|
| | | | | | | (kg/kWh) | (l/h) | | Temp (°C) | Pre-ssure (kPa) | R.H. (%) | Fuel | Trans. oil | Coolant (water) | Eng-ine oil | |
| | | | | | | | | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| iii) Five hours test at 75 percent of pull obtained at max. Power (ballasted wheeled tractor): | | | | | | | | | | | | | | | | |
| L3 | 6.32 | 21.5 | 12.26 | 2337 | 6.51 | 0.380 | 9.96 | 2.16 | 23 to 24 | 97.6 to 97.9 | 75 to 90 | 30 to 32 | 39 to 75 | 76 to 78 | 91 to 94 | -- |
| iv) Five hours test at pull corresponding to 15 percent wheel slip (ballasted wheeled tractor): | | | | | | | | | | | | | | | | |
| L2 | 3.61 | 25.0 | 24.94 | 2288 | -- | 0.350 | 10.76 | 2.32 | 28 to 30 | 97.8 to 98.0 | 63 to 79 | 38 to 44 | 36 to 77 | 77 to 81 | 90 to 97 | -- |

i) The coolant (water) and lub oil consumption during 10 hours test were observed as nil and nil ml/h respectively.

ii) Tyre Creeping, (mm):

- LHS : 20

- RHS : 30

iii)

Maximum temperatures during entire drawbar test, (°C):

Engine oil

Coolant (Water)

Transmission oil

Fuel

: 99

: 85

: 77

: 44

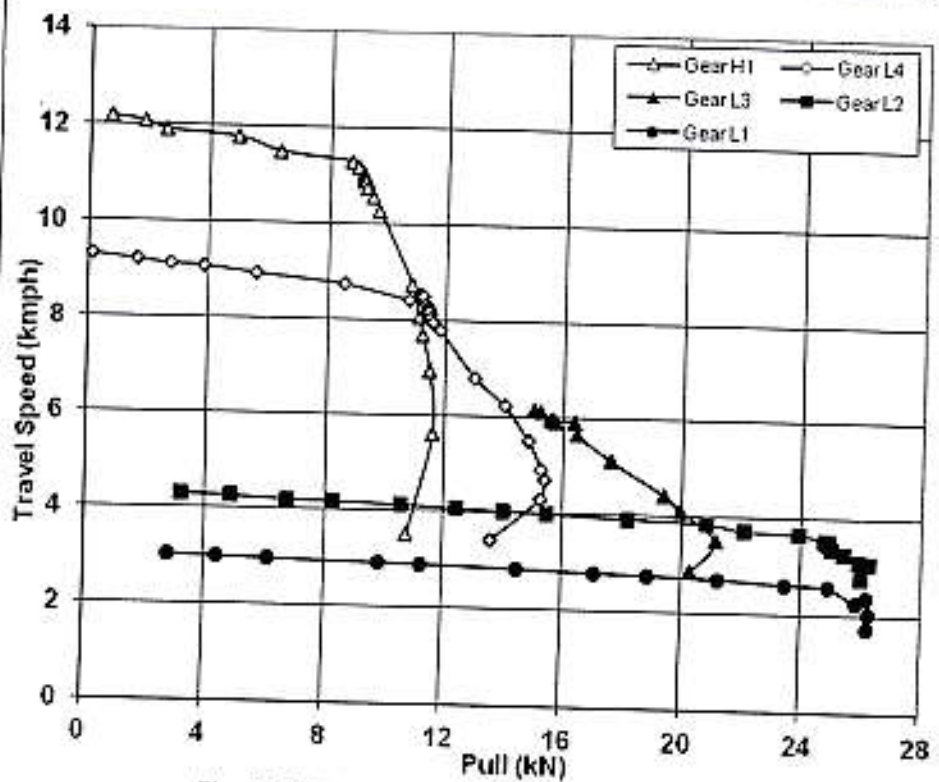
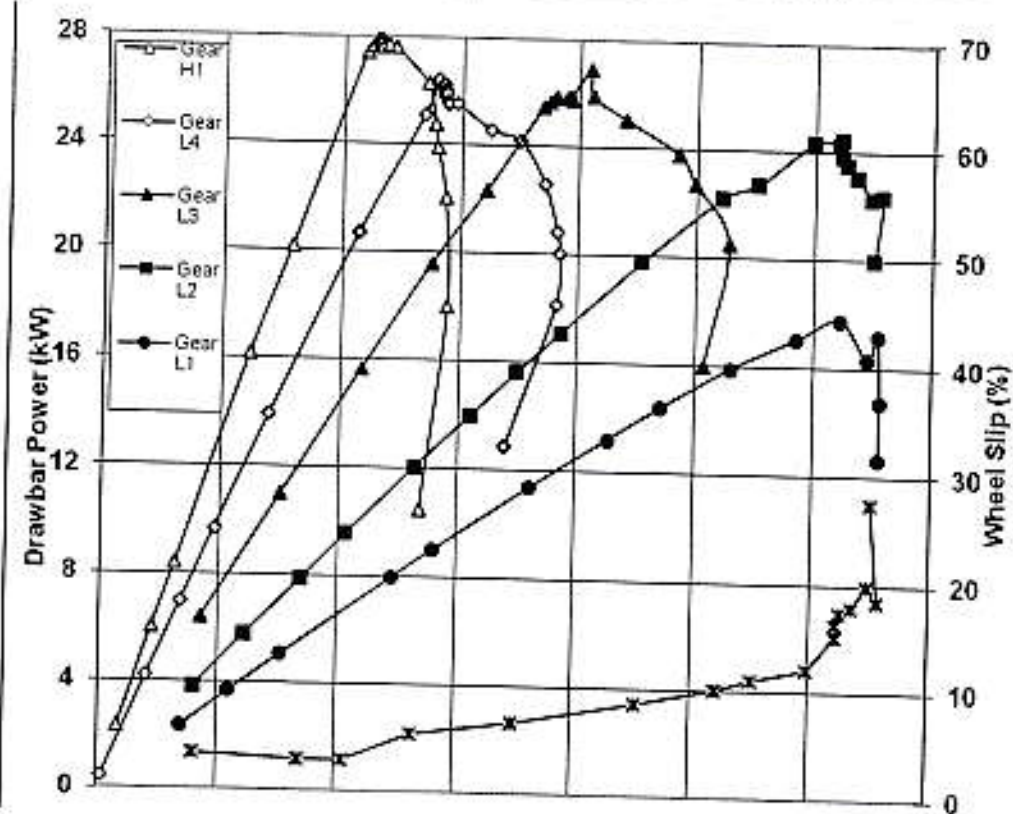


Fig. 6: DRAWBAR PERFORMANCE CHARACTERISTICS (Ballasted)

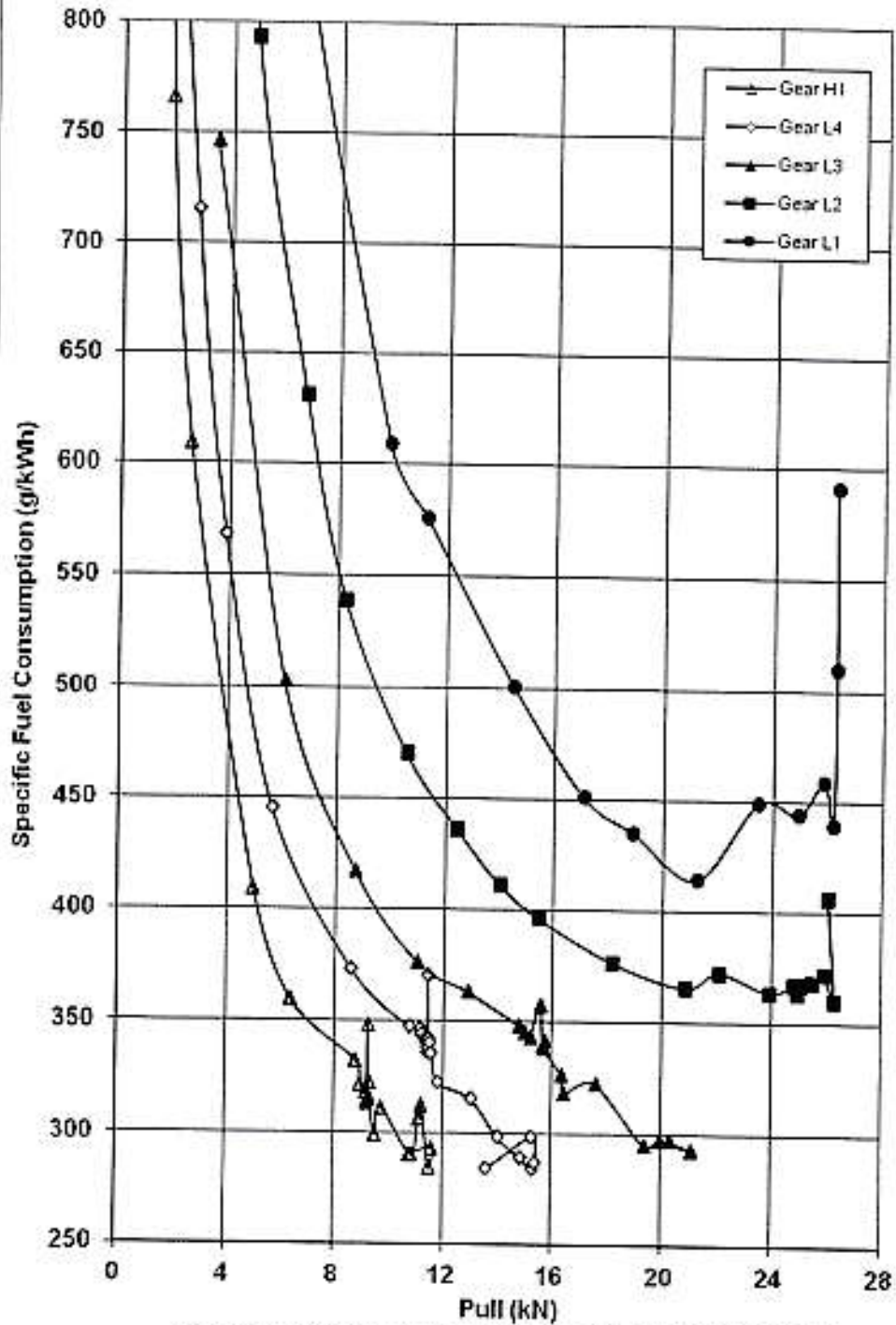


Fig. 7: DRAWBAR PERFORMANCE CHARACTERISTICS (Ballasted)



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5. POWER LIFT AND HYDRAULIC PUMP PERFORMANCE TEST

Date(s) of test : 24.04.2017 & 25.04.2017
 Tractor run at the Institute prior to start of hydraulic test, (h) : 58.03
 Pump speed at rated engine speed,(rpm) : 2200 (apa)

5.1 Hydraulic power test:

Pump delivery rate at minimum pressure and rated engine speed (l/min) : 25.90
 Maximum hydraulic power,(kW) : 4.4
 Pump delivery rate at maximum hydraulic power, (l/min) : 16.0
 Pressure at maximum hydraulic power, (Mpa) : 16.5
 Sustained pressure of the open relief Valve, (Mpa) : 20.0

Tapping point:

a) Relief valve test : External circuit
 b) Pump performance test : Pump outlet
 Temperature of hydraulic fluid, (°C) : 60 to 65

5.2 Lifting capacity test:

| Test | Height of lower hitch point above ground in down position, (mm) | Vertical Movement with lifting force, (mm) | Maximum corrected force exerted through full range, (kN) | Corresponding pressure (Mpa) | Moment about rear axle, (kN-m) | Maximum tilt angle of mast from vertical (degrees) |
|-----------------------|---|--|--|------------------------------|--------------------------------|--|
| At hitch points | 200 | 545 | 18.61 | 18.0 | 16.28 | — |
| On the standard frame | 200 | 530 | 16.82 | 18.0 | 24.98 | 11 |

5.3 Maintenance of lift load:

Force applied at the frame, (kN) : 15.15
 Temperature of hydraulic fluid at the start of test, (°C) : 60

Test data:

| | | | | | | |
|---|----|----|----|----|----|----|
| Elapsed Time, (minute) | 5 | 10 | 15 | 20 | 25 | 30 |
| Cumulative drop in height of lift, (mm) | 24 | 37 | 45 | 51 | 63 | 78 |



6. BRAKE TEST

6.1 Service brake:

6.1.1 Cold brake test:

Date of test : 27.02.2017 & 28.02.2017
 Type of track : Concrete
 Maximum attainable speed (kmph):
 - Unballasted Tractor : 35
 - Road Ballasted Tractor : 35

| | | Maximum attainable speed (kmph) | | | |
|-------------------------|---|---------------------------------|-------|-------|-------|
| Unballasted Tractor | Braking device control force, (N) | 508 | 443 | 378 | 312 |
| | Mean deceleration, (m/ sec ²) | 3.16 | 3.07 | 2.76 | 2.50 |
| | Stopping distance, (m) | 14.88 | 15.38 | 17.14 | 18.90 |
| Road Ballasted Tractor | Braking device control force, (N) | 529 | 467 | 404 | 342 |
| | Mean deceleration, (m/ sec ²) | 3.10 | 2.98 | 2.90 | 2.50 |
| | Stopping distance, (m) | 15.34 | 15.87 | 16.31 | 18.90 |
| At 25 kmph travel speed | | | | | |
| Unballasted Tractor | Braking device control force, (N) | 470 | 424 | 379 | 333 |
| | Mean deceleration, (m/ sec ²) | 2.70 | 2.65 | 2.52 | 2.50 |
| | Stopping distance, (m) | 8.10 | 9.09 | 9.56 | 9.65 |
| Ballasted Tractor | Braking device control force, (N) | 474 | 436 | 398 | 360 |
| | Mean deceleration, (m/ sec ²) | 2.90 | 2.77 | 2.66 | 2.50 |
| | Stopping distance, (m) | 8.44 | 8.72 | 9.07 | 9.65 |

6.1.2 Brake fade test:

| | | Maximum attainable speed (kmph) | | | |
|-------------------------|-----------------------------------|---------------------------------|-------|-------|-------|
| Ballasted Tractor | Braking device control force, (N) | 596 | 513 | 429 | 345 |
| | Mean deceleration, (m/sec.sq.) | 2.96 | 2.86 | 2.78 | 2.50 |
| | Stopping distance, (m) | 16.01 | 16.54 | 17.02 | 18.90 |
| At 25 kmph travel speed | | | | | |
| Ballasted Tractor | Braking device control force, (N) | 496 | 490 | 484 | 478 |
| | Mean deceleration, (m/sec.sq.) | 2.56 | 2.58 | 2.55 | 2.50 |
| | Stopping distance, (m) | 9.29 | 9.36 | 9.44 | 9.65 |

Max. deviation of tractor from its original course, (m) : Nil
 Abnormal vibration : Nil
 The brakes were heated by : Self braking

6.2 Parking brake test:

| Particulars | Parked on 18 percent slope | | Parked on 12 percent slope with trailer of 2.4 tones | |
|-----------------------------------|----------------------------|-------------|--|-------------|
| | Facing Up | Facing Down | Facing Up | Facing Down |
| Braking device control force, (N) | 240 | 270 | 211 | 116 |
| Efficacy of parking brake | ----- Effective ----- | | | |



7. NOISE MEASUREMENT

7.1 Noise at bystander's position:

Date of test : 13.02.2017
 Type of track : Concrete
 Background noise level, Db (A) : 54.4

Atmospheric conditions:

Temperature, (°C) : 31.2
 Pressure, (kPa) : 98
 Relative humidity, (%) : 48
 Wind velocity, (m/s) : 2.5

TEST DATA:

| S. No. | Gear | Travelling speed before acceleration, (kmph) | Noise level, Db (A) |
|--------|------|--|---------------------|
| 1. | L1 | 2.26 | 86 |
| 2. | L2 | 3.21 | 86 |
| 3. | L3 | 5.09 | 86 |
| 4. | L4 | 6.83 | 86 |
| 5. | H1 | 8.96 | 85 |
| 6. | H2 | 13.13 | 85 |
| 7. | H3 | 20.33 | 84 |
| 8. | H4 | 26.94 | 83 |

7.2 Noise at operator's ear level:

Date of test : 30.06.2017
 Type of track : Concrete
 Background noise level, Db (A) : 57

Atmospheric conditions:

Temperature, (°C) : 32
 Pressure, (kPa) : 97.6
 Relative humidity, (%) : 61
 Wind velocity, (m/s) : 1.1

Test data:

| Gear | Drawbar pull at which the tractor develops the max. noise level, (Kn) | Corresponding travelling speed, (kmph) | Noise level Db (A) |
|------|---|--|--------------------|
| L1 | 3.58 to 18.88 | 3.03 to 2.58 | 94 |
| L2 | 8.48 to 18.53 | 4.16 to 3.63 | 95 |
| *L3 | 7.83 to 15.01 | 6.54 to 6.04 | 95 |
| L4 | 0.45 to 11.79 | 9.36 to 8.32 | 94 |
| H1 | 0.29 to 7.32 | 6.78 to 6.65 | 94 |

*Gear corresponds to the nominal travelling speed nearest to 7.5 kmph.



8. AIR CLEANER OIL PULL OVER TEST

| | |
|-------------------------------|----------------|
| Date of test | : 02.03.2017 |
| Atmospheric conditions | |
| Temperature, (°C) | : 26 |
| Pressure, (kPa) | : 97.2 to 96.9 |
| Relative humidity, (%) | : 38 to 43 |
| Mass of oil before test, (g) | : 802.9 |

| Sl No. | Position of tractor | Loss of oil (g) | Oil pull-over (%) | Engine oil pressure |
|--------|---|-----------------|-------------------|---------------------|
| i) | Tractor parked on level ground | 1.0 | 0.11 | Normal |
| ii) | Tractor tilted to 15 deg laterally with RHS up | 0.7 | 0.08 | Normal |
| iii) | Tractor tilted to 15 deg laterally with LHS up | 1.0 | 0.11 | Normal |
| iv) | Tractor tilted to 15 deg longitudinally with front end up | 0.6 | 0.07 | Normal |
| v) | Tractor tilted to 15 deg longitudinally with rear end up | 0.2 | 0.02 | Normal |

9. MECHANICAL VIBRATION MEASUREMENT

| | |
|----------------------|--------------|
| Date of test | : 28.02.2017 |
| Type of test surface | : Concrete |

| Sl. No. | Measuring points | Vibration, microns | | | | |
|---------|------------------------------|--------------------|------|--|------|------|
| | | At no load | | At load corresponding to 85% of max. pto power | | |
| | | VD | HD | VD | HD | |
| i) | Foot rest | Left | 100 | 90 | 200* | 220* |
| | | Right | 160* | 20 | 250* | 170* |
| ii) | Steering wheel | 60 | 80 | 50 | 160* | |
| iii) | Seat | Bottom | 10 | 10 | 40 | 20 |
| | | Back | 30 | 50 | 40 | 30 |
| iv) | Mudguard | Left | 120* | 90 | 120* | 40 |
| | | Right | 30 | 20 | 100 | 70 |
| v) | Head light | Left | 100 | 120* | 160* | 180* |
| | | Right | 50 | 50 | 210* | 180* |
| vi) | Battery base, centre | 40 | 50 | 240* | 130* | |
| vii) | Tail light | Left | 100 | 70 | 90 | 60 |
| | | Right | 50 | 60 | 60 | 60 |
| viii) | | 30 | 20 | 40 | 10 | |
| ix) | Gear shifting lever | 60 | 30 | 30 | 20 | |
| x) | Accelerator lever | Hand | 240* | 30 | 140* | 60 |
| | | Foot | 140* | 100 | 80 | 100 |
| xi) | Brake pedal | Left | 120* | 90 | 160* | 40 |
| | | Right | 130* | 140* | 150* | 110* |
| xii) | Clutch pedal | 110* | 100 | 150* | 60 | |
| xiii) | Main hydraulic control lever | 40 | 30 | 30 | 40 | |
| xiv) | PTO engaging lever | 20 | 60 | 90 | 90 | |
| xv) | Differential lock pedal | - | - | - | - | |

* The amplitude of mechanical vibration is on higher side.



10. FIELD TEST

The major breakdowns were not observed in the field test during Initial Commercial Test of this tractor model as tested vide test report No. T-825/1334/2012, April 2012. So as per the provision as laid down in Clause 7.2 of IS: 12207 – 2014, the field test during the batch testing of this tractor model was not conducted.

11. HAULAGE TEST

| Type of trailer: | Two wheel (Single axle) | Four wheel (Double axle) |
|---|----------------------------|-----------------------------|
| Gross mass of trailer, (ton) | 5.0 | 6.5 |
| Height of trailer hitch above ground level, (mm) | 590 | 555 |
| Gear used during the test for negotiating slopes upto 8% | H-4 | H-4 |
| Average travel speed, (kmph) | 31.81 to 35.96 | 35.05 |
| Average fuel consumption: | | |
| - (l/h) | 7.61 to 8.95 | 7.62 to 8.30 |
| - (ml/km/ton) | 47.87 to 49.80 | 33.47 to 36.45 |
| Average distance traveled per litre of fuel consumption, (km) | 4.01 to 4.17 | 4.22 to 4.59 |
| General observations: | | |
| Effectiveness of brakes | Effective | Effective |
| Maneuverability of tractor-trailer combination | Satisfactory | Satisfactory |

12. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

| S. No. | Adjustments, Defects, Breakdowns and Repairs | Tractor run hours |
|--------|--|-------------------|
| - | None | -- |

13. COMPONENTS / ASSEMBLY INSPECTION

The engine and other assemblies were dismantled after 92.2 hours of tractor operation at this Institute.

13.1 Engine:

13.1.1 Cylinder bore:

| Cylinder No. | Cylinder bore dia, (mm) | | | | | | Max. permissible limit, (mm) |
|--------------|-------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------------------|
| | Top position | | Middle position | | Bottom position | | |
| | Thrust side | Non-thrust side | Thrust side | Non-thrust side | Thrust side | Non-thrust side | |
| 1. | 100.06 | 100.06 | 100.06 | 100.06 | 100.05 | 100.06 | 100.30 |
| 2. | 100.05 | 100.05 | 100.05 | 100.05 | 100.04 | 100.05 | |
| 3. | 100.05 | 100.04 | 100.06 | 100.05 | 100.05 | 100.04 | |
| 4. | 100.05 | 100.05 | 100.05 | 100.04 | 100.04 | 100.05 | |

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**13.1.2 Piston:**

| Piston No. | Piston dia, (mm) | | | | Max. permissible wear limit, | Piston to cylinder liner clearance at skirt (mm) | |
|------------|----------------------------------|-----------------|-------------|-----------------|------------------------------|--|---------------|
| | Top (above top compression ring) | | At skirt | | | As observed | Discard limit |
| | Thrust Side | Non-thrust side | Thrust side | Non-thrust side | | | |
| 1. | 99.412 | 99.294 | 99.941 | ** | 99.60 | 0.119 | 0.35 |
| 2. | 99.427 | 99.347 | 99.921 | ** | | 0.129 | |
| 3. | 99.419 | 99.336 | 99.928 | ** | | 0.132 | |
| 4. | 99.430 | 99.360 | 99.931 | ** | | 0.119 | |

** Not measured due to piston design constraints.

13.1.3 Ring end gap:

| Rings | Ring end gap, (mm) | | | | | | | | | | | | Max. Permissible end gap limit, (mm) | |
|----------------------------|--------------------|--------|--------|---------------|--------|--------|----------------|--------|--------|---------------|--------|--------|--------------------------------------|------|
| | Cylinder No.1 | | | Cylinder No.2 | | | Cylinder No. 3 | | | Cylinder No.4 | | | | |
| | Top | Middle | Bottom | Top | Middle | Bottom | Top | Middle | Bottom | Top | Middle | Bottom | | |
| 1 st Comp. Ring | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 2.00 |
| 2 nd Comp. Ring | 0.90 | 0.90 | 0.90 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 2.00 |
| Oil ring | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 0.70 | 2.00 |

13.1.4 Ring side clearance:

| Rings | Ring side clearance, (mm) | | | | Max. Permissible clearance Limit, (mm) |
|----------------------------------|---------------------------|-----------|------------|-----------|--|
| | Piston-I | Piston-II | Piston-III | Piston-IV | |
| 1 st Compression ring | -Tapered- | | | | -- |
| 2 nd Compression ring | 0.055 | 0.043 | 0.053 | 0.044 | 0.140 |
| Oil ring | 0.043 | 0.048 | 0.050 | 0.045 | 0.130 |

13.1.5 Main bearings:

| Bearing No. | Diametrical Clearance, (mm) | Crankshaft end Float, (mm) | Max. permissible clearance limit, (mm) | |
|-------------|-----------------------------|----------------------------|--|----------------------|
| | | | Diametrical clearance | Crankshaft end float |
| 1. | 0.068 to 0.073 | 0.20 | 0.40 | 0.60 |
| 2. | 0.074 to 0.094 | | | |
| 3. | 0.076 to 0.080 | | | |
| 4. | 0.072 to 0.082 | | | |
| 5. | 0.074 to 0.080 | | | |

13.1.6 Big end bearings:

| Bearing No. | Clearance, (mm) | | Max. permissible clearance limit, (mm) | |
|-------------|-----------------|-------|--|-------|
| | Diametrical | Axial | Diametrical | Axial |
| 1. | 0.074 to 0.090 | 0.25 | 0.31 | 1.00 |
| 2. | 0.092 to 0.095 | 0.25 | | |
| 3. | 0.090 to 0.098 | 0.25 | | |
| 4. | 0.084 to 0.087 | 0.25 | | |

13.1.7 Valve, guides and timing gears:

Observation

Any marked sign of overheating of valves : **None**

Pitting of seat/faces of valves : **None**

Any visual damage to the teeth of timing gears : **None**



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Spring Rate, (N/mm):

- Intake valve spring (inner) : 2.06 to 2.75
- Exhaust valve spring (inner) : 2.65 to 2.84
- Intake valve spring (outer) : 5.83 to 6.22
- Exhaust valve spring (outer) : 5.98 to 6.33

Against the discard limit of 2.12 N/mm for inner spring and 5.61 N/mm for outer spring.

Clearance between valve guide and valve stem, (mm):

- Intake valve : 0.045 to 0.060
- Exhaust valve : 0.040 to 0.053

Against the discard limit of 0.10 intake and exhaust valves

13.2 Clutch:

- Any marked wear on clutch friction plate(s) : None
- Condition of clutch release bearing : Normal
- Condition of pilot bearing : Normal
- Condition of diaphragm : Normal
- Presence of oil in clutch housing : None
- Any marks on fly wheel/pressure plate : None
- Overall thickness of clutch plate,(mm)

- Transmission : 11.13 to 11.39
- PTO : 7.60 to 7.65
- Height of lining over rivet head, (mm) :
- Transmission : 1.22 to 1.59
- PTO : 1.14 to 1.26

Against discard limit up to rivet head
Against discard limit up to rivet head for transmission and PTO clutch plate

13.3 Transmission gears:

- Any visual damage, pitting & chipping of any transmission gear teeth : None
- Backlash between crown wheel and Pinion, (mm) : 0.22

Against discard limit of 1.0 mm

13.4 Brakes:

| Description | Initial specified overall thickness of brake disc, (mm) | Measured overall thickness of brake disc after test, (mm) | Measured depth of brake lining over metal plate, (mm) | Minimum permissible depth of oil groove (mm) |
|-------------|---|---|---|--|
| Left | 4.8+0.2 | 4.79 to 4.91 | 1.02 to 1.24 | NA |
| Right | 4.8+0.2 | 4.85 to 4.99 | 1.04 to 1.33 | NA |

13.5 Front axle:

- Any marked wear of king pins : None
- Any marked wear of kin pin bushes : None
- Clearance between king pin and bushes : 0.08 to 0.13
- Condition of thrust bearing : Normal
- Condition of bearings for stub axles : Normal
- Condition of front axle seals and bearings : Normal
- Any visual damage, pitting & chipping of any front axle transmission gear teeth : None
- Condition of centre pin and bushes : Normal
- Clearance between centre pin and bush, (mm) : 0.14 to 0.15

Against discard limit of 1.0 mm

Against discard limit of 1.0 mm



- 13.6 Steering system:**
Visual condition of the components : Normal
of complete steering assembly

**14. COMPARISON OF SPECIFICATION AND PERFORMANCE CHARACTERISTICS OF
PREVIOUS SAMPLE (TEST REPORT No. T-825/1334/2012, April) AND PRESENT SAMPLE**

| 14.1 Specification: | <u>Previous sample</u> | <u>Present sample</u> |
|---|--|--|
| 14.1.1 Tractor: | | |
| Make | : International Tractors Limited | International Tractors Limited |
| Model | : Sonalika International DI-750 III Super | Sonalika International DI-750 III Super |
| 14.1.2 Engine: | | |
| Make | : International Tractors Limited | International Tractors Limited |
| Model | : 4100 IL | 4100 IL (apa) |
| Bore/Stroke, (mm) | : 100 / 118 | 100 / 118 |
| Specified cubic capacity, (cc) | : 3707 | 3707 |
| Rated engine speed (rpm) | : 2200 | 2200 |
| 14.1.2.1 Fuel system: | | |
| Make & model of fuel feed pump | : Bosch, India & FP/KS 22AD 48/2, 9 440 030 011 | Bosch, India & FP/KE 22AD 48/2, 9 440 030 011 |
| Make & model of fuel filters | : Bosch, India & F002 H20 109 | Bosch, India & F002 H20 109 |
| Make and model of fuel injection pump | : Bosch, India & F002 AOZ 693, PES4A90D320RS3500 | Bosch, India & F002 AOZ 693, PES4A90D320RS3500 |
| Make & model of fuel injectors | : Bosch, India & F 002 C70 552 | Bosch, India & F 002 C70 552 |
| Type of injector | : Multi hole (Five holes) | Multi hole (Five holes) |
| Manufacturer's production pressure setting, (Mpa) | : 25.0 + 0.8 | 25.0+0.8 |
| Injection timing | : 12 ± 2 degree BTDC | 12 ± 2 degree BTDC |
| Make & model of governor | : Bosch, India & RSV 325....1100A5C 1572R | Bosch, India & RSV 325....1100A5C 1572R |
| 14.1.2.2 Lubricating system: | | |
| Total lubricating oil capacity, (l) | : 12.00 | 11.46 |
| 14.1.2.3 Cooling system: | | |
| Type | : Forced circulation of water | Forced circulation of liquid |
| Bare radiator capacity, (l) | : 5.00 | 5.00 |
| Capacity of expansion tank, (l) | : Not applicable | 1.00 |
| Total lubricating oil capacity, (l) | : 11.85 | 11.92 |
| 14.1.3 Transmission: | | |
| 14.1.3.1 Clutch: | | |
| Type of clutch plate | : Dual, dry friction plate & pads | |
| Size, (mm),(OD/ID) | | |
| - Main transmission | : 280/165 φ | 279.4 /164.6 φ and 28.0 cm ² contact area of each pad having Five pads. |
| -PTO | : 280.0 φ mm outer dia and 28.1 cm ² contact area of each pad having four pads. | 280.0 /165.5 φ |



| | | Previous sample | Present sample |
|-----------------|--|-------------------------------------|--|
| 14.1.3.2 | Gear Box: | | |
| | No. of speeds: | | |
| | - Forward | 8 | 8 |
| | - Reverse | 2 | 2 |
| | Range of speed, (kmph) : | | |
| | - Forward | 2.82 to 34.45 | 2.82 to 34.44 |
| | - Reverse | 3.73 to 14.99 | 3.73 to 15.00 |
| 14.1.4 | Service Brake: | | |
| | Type | Mechanical, oil immersed disc brake | |
| | No. of friction disc | Four (on each wheel side) | |
| | Area of liners, (cm ²) | 950.3 (on each wheel side) | 915.1 (on each wheel side) |
| 14.1.5 | Wheel equipment: | | |
| | Make & Size of tyres | | |
| | - Front | 7.50 - 16, 8 PR | 7.50 - 16, 8 PR |
| | - Rear | 16.9 - 28, 12 PR | 16.9 - 28, 12 PR |
| | Standard Track width, (mm): | | |
| | - Front | 1340 | 1360 |
| | - Rear | 1460 | 1450 |
| 14.1.5.1 | Wheel base, (mm) | 2100 | 2100 |
| 14.1.6 | Overall dimensions, (mm): | | |
| | - Length | 3700 | 3720 |
| | - Width | 1910 | 1905 |
| | - Height (at steering wheel) | 1770 | 1760 |
| | - Ground clearance, (mm) (below trailer hitch mounting bracket) | 445 (below tie rod) | 455 (below tie rod & differential housing) |
| 14.1.7 | Operational mass (kg),(unballast): | | |
| | - Front | 925 | 915 |
| | - Rear | 1455 | 1445 |
| | - Total | 2380 | 2350 |
| 14.1.8 | Conformity with following IS: | | |
| | i) Guide lines for declaration of power and specific fuel consumption and labeling of agricultural tractors (First Revision) [IS 10273:1987 (Reaffirmed in March, 2009)] | Conformed | Conforms |
| | ii) Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3 (third revision)[IS: 4931-1995 (Reaffirmed in March, 2009)] | Conformed | Conforms |
| | iii) Agricultural wheeled tractors - Rear mounted three-point linkage: Part 1 Categories 1, 2, 3 & 4 (fourth revision) [IS 4468(Part-I):1997/ISO 730-1:1994 (Reaffirmed in March, 2007)] | Did not Conform | Does not conform |
| | iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in March, 2007)] | Conformed | Does not conform |
| | v) Agricultural tractors - Operator's seat technical requirement [IS 12343 -1998 (First revision) (Reaffirmed in March, 2009)] | Did not Conform | Does not conform |
| | vi) Guide for safety & comfort of operator of agricultural tractor Part 1 general requirement (first revision) [IS: 12239 (Part-1) 1996/ISO 4254-I: 1989. (Re-affirmed in March, 2007)] | Did not conform | Does not conform |



| | |
|------------------|---|
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|------------------|---|

| | Previous sample | Present sample |
|--|-------------------|------------------|
| vii) Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) (IS 12239 (PT-2) 1999) (Re-affirmed in March, 2009.) | : Did not conform | Does not conform |
| viii) Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) (IS: 8133-1983) (Re-affirmed in March, 2009) | : Did not conform | Does not conform |
| ix) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment – symbols for operator controls and other displays. (Second Revision) (IS :6283 (Part-I)-2006 | : Did not conform | Does not conform |
| x) Tractors and machinery for agriculture and forestry, powered lawn and garden equipment – symbols for operator controls and other displays. (Second Revision) [IS :6283 (Part-II)-2007 Part – 2: Symbols for agriculture tractors and machinery/ISO3767-2: 1991] | Did not conform | Conforms |
| xi) Agricultural tractor and machinery lighting device for travel on public roads (IS: 14683-1999) (Reaffirmed in March, 2009) | : Conformed | Conforms |
| 14.2 Performance Characteristics: | | |
| 14.2.1 PTO Performance: | | |
| Maximum Power, (Kw) | : 31.1 | 31.9 |
| Power at Rated engine speed,(Kw) | : 31.1 | 31.9 |
| Specific fuel consumption corresponding to maximum power, (g/kWh) | : 261 | 281 |
| Maximum equivalent crankshaft torque,(Nm) | : 182.0 | 183.2 |
| Back up torque, (%) | : 34.6 | 32.3 |
| Maximum temperatures (degree): | | |
| Engine oil | : 116 | 107 |
| Coolant | : 99 | 86 |
| Fuel | : 66 | 59 |
| Air intake | : 51 | 48 |
| Exhaust gas | : 478 | 537 |
| Lub oil consumption, (g/kWh) | : 0.38 | 0.69 |
| 14.2.2 Drawbar performance : | | |
| Maximum power with un-ballasted tractor, (kW) | : 28.2 | 28.7 |
| Maximum pull with un-ballasted Tractor, (kN) | : 18.88 | 18.88 |
| Maximum transmission oil temperature (deg. C) | : 78 | 77 |
| 14.2.3 Hydraulic performance: | | |
| Hydraulic pump discharge at minimum pressure and rated engine speed (l/min.) | : 24.5 | 25.90 |
| Maximum hydraulic power, (kW) | : 5.7 | 4.4 |
| Sustained pressure of the open relief valve, (Mpa) | : 19.5 | 20.0 |



| Maximum lifting capacity, (kN): | Previous sample | Present sample |
|---|-----------------|----------------|
| - At the hitch point | : 16.84 | 18.61 |
| - At the standard frame | : 12.18 | 16.82 |
| Total drop in height of lift during load maintenance test, (mm) | : 10 | 78 |

14.2.4 Brake performance test at 25 kmph speed (max):

| Parameter | Cold | | Hot | |
|---|--------------|------|------------|------|
| | Cold | Hot | Cold | Hot |
| Maximum Stopping distance, (m): | 6.95 | 7.80 | 8.44 | 9.29 |
| Maximum force exerted on the brake Pedal effort required to achieve deceleration of 2.5 m/sq sec, (N) | : 290 to 380 | | 333 to 478 | |
| Whether parking brake is effective at a force of 600N at foot pedal (s) or 400 N at hand lever | : Effective | | Effective | |

14.2.5 Noise measurement:

| | | |
|--|------|----|
| - Maximum noise at bystanders position, Db(A) | : 85 | 86 |
| - Maximum noise at operator's ear level, Db(A) | : 96 | 95 |

14.2.6 Mechanical vibration:

| | | | | |
|--|-------------|--|-----------|--|
| Maximum amplitude of vibration at (microns): | | | | |
| - Foot rest – LHS & RHS | : 240 & 600 | | 220 & 250 | |
| - Steering wheel | : 300 | | 160 | |
| - Driver's seat, (driver in seat): | : 90 | | 50 | |

14.2.7 Haulage Test:

| | Two wheel trailer | Four wheel trailer | Two wheel trailer | Four wheel trailer |
|---|-------------------|--------------------|-------------------|--------------------|
| -Gross mass of trailer, (ton) | : 5.0 | 6.5 | 5.0 | 6.5 |
| - Average speed, (kmph) | : 25.45 to 25.95 | 23.78 to 24.51 | 31.81 to 35.96 | 35.05 |
| -Distance traveled per litre of fuel consumed, (km) | : 5.61 to 5.86 | 5.29 to 5.42 | 4.01 to 4.17 | 4.22 to 4.59 |
| - Average fuel consumption (ml/km/ton) | : 34.2 to 35.7 | 28.4 to 29.1 | 47.87 to 49.80 | 33.47 to 36.45 |



| | |
|------------------|---|
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14.3 Qualifying performance (comparable limit) for batch model in comparison to ICT model (please refer Clause 7.6 of IS: 12207-2014):

| S. No. | Characteristic | Requirements as per IS: 12207-2014 | | As observed | | Whether meets the requirement (Yes/No) |
|--|---|--|---|-----------------|----------------|--|
| | | Column 4 of Table-1 | Clause 7.6 | Previous sample | Present sample | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 14.3.1 Drawbar performance: | | | | | | |
| a) | Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (Kn) | Minimum 65% of static mass with ballast | The performance shall be within 7.5% of ICT or limit specified under Column 3 whichever is higher | 26.18 | 24.90 | Yes |
| b) | Maximum drawbar pull without ballast corresponding to 15 percent wheel slip, (Kn) | Minimum 65% of static mass of tractor without ballast | | 18.88 | 18.88 | Yes |
| c) | Maximum drawbar power without ballast, (Kw). | Minimum 60 % of PTO power as referred in SI No. i) a) of PTO performance in case of tractors having total static mass > 1500 kg Minimum 75 % of PTO power as referred in SI No. i) a) of PTO performance in case of light weight tractors having 1500 kg total static mass of tractor Minimum 75 % of the engine power as referred in SI No. ii) a) of engine performance in case of tractors which do not have a PTO shaft. | | 28.2 | 27.4 | Yes |
| d) | Maximum transmission oil temperature (°C) | The declared value should not exceed the maximum value specified by oil company | | 78 | 77 | Yes |
| 14.3.2 Hydraulic performance: | | | | | | |
| a) Maximum lifting capacity throughout the range of lift, (kN): | | | | | | |
| 1) | At hitch points | [Tolerance of minus 10%] | The performance shall be within 7.5% of ICT or limit specified under Column 3 whichever is higher | 16.84 | 18.61 | No |
| 2) | With the standard frame | The lift capacity should at least be 24 kg/PTO kW. And it should be 21.5 kg/engine kW where the tractor is not provided with a PTO shaft | | 12.18 | 16.82 | No |
| b) | Maximum drop in the height of the point of application of the force after each 5 minutes interval for a total duration of 30 minute, (mm) | The observed value should not exceed 50 mm | | 10 | 78 | No |



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14.4 Salient Observations:

14.4.1 Laboratory test:

| <u>Previous Sample</u> | <u>Present Sample</u> |
|--|---|
| <p>14.4.1.1 PTO Performance:</p> <p>i) The maximum PTO power in case of base model was observed as 31.1 kW against the declaration of 32.5 kW which is within the specified limit.</p> <p>ii) The specific fuel consumption in case of base model corresponding to maximum power was observed as 261 g/kWh against the declaration of 263 g/kWh. Which is within the tolerance limit of IS: 12207:2008.</p> | <p>i) The maximum power was recorded as 31.9 kW in case of present sample against the declaration of 32.5 kW, which meets the requirement of IS: 12207-2014 with regard to tolerance.</p> <p>ii) The specific fuel consumption corresponding to maximum power in case of present sample was measured 281 g/kWh against the declaration of 263 g/kWh, which does not meet the requirement of IS: 12207-2014 with regard to tolerance.</p> |
| <p>14.4.1.2 Drawbar Performance:</p> <p>i) The maximum drawbar power without ballast in case of base model was observed as 28.2 kW against the declaration of 26.0 kW which is within the specified limit.</p> <p>ii) Maximum pull with un-ballasted Tractor in case of base model was observed as 18.88 kN against the declaration of 15.32 kN which is within the specified limit</p> | <p>i) The maximum drawbar power without ballast in case of present model was observed as 27.4 kW against the declaration of 26.0 kW which is within the specified limit.</p> <p>ii) Maximum pull with un-ballasted Tractor in case of present model was observed as 18.88 kN against the declaration of 15.32 kN which is within the specified limit</p> |
| <p>14.4.1.2 Hydraulic Performance:</p> <p>i) Maximum hydraulic power in case of base model was observed as 5.7 kW.</p> <p>ii) Maximum lifting capacity throughout the range of lift at hitch point and at standard frame in case of base model was recorded as 16.84 and 12.18 kN, respectively.</p> <p>iii) Maximum drop in the height of the point of application of the force after each 5 minutes interval for a total duration of 30 minutes in case of base model was recorded as 10 mm, which is within the specified limit.</p> | <p>i) Maximum hydraulic power in case of present model was observed as 4.4 kW, which is 22.8% less when compared with the maximum hydraulic power in it's base model.</p> <p>ii) Maximum lifting capacity throughout the range of lift at hitch point and at standard frame in case of present model was recorded as 18.61 and 16.82 kN, respectively which is more than 7.5 % when compared with the performance of it's base and not meeting the qualifying performance criteria for batch model.</p> <p>iii) Maximum drop in the height of the point of application of the force after each 5 minutes interval for a total duration of 30 minutes in case of present model was recorded as 78 mm, which does not meet the specified limit of 50 mm and also more than 7.5 % when compared with the performance of it's base and not meeting the qualifying performance criteria for batch model.</p> |

**14.5 Adequacy of literature:**

- | | |
|--|--|
| <p>i) No literature was supplied during the course of testing for reference. However, the following literature has been supplied by the applicant during the preparation of test report.</p> <p>a) Operator's manual b) Service manual c) Spare parts catalogue</p> <p>The following discrepancies were noticed in the part catalogue and specifications submitted to this Institute.</p> <p>i) The part number for felt rings of king pins & stub axle were not matching with the specified part number. Beside this, the felt rings were not fitted on the said assembly of the selected test sample.</p> <p>ii) Mud block (Part No. 20003513 AB) of stub axle was not illustrated in the supplied part catalogue of the tractor. In place of mud block oil seal (Part No. 04070155080) was illustrated. This may be re-examined and corrective action should be taken.</p> <p>iii) Details of all variant models and their features at a glance should be included in the operator's manual of the tractor.</p> | <p>No literature was supplied during the course of testing for reference. However, the following literature has been supplied by the applicant during the preparation of test report.</p> <p>a) Operator's manual b) Service manual c) Spare parts catalogue</p> <p>Provided</p> <p>Provided</p> <p>Not applicable</p> |
|--|--|

15. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

15.1 Evaluative (mandatory) / Non-evaluation (Non-mandatory) parameter applicable for qualifying Minimum Performance criteria as per Clause-4 (Table-1) of IS: 12207-2014 for acceptance of the tractor for the purpose of subsidies/NABARD financing are summarized as under:

| S. No. | Characteristic | Category (Evaluative / Non Evaluative) | Requirements as per IS: 12207-2014 | Values declared by the applicant (D)/ Requirement | As observed | Whether meets the requirements (Yes/No.) |
|--------|--|--|---|---|-------------|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 15.1.1 | PTO Performance: | | | | | |
| a) | Maximum power under 2 hours test, (Kw) (Natural ambient condition) | Evaluative | Declared value to be achieved with a tolerance of: -5 / +10% for PTO power >26 Kw. -7.5/+10% for PTO power ≤ 26 Kw or -5 / +10% for Engine power >26 Kw. -7.5/+10% for Engine power ≤ 26 Kw | 32.5 (D) | 31.9 | Yes |
| b) | Power at rated engine speed, (Kw) | Non Evaluative | -do- | 32.5 (D) | 31.9 | Yes |
| c) | Specific fuel consumption corresponding to maximum power, (g/kWh) | Non Evaluative | + 5% | 263 (D) | 281 | No |



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|--|---|----------------|---|----------------|----------------|-----|
| d) | Maximum equivalent crankshaft torque, (Nm) | Non Evaluative | ± 8% | 190 (D) | 183.2 | Yes |
| e) | Back-up torque, percent | Non Evaluative | 10 percent, minimum | 10 (R) | 32.3 | Yes |
| f) | Maximum operating temperature (°C) | | | | | |
| | 1) Engine oil | Non Evaluative | The declared value should not exceed the max. value specified by the oil company and the observed value under high ambient condition should not exceed the declaration. | 132 (D) | 107 | Yes |
| | 2) Coolant (water) | Evaluative | The declared value should not exceed the boiling temperature of coolant under the pressurized or otherwise and the observed value under high ambient condition should not exceed the declaration. | 118 (D) | 86 | Yes |
| g) | Engine oil consumption, (g/kWh) | Evaluative | Not exceeding 1% of SFC at max. power under High ambient conditions | 2.83 (R) | 0.69 | Yes |
| h) | Smoke level | Evaluative | Maximum light absorption coefficient of 3.25 per metre or equivalent BOSCH No. 5.2 or 75 Halridge value (As per CMVR) | 3.25 per metre | 0.18 per meter | Yes |
| 15.1.2 Drawbar performance: | | | | | | |
| a) | Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (Kn) | Non Evaluative | Minimum 65% of static mass with ballast | 19.58 (D) | 24.90 | Yes |
| | | | | 19.25 (R) | | |
| b) | Maximum drawbar pull without ballast corresponding to 15 percent wheel slip, (Kn) | Evaluative | Minimum 65% of static mass of tractor without ballast | 15.32 (D) | 18.88 | Yes |
| | | | | 14.98 (R) | | |
| c) | Maximum drawbar power without ballast, (Kw). | Evaluative | Minimum 80 % of PTO power as referred in SI No. i) a) of PTO performance in case of tractors having total static mass > 1500 kg Minimum 75 % of PTO power as referred in SI No. i) a) of PTO performance in case of light weight tractors having 1500 kg total static mass of tractor Minimum 75 % of the engine power as referred in SI No. i) a) of engine performance in case of tractors which do not have a PTO shaft. | 26.0 (D) | 27.4 | Yes |
| | | | | 25.5 (R) | | |
| d) | Maximum transmission oil temperature (°C) | Non Evaluative | The declared value should not exceed the maximum value specified by oil company | 130 (D) | 77 | Yes |
| 15.1.3 Power lift and hydraulic pump performance: | | | | | | |
| a) | Maximum lifting capacity throughout the range of lift, (kN): | | | | | |
| | 1) At hitch points | Non Evaluative | [Tolerance of minus 10%] | 14.00 (D) | 18.61 | No |



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| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--|---|----------------|--|-----------------------|----------------|-----|
| | 2) With the standard frame | Evaluative | The lift capacity should at least be 24 kg/PTO kW. And it should be 21.5 kg/engine kW where the tractor is not provided with a PTO shaft | 10.00 (D) 7.74 (R) | 16.8 2 | Yes |
| b) | Maximum drop in the height of the point of application of the force after each 5 minutes interval for a total duration of 30 minute, (mm) | Non Evaluative | The observed value should not exceed 50 mm | 50 (D) | 78 | No |
| 15.1.4 Brake performance at 25 kmph: | | | | | | |
| a) | Maximum stopping distance at a force, equal to or less than 600 N on brake pedal with road ballast, (m): | | | | | |
| | 1) Cold brake | Evaluative | 10 | 10 (R) | 8.44 | Yes |
| | 2) Hot brake | Evaluative | 10 | 10 (R) | 9.29 | Yes |
| b) | Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N) | Evaluative | 600 | 600 (R) | 333 to 478 | Yes |
| c) | Whether parking brake is effective at a force of 600 N at foot pedal(s) or 400 N at hand lever | Evaluative | Yes / No | Yes (R) | Yes | Yes |
| 15.1.5 Noise measurement: | | | | | | |
| a) | Maximum ambient noise emitted by the tractor Db(A) | Evaluative | As per CMVR | 88 (R) | 86 | Yes |
| b) | Maximum noise at operator's ear level Db(A) | Evaluative | As per CMVR | 96 (R) | 95 | Yes |
| 15.1.6 Amplitude of mechanical vibrations at: | | | | | | |
| 1) | Left foot rest | Non Evaluative | 100 microns (max) | 100 (R) | 220 | No |
| | Right foot rest | | | 100 (R) | 250 | No |
| 2) | Seat (with driver seated) | | -do- | 100 (R) | 50 | Yes |
| | Steering wheel | | -do- | 100 (R) | 160 | No |
| 15.1.7 Haulage requirements: | | | | | | |
| a) | Gross mass of the trailers, (tones): | | | | | |
| | 1) Two wheel | Non Evaluative | As specified by the manufacturer | 5.0 (D) | 5.0 | Yes |
| | 2) Four wheel | | ---do--- | 6.5 (D) | 6.5 | Yes |
| b) | Distance travelled / litre of fuel consumption, (km/l): | | | | | |
| | 1) Two wheel | Non Evaluative | ---do--- | 4.5 to 6.0 (D) | 4.01 to 4.17 | Yes |
| | 2) Four wheel | | ----do-- | 4.5 to 6.0 (D) | 4.22 to 4.59 | Yes |
| c) | Fuel consumption (ml/km/ton): | | | | | |
| | 1) Two wheel | Non Evaluative | ----do-- | 30 to 40 (D) | 47.87 to 49.80 | No |



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|--|---|-----------------------------|---|--------------|---|------|
| | 2) Four wheel | | ---do--- | 30 to 40 (D) | 33.47 to 36.45 | Yes |
| 15.1.8 Safety features: | | | | | | |
| a) | Guards against moving and hot parts | Evaluative | Belt drives, pulleys, silencer, hydraulic pipes (As per IS 12239 Part 2) | - | Meet the requirements | Yes |
| b) | Lighting arrangement | Evaluative | As per CMVR | -- | Meet the requirements | Yes |
| c) | Sealing requirements (Tractors having more than 1150 mm rear track width) | Non Evaluative | Should meet the requirements of IS: 12343 (As amended from time to time) | -- | Does not meet the requirements | No |
| d) | Technical requirements for PTO shaft | Non Evaluative | Should meet the requirements of IS: 4931 (As amended from time to time) | -- | Meet the requirements | Yes |
| e) | Dimensions of three point linkage | Non Evaluative | Should meet the requirements of IS: 4468 (Part-I) (As amended from time to time) | -- | Does not meet the requirements | No |
| f) | Specifications of linkage drawbar | Non Evaluative | Should meet the requirements of IS 12953 and IS 12362 (Part 3) (As amended from time to time) | - | Does not meet the requirements | No |
| | Specifications of swinging drawbar | Non Evaluative | Should meet the requirements of IS 12362 (Part 3) (as amended from time to time) | -- | Not Provided | -- |
| 15.1.9 Labelling of tractors (Provision of labeling plate): | | | | | | |
| 1) | Make | Evaluative | Should conform to the requirements of CMVR along-with declared value of PTO HP | -- | International Tractor Ltd. | Yes |
| 2) | Model | Evaluative | | -- | Sonalika International DI-750 III Super | Yes |
| 3) | Year of manufacture | Evaluative | | -- | 2016 | Yes |
| 4) | Engine number | Evaluative | | -- | 4100DL63C 542623F9 | Yes |
| 5) | Chassis number | Evaluative | | -- | AZZDF5472 90S3 | Yes |
| 6) | Declaration of PTO power, (Kw) | Evaluative | | - | 32.5 | Yes |
| 15.1.10 Discard limit for: | | | | | | |
| (a) | Cylinder bore diameter, (mm) | Evaluative | To be specified by the manufacturer | 100.30 | 100.04 to 100.06 | Yes |
| (b) | Clearance between piston & cylinder liner at skirt, (mm) | Non Evaluative | -do- | 0.350 | 0.119 to 0.132 | Yes |
| (c) | Ring end gap (mm): | | | | | |
| | - | 1 st comp. ring. | Evaluative | -do- | 2.00 | 0.50 |



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| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------------|---|----------------|-----------------------|--------------------------|-------------------|-----|
| | - 2 nd comp. ring. | | -do- | 2.00 | 0.80 to 0.90 | Yes |
| | - Oil ring. | | -do- | 2.00 | 0.70 | Yes |
| (d) | Ring groove clearance (mm): | | | | | |
| | - 1 st comp. ring. | Evaluative | -do- | 0.150 | Tapered | -- |
| | - 2 nd comp. ring. | | -do- | 0.140 | 0.043 to 0.055 | Yes |
| | - Oil ring. | | -do- | 0.130 | 0.043 to 0.050 | Yes |
| (e) | Clearance of main bearings (mm): | | | | | |
| | - Diametrical clearance | Evaluative | -do- | 0.400 | 0.068 to 0.094 | Yes |
| | - Crankshaft end float | Evaluative | -do- | 0.60 | 0.20 | Yes |
| (f) | Clearance of big end bearings, (mm): | | | | | |
| | - Diametrical | Evaluative | -do- | 0.310 | 0.074 to 0.098 | Yes |
| | - Axial | Evaluative | -do- | 1.00 | 0.25 | Yes |
| (g) | Clearance between king pin and bush, (mm) | Non Evaluative | -do- | 1.00 | 0.08 to 0.13 | Yes |
| (h) | Clearance between center pin and bush, (mm) | Non Evaluative | -do- | 1.00 | 0.14 to 0.15 | Yes |
| 15.1.11 | Literature (Submission to test agency) | | | | | |
| (a) | Operator manual | Evaluative | Provided/Not Provided | As per relevant IS- 8132 | Provided | Yes |
| (b) | Parts Catalogue | Evaluative | Provided/Not Provided | | Provided | Yes |
| (c) | Workshop/ Service manual | Evaluative | Provided/Not Provided | | Provided | Yes |

| 15.1.12 CATEGORY OF BREAKDOWNS / DEFECTS : | | | | | |
|---|-----------------------|--|---|-------------|---|
| S. No. | Category of Breakdown | Category (Evaluative / Non Evaluative) | Requirements as per IS: 12207-2014 | As observed | Whether meets the requirement (Yes/No.) |
| 1. | Critical breakdown | Evaluative | No critical breakdown | None | Yes |
| 2. | Major breakdowns | Evaluative | Not more than two and neither of them should be repetitive in nature | None | Yes |
| 3. | Minor breakdowns | Evaluative | Not more than five and frequency of each should not be more than two. | None | Yes |
| 4. | Total breakdowns | Evaluative | In no case, the total number of breakdowns should exceed five, that is, (2 major + 3 minor) or 5 minor breakdowns | None | Yes |

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| 15.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2014: | | | | |
|--|-----------------|--|---|--|
| S. No. | Characteristic | Requirements as per IS: 12207-2014 | As observed | Whether meets the requirements (Yes/No.) |
| 1. | Fitment of ROPS | With a provision for fitment of ROPS. | Not provided | No |
| | | If ROPS fitted it should meet the requirement of IS: 11821-1992. | ROPS not fitted | Not applicable |
| 2. | Accessories | Trailer hitch, front tow hook may be provided. | Trailer hitch provided Front tow hook provided | No |

15.3 Salient Observations:**15.3.1 Laboratory tests:****15.3.1.1 PTO Performance:**

- i) The maximum power was recorded as **31.1 & 31.9 kW** in case of previous & present sample respectively against the declaration of **32.5 kW**, which meets the requirement of IS: 12207-2014 with regard to tolerance. However the EGR (exhaust gas recirculation) is provided in the present sample as against the previous sample resulting into 2.6% increase in the maximum power over previous sample.
- ii) The specific fuel consumption corresponding to maximum power in case of previous and present sample was measured as **261 & 281 g/kWh** respectively against the declaration of 263 g/kWh. The specific fuel consumption corresponding to maximum power does not meet the requirement of IS: 12207-2014 with regard to tolerance. This should be looked into for necessary corrective action.
- iii) The back-up torque was observed as 34.6 & 32.3 % in case of previous and present sample, respectively which meets the requirement of IS: 12207-2014 with regard to tolerance.

15.3.1.2 Drawbar Performance:

- i) The maximum drawbar power under un-ballasted condition was observed as **28.2 & 27.4 kW** in case of previous & present sample respectively which meets the requirement of IS: 12207-2014 with regard to tolerance.
- ii) The maximum drawbar pull under un-ballasted condition was observed as **18.88 kN** in case of previous & present sample which meets the requirement of IS: 12207-2014 with regard to tolerance.
- iii) During ten hours drawbar test, creeping of LHS & RHS rear tires over the rims were observed as **Nil & 7 mm** and **20 & 30 mm** in case of previous and present sample, respectively. This should be looked into for necessary corrective action.

15.3.1.3 Hydraulic performance:

- i) The moment about rear axle with standard frame was recorded as **24.28 kN-m** whereas the moment about front axle was calculated as **18.84 kN-m**. The moment about rear axle is on higher side as compared to the moment about front axle. It is therefore recommended that the lifting capacity of the hydraulic system may be reduced suitably or additional ballast mass may be provided at front axle to avoid front lifting of tractor.
- ii) The lifting capacity at lower hitch point was observed as **18.61 kN** which is more than the declaration of **14.00 kN** which doesn't meet the requirement of IS 12207:2014. This should be looked into for necessary corrective action.
- iii) The maximum drop in the height of point of application of force was recorded as **78 mm** in case of present sample, which is higher than the maximum limit of **50 mm** as per IS: 12207 -2014 and does not meet the requirement. This should be

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- looked into for necessary corrective action.
- 15.3.1.3.1** Maximum hydraulic power in case of previous and present model was observed as 5.7 & 4.4 kW, which is 22.8% less when compared with the maximum hydraulic power observed in it's previous sample.
- 15.3.1.3.2** Maximum lifting capacity throughout the range of lift at hitch point & at standard frame in case of previous and present sample was recorded as 16.84 & 12.18 kN and 18.61 & 16.82 kN, respectively which is more than 7.5 % when compared with the performance of it's base and not meeting the qualifying performance criteria for batch model as per Clause 7.6 of IS: 12207-2014. This should be looked into.
- 15.3.1.3.3** Maximum drop in the height of the point of application of the force after each 5 minutes interval for a total duration of 30 minute in case of previous and present sample was recorded as 10 mm and 78 mm, respectively which is more than 7.5 % when compared with the performance of it's base and not meeting the qualifying performance criteria for batch model as per Clause 7.6 of IS: 12207-2014. This should be looked into.
- 15.3.1.4 Mechanical Vibration:**
The amplitude of mechanical vibration at various locations of the tractor marked with * in Chapter 9 of this report were found on higher side, especially at steering control wheel & foot rests. This calls for dampening down of vibrations to improve the service life of components.
- 15.3.1.5 Three point linkage:**
The lateral distance from lower hitch point to centre line of tractor does not meet the requirement of IS: 4468 (Part-1) -1997. This should be looked into for necessary corrective action.
- 15.3.1.6 Operator's seat:**
Angle of inclination of back rest & longitudinal distance from seat index point to centre of steering control wheel does not meet the requirement of IS: 12343-1998. This should be looked into for necessary corrective action.
- 15.3.2 Haulage requirements:**
The specific fuel consumption with two wheel trailer does not meet the values declared by the applicant. This should be looked into.
- 15.3.3 Specifications, components/assembly inspection:**
- 15.3.3.1** The model of fuel feed pump specified in the previous model and observed in present model are not same. This should be looked into.
- 15.3.3.2** The type of cooling system specified in the previous model and observed in present model are not same. This should be looked into.
- 15.3.3.3** The type of clutch plate for transmission and PTO specified in previous model and observed in present model are not same. This should be looked into.
- 15.3.3.4** The area of brake liners specified in previous model and observed in present model are not same. This should be looked into.
- 15.3.3.5** The discard limit of minimum permissible depth of oil groove has been declared as NA, i.e. not applicable. However the type of brake is specified as oil immersed disc brakes. This should be looked into.
- 15.4 Maintenance / Service problems:**
No noticeable maintenance and service problems was observed during the entire test.



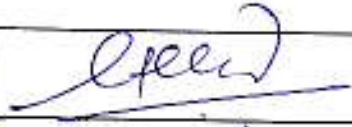


- 15.5 Recommendation with regard to safety on tractor:**
The following requirements, inter alia, may be considered for incorporation on the tractor:
- i) The angle of inclination of back rest and longitudinal distance from seat index point to centre of steering control wheel may be provided as per IS: 12343 - 1998 for safety and comfort of the operator.
 - ii) The oil and lubricant frequency shall be depicted on the tractor for the guidance of operator as per IS: 6283 (Part I) - 2006.
 - iii) The fuel shut-off knob shall remain in stop position without application of sustained manual efforts and the differential lock shall be provided on the tractor as far as the safety of tractor is concerned as per IS: 8133 - 1983.
 - iv) The height of first step from ground level shall be provided as per IS: 12239 (Part I) - 1996 for easy mounting and dismounting of operator from the seat and there shall be provision for spark arresting device in exhaust system.
 - v) The working clearance around the position control lever of the hydraulic may be provided as per IS: 12239 (Part-2) - 1999 for the easy maneuverability.
- 15.6 Adequacy of Literature supplied with machine:**
- 15.6.1** The following literature was supplied with the tractor for reference during the test:
- i) Operator's manual
 - ii) Spare parts catalogue
 - iii) Service manual
- 15.6.2** The printed literature supplied with the test sample is in English. The literature may be brought out as per IS: 8132-1999 (Reaffirmed in March, 2009) for the guidance of user and service personnel in national as well as other regional languages.

16. CITIZEN CHARTER

| Time frame for Testing & Evaluation as per Citizen Charter | Duration of Test | Whether the Test Report is released within the time frame given in Citizen Charter | Remarks |
|--|---|--|---------|
| 10 Months | 6 Months (January, 2017 to July, 2017) | Yes | - |

TESTING AUTHORITY:

| | | |
|---|--|---|
|  |  |  |
| C. K. TIJARE AGRICULTURAL ENGINEER | C. V. CHIMOTE TEST ENGINEER | Y.K.RAO SENIOR AGRICULTURAL ENGINEER |
| J.J.R.NARWARE DIRECTOR | | |



17. APPLICANT'S COMMENTS

| Para No. | Our Reference | Applicant's comments |
|----------|----------------------|---|
| 17.1 | 15.1.8 (c), (e), (f) | Observations will be studied & necessary action will be incorporated. |

TRACTOR RUN HOURS DURING TEST

ANNEXURE -I

| A. | LABORATORY AND TRACK TESTS: | HOURS |
|-----------|--|-------------|
| 1. | Running-in | |
| | -Engine | 37.1 |
| | -Transmission | NA |
| 2. | PTO performance test | 12.6 |
| 3. | Power lift and hydraulic pump performance test | 1.2 |
| 4. | Drawbar performance test | 16.6 |
| 5. | Brake test | 1.0 |
| 6. | Noise measurement | 1.8 |
| 7. | Mechanical vibration test | 0.6 |
| 8. | Theoretical speed test | 0.9 |
| 9. | Air cleaner oil pull over test | 3.5 |
| B. | HAULAGE TEST: | 6.8 |
| C. | Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test | 10.1 |
| | TOTAL: | 92.2 |