Report on test in accordance with
**OECD STANDARD CODE I** for the Official
Testing of Agricultural Tractor Performance

OECD Approval No.: **1/1906 FULL CODE**
Date of approval: 12th May, 2000
Test No.: OECD-H11-T003



## Agricultural Tractor

# KUBOTA M4900DT (4WD)

*Manufactured by:*
**KUBOTA Corporation, TSUKUBA Plant**
**Aza, Sakanoshinden, Yawaramura, Tsukubagun, IBARAKI, JAPAN**

**INSTITUTE OF AGRICULTURAL MACHINERY**
**BIO-ORIENTED TECHNOLOGY RESEARCH ADVANCEMENT INSTITUTION**
**( I A M - B R A I N )**
**OMIYA, JAPAN**

This bulletin is based on engineering tests in accordance with the OECD STANDARD CODE for the Official Testing of Agricultural Tractor Performance "Yellow Code", January 1998, Code 1. It does not contain the evaluation of the tractor performance on practical work. This report has been approved by the OECD Coordinating Center (CEMAGREF, France) as being in accordance with the OECD STANDARD CODE.

| | |
|---|---|
| Test No.: | OECD-H11-T003 |
| Duration of Test: | from February to March, 2000 |
| Date of Approval: | 12th May, 2000 |

| | |
|---|---|
| Make: | KUBOTA |
| Model: | M4900DT |
| Type: | 4WD |
| Serial number: | M490-50147 |
| 1st Serial number: | M490-50001 |

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In this report all performance characteristics are given corresponding to the International Systems of Units.
The reference to the former used Technical Systems of Units is given by the following relations:

| | | | |
|---|---|---|---|
| Forces | 1 kgf | = | 9.80665 N |
| Powers | 1 PS | = | 0.7355 kW |
| Pressures | 1 kgf/cm$^2$ | = | 98.0665 kPa |

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# GENERALITIES

| | |
|---|---|
| Tractor manufacturer's name and address: | KUBOTA Corporation, TSUKUBA Plant<br>Aza, Sakanoshinden, Yawaramura, Tsukubagun,<br>IBARAKI, JAPAN |
| Location of tractor assembly: | Ditto |
| Submitted for test by: | The manufacturer |
| Selected for test by: | The manufacturer with agreement by BRAIN |
| Place of running-in: | KUBOTA Corporation, Tsukuba Plant |
| Duration of running-in: | Engine and tractor 60 h |
| Location of test: | BRAIN |

# 1. SPECIFICATIONS OF TRACTOR

## 1.1 IDENTIFICATION

| | |
|---|---|
| Make: | KUBOTA |
| Model: | M4900DT |
| Type: | Four-wheel drive, unit construction<br>Agricultural tractor |
| Number of driving wheels: | 4 |
| Serial Number: | M490-50147 |
| 1st Serial Number: | M490-50001 |

## 1.2 ENGINE

| | |
|---|---|
| Make | Own make |
| Model: | F2803-ELA-1 |
| Type: | 4-cycle diesel engine with indirect injection,<br>water cooled, naturally aspirated |
| Serial No.: | XY5417 |

### 1.2.1 Cylinders

| | |
|---|---|
| Number and disposition: | 5, vertical, in-line |
| Bore/Stroke: | 87.0 mm / 92.4 mm |
| Capacity: | 2.746 $dm^3$ |
| Compression ratio: | 23:1 |
| Arrangement of valves: | Over head |
| Cylinder Liners: | None |

### 1.2.2 Supercharging

Not fitted

1.2.3 Fuel System

| | |
|---|---|
| Fuel feed system: | Forced feed type (diaphragm pump) |
| Filters | |
| Make: | TAIYO GIKEN KOGYO Corporation |
| Model: | D1402 |
| Type: | Replaceable paper element type |
| Number: | 1 |
| Capacity of fuel tank: | 65 $dm^3$ |
| Injection pump | |
| Make: | DENSO Corporation |
| Model: | ND-PFR5M575A2ND753 |
| Type: | Bosch type M |
| Manufacturer's production setting of injection pump | |
| Flow rate: | 11.9 ± 0.6 $dm^3/h$ at rated engine speed and full load |
| Timing: | 18 ~ 20 degrees before T.D.C. |
| Injectors | |
| Make: | DENSO Corporation |
| Model: | DNOPD 95 |
| Type: | Throttle Type |
| Injection pressure: | 13.7 ~ 14.7 MPa |

1.2.4 Governor

| | |
|---|---|
| Make: | Own make |
| Type: | Mechanical (all speed governor) |
| Governed range of engine speed: | from 900 to 2820 $min^{-1}$ |
| Rated engine speed: | 2600 $min^{-1}$ |

1.2.5 Air cleaner

| | |
|---|---|
| Pre-cleaner: | Not fitted |
| Main cleaner | |
| Make: | NIPPON DONALDSON Co., LTD. |
| Model: | FP G068355 (fitted on tested tractor)<br>FP G068332 (as option) |
| Type: | Dry dual paper element |
| Location of air intake: | Under the bonnet, in front of the radiator |
| Maintenance indicator: | Not fitted |

1.2.6 Lubrication system

| | |
|---|---|
| Type of feed pump: | Forced feed (trochoidal pump) |
| Type of filter: | Replaceable paper element canister |
| Number: | 1 |

1.2.7 Cooling system

| | |
|---|---|
| Type of coolant: | 50 % solution of permanent antifreeze and clean water |
| Specification of pump | |
| Type: | Centrifugal |
| Model: | C1641273033 |
| Specification of fan | |
| Type: | Axial type |
| Number of fan blades: | 5 |
| Fan diameter: | 380 mm |
| Coolant capacity: | 6.2 $dm^3$ |
| Type of temperature control: | Wax type thermostat and bypass circuit |
| System pressure: | 88.3 kPa |

1.2.8 Starting system

| | |
|---|---|
| Make: | DENSO Corporation |
| Model: | ADXD13 |
| Type: | Solenoid engaged type |
| Starter motor power rating: | 12 V, 1.4 kW |
| Cold starting aid: | Electrical glow plug |
| Safety device: | Operable only with shuttle shift lever in neutral and PTO clutch disengaged |

1.2.9 Electrical system

| | |
|---|---|
| Voltage: | 12 V |
| Generator | |
| Make: | DENSO Corporation |
| Model: | ACFA69 |
| Type: | Three phase generator |
| Power: | 40 Amps |
| Battery | |
| Number: | 1 |
| Rating: | 68 Ah at 5 hours |

1.2.10 Exhaust system

| | |
|---|---|
| Make: | NELSON Industries Inc. |
| Model: | 25816A |
| Type: | Multi chamber absorption-expansion |
| Location: | Horizontally left side under the body, mouth showing rearward (fitted on tested tractor)<br>Vertically left side of tractor (as option) |

## 1.3 TRANSMISSION

### 1.3.1 Clutch (travel alone)

Make: EXEDY Corporation
Model: D707 00F
Type: Dry single plate-single stage
Number of plates: 1
Diameter of plates: 275 mm
Method of disengagement: By foot pedal

### 1.3.2 Gear box

Make: Own make
Type: Mechanical
Description: Synchromesh 4 speed (1st ~ 4th) gears with main shift lever, constant mesh 2 gears low(L)/high(H) with range shift lever, synchromesh 2 speed gears, forward(F) / reverse(R) with shuttle lever.
Totally 8 forward/ 8rearward speeds.

| | Forward | Reverse |
|---|---|---|
| Number of gears | 4 | 4 |
| Number of ranges | 2 | 2 |
| Total of arrangements | 8 | 8 |

Available options: Additional one constant mesh creeper gear
Totally 12 forward / 12 reverse speeds
(fitted on tested tractor)

### 1.3.3 Rear axle and final drives

Make: Own make
Type: Bevel gear type differential and planetary gear type final drives

Differential lock
Type: Mechanical, dog clutch
Method of engagement: By foot pedal
Method of disengagement: Self disengagement

### 1.3.4 Front axle and final drives

Make: Own make
Type: Bevel gear type differential and planetary gear type final drives

Differential lock: Not fitted

1.3.5 Total ratios and travelling speeds (not tested tractor)

| Gear Number | Range | Number of engine revolutions for one revolution of the driving wheels | | Nominal travelling speed(*) at rated engine speed of 2600 $min^{-1}$ [km/h] | |
|---|---|---|---|---|---|
| | | Forward | Reverse | Forward | Reverse |
| 1 | 1-L | 251.55 | 240.82 | 2.55 | 2.66 |
| 2 | 2-L | 187.43 | 179.44 | 3.42 | 3.57 |
| 3 | 3-L | 122.14 | 116.93 | 5.25 | 5.48 |
| 4 | 4-L | 81.99 | 78.50 | 7.81 | 8.16 |
| 5 | 1-H | 69.79 | 66.81 | 9.18 | 9.59 |
| 6 | 2-H | 51.99 | 49.78 | 12.32 | 12.87 |
| 7 | 3-H | 33.89 | 32.44 | 18.91 | 19.75 |
| 8 | 4-H | 22.75 | 21.78 | 28.16 | 29.42 |

(*) Calculated with a tyre dynamic radius index (ISO 4251-1:1992) of 654 mm (tyre:14.9-28)

Number of revolutions of front wheels for one revolution of rear wheels: 1.3989

1.3.6 Total ratios and travelling speeds (with creep range, fitted on tested tractor)

| Gear Number | Range | Number of engine revolutions for one revolution of the driving wheels | | Nominal travelling speed(*) at rated engine speed of 2600 $min^{-1}$ [km/h] | |
|---|---|---|---|---|---|
| | | Forward | Reverse | Forward | Reverse |
| 1 | 1-C | 1783.79 | 1707.79 | 0.36 | 0.37 |
| 2 | 2-C | 1329.09 | 1272.42 | 0.48 | 0.51 |
| 3 | 3-C | 866.13 | 829.19 | 0.74 | 0.77 |
| 4 | 4-C | 581.48 | 556.68 | 1.10 | 1.15 |
| 5 | 1-L | 251.55 | 240.82 | 2.55 | 2.66 |
| 6 | 2-L | 187.43 | 179.44 | 3.42 | 3.57 |
| 7 | 3-L | 122.14 | 116.93 | 5.25 | 5.48 |
| 8 | 4-L | 81.99 | 78.50 | 7.81 | 8.16 |
| 9 | 1-H | 69.79 | 66.81 | 9.18 | 9.59 |
| 10 | 2-H | 51.99 | 49.78 | 12.32 | 12.87 |
| 11 | 3-H | 33.89 | 32.44 | 18.91 | 19.75 |
| 12 | 4-H | 22.75 | 21.78 | 28.16 | 29.42 |

(*) Calculated with a tyre dynamic radius index (ISO 4251-1:1992) of 654 mm (tyre:14.9-28)

Number of revolutions of front wheels for one revolution of rear wheels: 1.3989

## 1.4 POWER TAKE-OFF

1.4.1 Main power take-off

| | |
|---|---|
| Type: | Independent PTO |
| Method of engagement: | Hydraulically actuated wet multi-plate clutch by hand lever |
| Number of shafts: | 1 |
| Method of changing power take-off shafts ends and speeds: | Fixed speed |

1.4.1.1 Power take-off proportional to engine speed

Power take-off at 540 $min^{-1}$ (not fitted on tested tractor)

| | |
|---|---|
| Location: | At rear of tractor |
| Diameter of power take-off shaft end: | 35 mm |
| Number of splines: | 6, in conformity with ISO 500:1991/ SAE J1170 |
| Height above ground: | 638 mm |
| Distance from the median plane of the tractor: | 0 mm |

Distance behind rear axle center: 315 mm

Direction of rotation (viewed from shaft end): Clockwise

| PTO type | PTO speed [min$^{-1}$] | Engine speed [min$^{-1}$] | Engine/PTO transmission ratio | Power restriction [kW] |
|---|---|---|---|---|
| 540 | 540 | 2295 | 4.250 | 33.6 kW |
| | 612 | 2600 | | |

1.4.1.2 Power take-off proportional to ground speed Not fitted

1.4.2 Optional power take-off (fitted on tested tractor)

Type: Independent PTO

Method of engagement: Hydraulically actuated wet multi-plate clutch by hand lever

Number of shafts: 1

Method of changing power take-off shafts ends and speeds: By shift lever

1.4.2.1 Power take-off proportional to engine speed

Power take-off at 540/540E min$^{-1}$ 2 speeds (fitted on tested tractor)

Location: At rear of tractor

Diameter of power take-off shaft end: 35 mm

Number of splines: 6, in conformity with ISO 500:1991/ SAE J1170

Height above ground: 638 mm

Distance from the median plane of tractor: 0 mm

Distance behind rear axle center: 377 mm

Direction of rotation (viewed from shaft end): Clockwise

| PTO type | PTO speed [min$^{-1}$] | Engine speed [min$^{-1}$] | Engine/PTO transmission ratio | Power restriction [kW] |
|---|---|---|---|---|
| 540 | 540 | 2307 | 4.273 | None |
| | 609 | 2600 | | |
| 540E | 750 | 2538 | 3.385 | None |
| | 768 | 2600 | | |

1.4.2.2 Power take-off proportional to ground speed Not fitted

## 1.5 HYDRAULIC POWER LIFT

Make: Own make

Type: Hydraulic, 3-point hitch
Position, draft and mix control

Type of hydraulic system: Open center system

Type and number of cylinders: Single acting, 1

Type of linkage lock for transportation: Hydraulically closed by throttle valve

Relief valve pressure setting: 18.6 ~ 19.1 MPa

Opening pressure of cylinder safety valve: 21.1 ~ 22.6 MPa

Lift pump type: Gear type

Transmission between pump and engine: Gear drive

| | |
|---|---|
| | (gear: injection pump cam shaft drive) |
| Type and number of filters: | Replaceable paper element canister, 2 |
| Site of oil reservoir: | Transmission case |
| Type, number and location of tapping points | |
| Type: | SAE 1/2" hydraulic female coupler |
| Number: | 1 set (fitted on tested tractor), 2 sets (option) |
| Location: | At rear of tractor |
| Maximum volume of oil available to external cylinders: | Hydraulic oil should be added for external hydraulic circuit |

## 1.6 THREE POINT LINKAGE

Category:1 in conformity with ISO 730-1:1994+Cor.1:1995

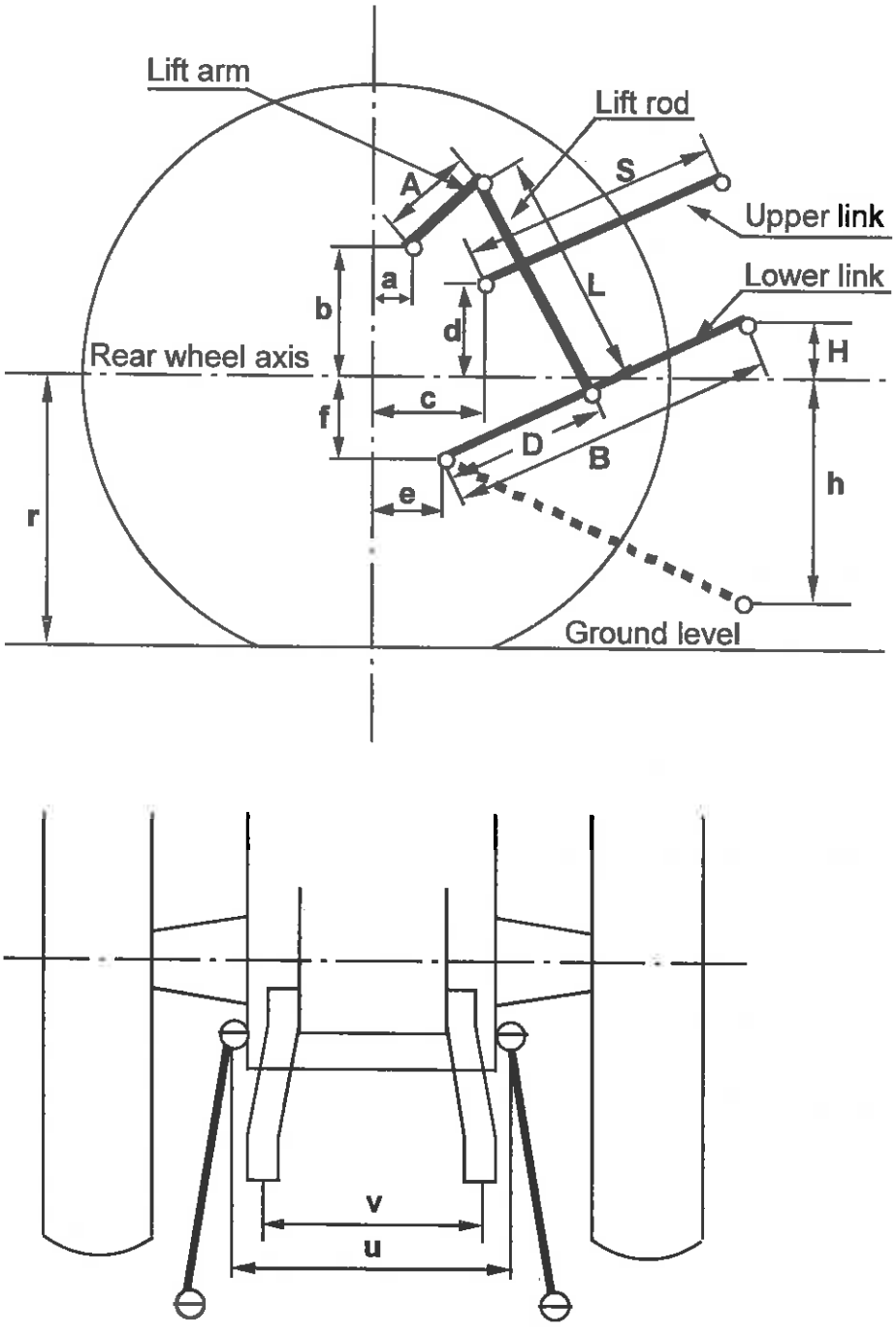



Figure
Lift test - Linkage geometry

| | | Dimension of range [mm] | Settings used in test [mm] |
|---|---|---|---|
| Length of lift arms | (A) | 240 | 240 |
| Length of lower links | (B) | 790 | 790 |
| Distance of lift arm pivot point from rear-wheel axis: | | | |
| - horizontally | (a) | 95 | 95 |
| - vertically | (b) | 278 | 278 |
| Horizontal distance between the 2 lower link points | (u) | 339 | 339 |
| Horizontal distance between the 2 lift arm end points | (v) | 464 | 464 |
| Length of upper link | (S) | from 506 to 712 | 577 |
| Distance of upper link pivot point from rear wheel axis: | | | |
| - horizontally | (c) | 301 301 301 305 | 301 |
| - vertically | (d) | 270 240 210 180 | 210 |
| Distance of lower link pivot point from rear wheel axis: | | | |
| - horizontally | (e) | 104 | 104 |
| - vertically | (f) | 197 | 197 |
| Distance of lower link pivot points to lift rod pivot points on lower links: | (D) | 395 | 395 |
| Length of lift rods: | (L) | from 470 to 545 | 530 |
| Height of lower hitch points relative to the rear wheel axis: | | | |
| - in low position | (h) | 474 | 474 |
| - in high position | (H) | 129 | 129 |
| Height above ground of lower hitch points when locked in transport position(*): | | from 770 to 910 | 783 |
| (*) Assuming r = rear tyre dynamic radius index (ISO 4251-1:1992): 654 mm (tyre: 14.9-28) | | | |

Table

Dimensions of linkage geometry when connected to the standard frame

## 1.7 SWINGING DRAWBAR

Type: Bar type (fitted on tested tractor)
Clevis type (as option)

Height above ground 446 mm at top surface of bar
(tyre size 14.9-28, r = 654 mm)

Distance of hitch point from rear wheel axis,
horizontally: 690 mm

Distance of hitch point from power take-off shaft end
vertically: 192 mm at top surface of bar
horizontally: 540 $min^{-1}$ one speed power take-off: 374.5 mm
540/540E $min^{-1}$ 2 speeds power take-off: 313 mm

Lateral adjustment (center of clevis)
right hand: 117 mm
left hand: 117 mm

Distance of pivot point from rear wheel axis,
horizontally: 195 mm

Diameter of drawbar pin hole: 26.5 mm

Maximum vertical permissible load: 9.8 kN

## 1.8 TRAILER HITCH

Not fitted

## 1.9 HOLED DRAWBAR

Not fitted

## 1.10 STEERING

| | |
|---|---|
| Make: | SUMITOMO EATON HYDRAULICS CO., LTD. |
| Model: | WVQ 150Z23AUD |
| Type: | Hydrostatic power steering |
| Method of operation: | Steering wheel operated and full hydraulic power |
| Pump: | Independent gear type |
| Ram: | Balanced type cylinder |
| Working pressure: | 17.5 MPa |

## 1.11 BRAKES

### 1.11.1 Service brake

| | |
|---|---|
| Make: | Own make |
| Type: | Multiple wet disks operated by two foot pedals which can be locked together |
| Method of operation: | By independent or combined pedal |
| Trailer breaking take-off: | Not fitted |

### 1.11.2 Parking brake

| | |
|---|---|
| Type: | Mechanical acting type (combined foot pedal) |
| Method of operation: | By hand lever with ratchet |

## 1.12 WHEELS

| | |
|---|---|
| Number | 4 |
| Front: | 2, steering and driving |
| Rear: | 2, driving |
| Wheelbase: | 2000 mm |

Track width adjustment

| | Minimum [mm] | Maximum [mm] | Adjusted method |
|---|---|---|---|
| Front | 1330 | 1430 | Changing by offset of rims |
| Rear | 1320 | 1720 | Changing by turning wheels and offset of rims |

## 1.13 PROTECTIVE STRUCTURE

Safety frame

| | |
|---|---|
| Make: | KUBOTA |
| Model: | SFM-54 |
| Type: | 2-post safety frame |
| Protective device: | Rear roll bar not tiltable |
| OECD approval number: | 4/0388/1 |
| Date of approval: | 26th April, 2000 |

Cab

| | |
|---|---|
| Make: | KUBOTA |
| Model: | IC68 |
| Type: | Integral cab |
| Protective device: | Cab, not tilted |
| OECD approval number: | 4/0634 |
| Date of approval: | 26th April, 2000 |

## 1.14 SEAT

1.14.1 Driver's seat

| | |
|---|---|
| Make: | Seats Incorporated |
| Model: | 176710-1 |
| Seat and steering wheel reversible: | No |
| Type of suspension: | Coil spring |
| Type of damping: | Oil damping |
| Range of adjustment | |
| Longitudinal: | 152.4 mm |
| Vertical: | 0 mm |
| Safety belt: | Not fitted on tested tractor |

1.14.2 Optional driver's seat — Not fitted

1.14.3 Passenger seat — Not fitted

## 1.15 LIGHTING

| | Height above ground of center [mm] | Size [mm] | Distance from outside edge of lights to median plane of tractor [mm] |
|---|---|---|---|
| Headlights | 920 | 145 x 90 | 217 |
| Sidelights | – | – | – |
| Rearlights | 1500 | 101.5 x 89.5 | 698.5 |
| Reflectors | 1370 | 195 x 75 | 676 |
| Flashers | 1500 | 101.5 x 89.5 | 698.5 |

# 2. TEST CONDITIONS

## 2.1 OVERALL DIMENSIONS

| | Length | Width | | Height | |
|---|---|---|---|---|---|
| | | Minimum | Maximum | At top of protective structure | Mirror |
| | [mm] | [mm] | [mm] | [mm] | [mm] |
| Unballasted | 3420 | 1705 | 2105 | 2355 | 1797 |
| Ballasted | 3808 | 1921 | 2105 | 2350 | 1785 |

## 2.2 GROUND CLEARANCE

Ground clearance: 406 mm

Clearance-limiting part: Bottom of the muffler

## 2.3 TRACTOR MASS

| | Ballasted | | Unballasted | |
|---|---|---|---|---|
| | Without driver [kg] | With driver [kg] | Without driver [kg] | With driver [kg] |
| Front | 1308 | 1317 | 764 | 773 |
| Rear | 1674 | 1740 | 1139 | 1205 |
| Total | 2982 | 3057 | 1903 | 1978 |

## 2.4 BALLAST

| | | |
|---|---|---|
| Front: | 1 bracket | 44 kg |
| | 8 weights, total | 360 kg |
| Rear: | 6 weights, total | 310 kg |
| | Water in the tyres | 365 kg |

## 2.5 TYRES AND TRACK WIDTH SPECIFICATIONS

| | | Front | Rear |
|---|---|---|---|
| Tyres: | | | |
| - dimension | | 9.5-22 | 14.9-28 |
| - ply rating | | 6 | 6 |
| - type | | cross-ply | cross-ply |
| - maximum load (tyre manufacturer's) | [kN] | 8.83 | 15.79 |
| - inflation pressure (tyre manufacturer's) | [kPa] | 196 | 137 |
| - dynamic radius index | [mm] | 478 | 654 |
| Chosen track width | [mm] | 1330 | 1320 |

## 2.6 FUEL

Type: Diesel fuel No.2 in conformity with JIS

Density at 15 °C: 0.8375 g/cm³

## 2.7 OILS AND LUBRICATION

### 2.7.1 Capacity and change interval

| | Capacity [dm³] | Oil change [h] | Filter change [h] |
|---|---|---|---|
| Engine | 8.0 | 100 | 200 |
| Gear box<br>Rear axle<br>Final drive (rear and front)<br>Hydraulic system<br>Power steering | 40.0 | 600 | 200 |
| Front axle | 8.0 | 600 | – |
| Service brake | – | – | – |

### 2.7.2 Specifications

| | Recommended | Used during test |
|---|---|---|
| Engine oil:<br>type<br>viscosity<br>classification | API grade CD<br>Below 0 °C : SAE 10W , 10W-30, 10W-40<br>From 0 °C to 25 °C : SAE 20 , 10W-30 , 10W-40<br>Above 25 °C : SAE 30 , 10W-30 , 10W/-40 | SAE 10W-30 |
| Transmission oils<br>Hydraulic fluid<br>Steering oil<br>type<br>viscosity<br>classification | API grade GL-3<br>SAE 75W/80<br>(ISO VG46) | API grade GL-3<br>SAE 75W/80<br>(ISO VG46) |

### 2.7.3 Grease

Number of lubrication points: 9

# 3. COMPULSORY TESTS RESULTS

## 3.1 MAIN POWER TAKE-OFF

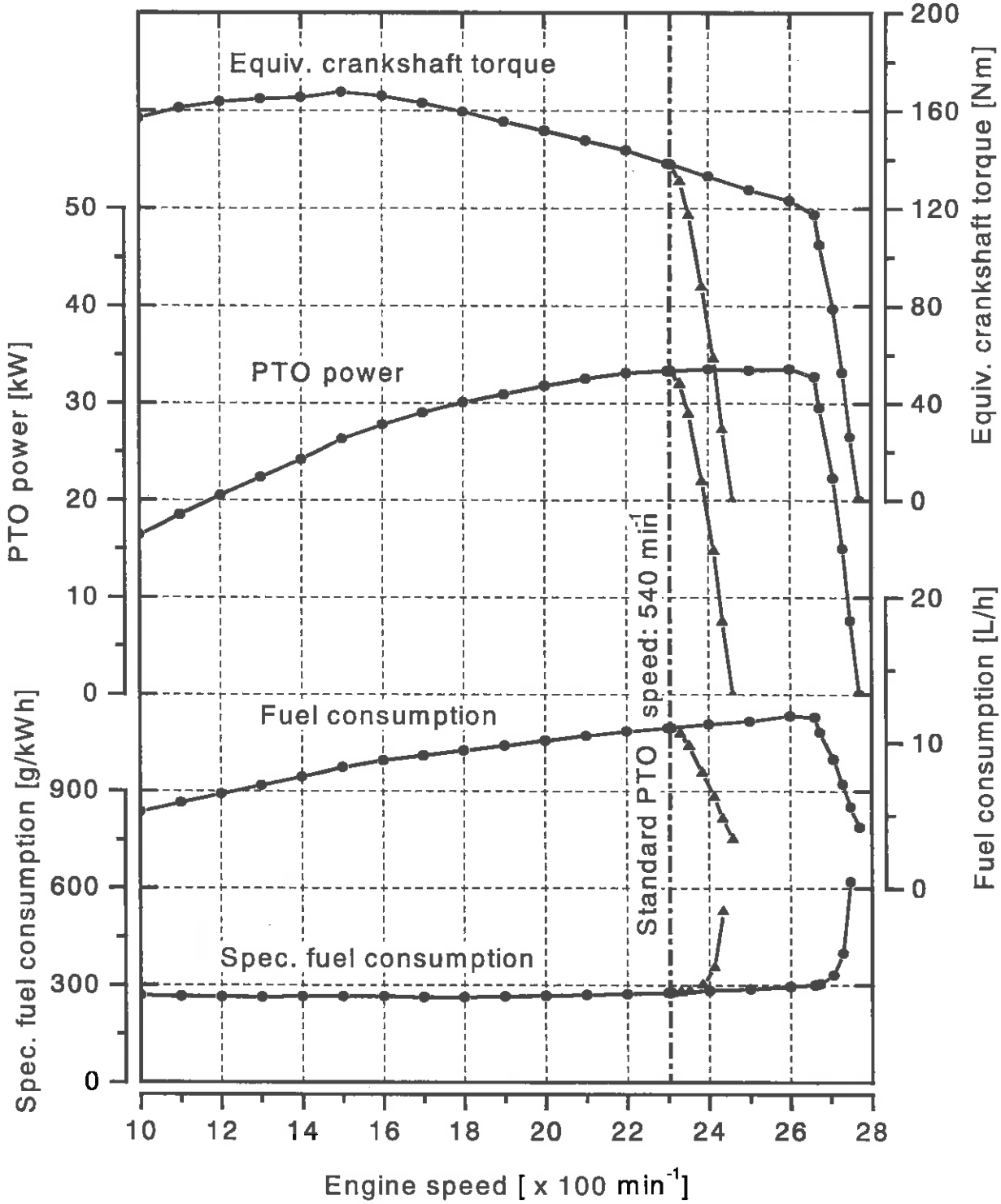
Date and location of tests: 28th February, 2000, BRAIN, Omiya

Type of dynamometer: Alternating current , MEIDEN FC-95

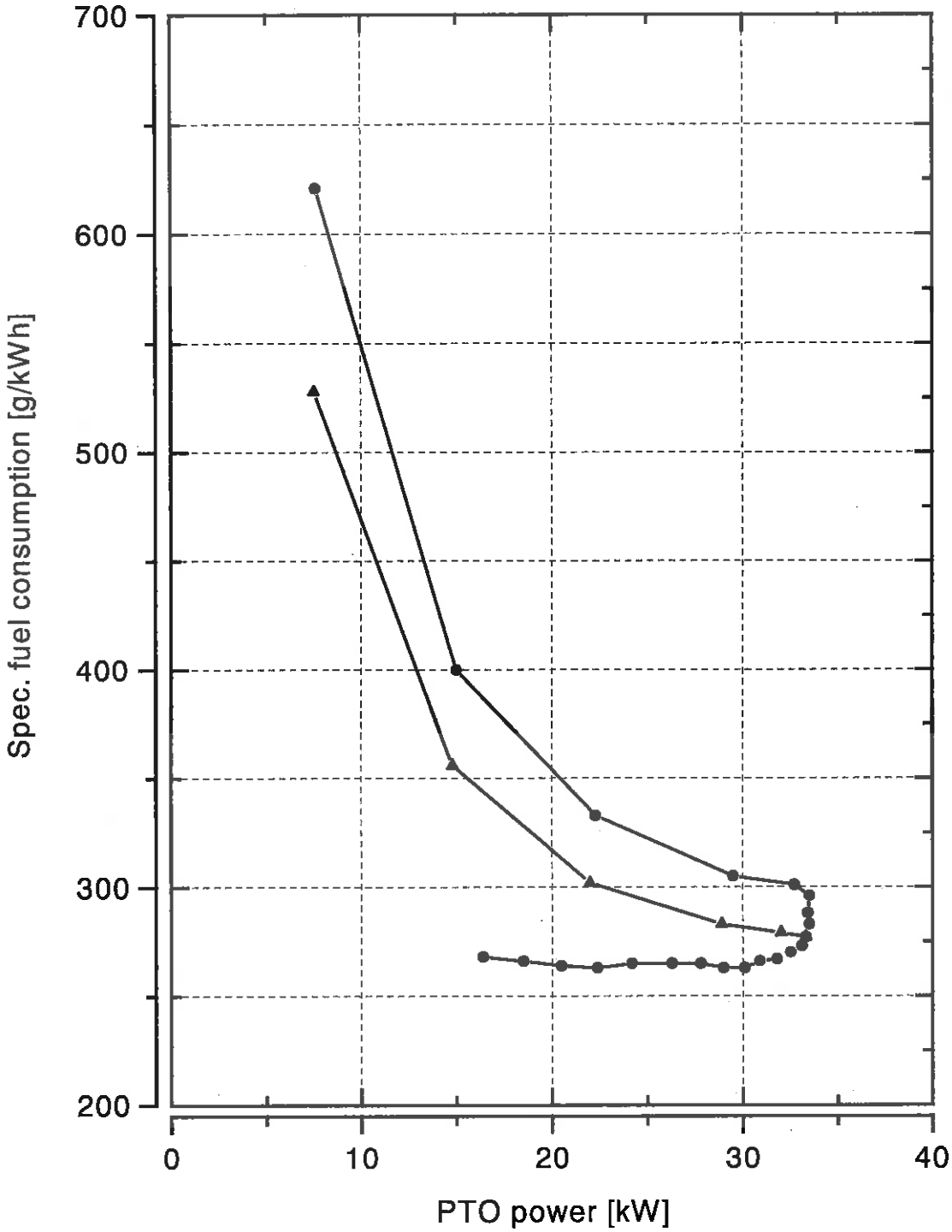
| Power | Speed | | Fuel consumption | | | Specific Energy |
|---|---|---|---|---|---|---|
| | Engine | PTO | Hourly | | Specific | |
| [kW] | [min$^{-1}$] | | [kg/h] | [L/h] | [g/kWh] | [kWh/L] |
| 3.1.1 MAXIMUM POWER - TWO-HOUR TEST | | | | | | |
| 33.5 | 2600 | 608 | 9.93 | 11.86 | 296 | 2.825 |
| 3.1.2 POWER AT RATED ENGINE SPEED | | | | | | |
| 33.5 | 2600 | 608 | 9.93 | 11.86 | 296 | 2.825 |
| 3.1.3 STANDARD POWER TAKE-OFF SPEED (540 min$^{-1}$) | | | | | | |
| 33.3 | 2307 | 540 | 9.24 | 11.03 | 277 | 3.018 |
| 3.1.4 PART LOADS AT RATED ENGINE SPEED<br>3.1.4.1 The torque corresponding to maximum power at rated engine speed | | | | | | |
| 33.5 | 2600 | 608 | 9.93 | 11.86 | 296 | 2.825 |
| 3.1.4.2 85% of torque obtained in 1.4.1 | | | | | | |
| 29.5 | 2675 | 626 | 9.00 | 10.74 | 305 | 2.746 |
| 3.1.4.3 75% of torque defined in 1.4.2 | | | | | | |
| 22.3 | 2705 | 633 | 7.43 | 8.87 | 333 | 2.514 |
| 3.1.4.4 50% of torque defined in 1.4.2 | | | | | | |
| 15.0 | 2730 | 639 | 6.01 | 7.17 | 400 | 2.091 |
| 3.1.4.5 25% of torque defined in 1.4.2 | | | | | | |
| 7.6 | 2748 | 643 | 4.72 | 5.63 | 621 | 1.349 |
| 3.1.4.6 Unloaded | | | | | | |
| 0 | 2773 | 649 | 3.51 | 4.20 | – | – |
| 3.1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED (540 min$^{-1}$)<br>3.1.5.1 The torque corresponding to maximum power at standard power take-off speed | | | | | | |
| 33.3 | 2307 | 540 | 9.24 | 11.03 | 277 | 3.018 |
| 3.1.5.2 85% of torque obtained in 1.5.1 | | | | | | |
| 28.9 | 2350 | 550 | 8.19 | 9.78 | 283 | 2.956 |
| 3.1.5.3 75% of torque obtained in 1.5.2 | | | | | | |
| 22.0 | 2384 | 558 | 6.65 | 7.94 | 302 | 2.769 |
| 3.1.5.4 50% of torque obtained in 1.5.2 | | | | | | |
| 14.8 | 2414 | 565 | 5.27 | 6.29 | 356 | 2.353 |
| 3.1.5.5 25% of torque obtained in 1.5.2 | | | | | | |
| 7.5 | 2436 | 570 | 4.02 | 4.79 | 535 | 1.564 |
| 3.1.5.6 Unloaded | | | | | | |
| 0 | 2461 | 576 | 2.85 | 3.41 | – | – |

Other results

| | | |
|---|---|---|
| No load maximum engine speed: | 2773 | $min^{-1}$ |
| Torque (equivalent crankshaft) at maximum power | | |
| At rated engine speed: | 123.2 | Nm |
| At 2-hour test: | 123.2 | Nm |
| Maximum torque (equivalent crankshaft): | 167.6 | Nm |
| (engine speed: 1500 $min^{-1}$) | | |
| | | |
| Mean atmospheric conditions | | |
| Temperature: | 25 | °C |
| Pressure: | 100.9 | kPa |
| Relative humidity: | 30 | % |
| Maximum temperatures | | |
| Coolant: | 83 | °C |
| Engine oil: | 109 | °C |
| Fuel: | 19 | °C |
| Engine air intake: | 23 | °C |




**POWER TAKE-OFF PERFORMANCE**




**POWER TAKE-OFF PERFORMANCE**

## 3.2 HYDRAULIC POWER AND LIFTING FORCE

Date of tests: 20th June, 1996

### 3.2.1 HYDRAULIC POWER TEST

Tapping point used for test: Auxiliary service connection
(can be measured by transferring circuit)

Sustained pressure with relief valve open: 18.9 MPa

Pump delivery rate at minimum pressure: 38.5 L/min

Temperature of hydraulic fluid: °C

| | Flow rate [L/min] | Pressure [MPa] | Power [kW] |
|---|---|---|---|
| Flow rate corresponding to a hydraulic pressure equivalent to 90 percent of the actual relief valve pressure setting and corresponding hydraulic power | 26.2 | 17.1 | 7.47 |
| Flow rate and hydraulic pressure corresponding to maximum hydraulic power | 31.0 | 15.2 | 7.85 |

### 3.2.2 POWER LIFT TEST

| | At hitch point | On the frame |
|---|---|---|
| Height of lower hitch points above ground in down position [mm] | 192 | 177 |
| Vertical movement without lifting forces [mm] | 595 | 697 |
| with lifting forces [mm] | 568 | 652 |
| Maximum corrected force exerted though full range (*) [kN] | 14.71 | 12.63 |
| Corresponding pressure of hydraulic fluid [MPa] | 17.1 | 17.1 |
| Moment about rear wheel axle [kNm] | — | 19.03 |
| Maximum tilt angle mast from vertical [Degrees] | — | 10 |

| Lifting height (**) [mm] | | -277 | -262 | -200 | -100 | 0 | 100 | 200 | 300 | 306 | 375 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lifting force (**) | at the hitch point [kN] | — | 14.71 | 16.23 | 17.46 | 18.04 | 18.39 | 18.44 | 18.44 | 18.49 | — |
| | at the frame [kN] | 15.00 | — | 15.93 | 16.15 | 15.88 | 15.33 | 14.39 | 13.59 | — | 12.63 |

(*) The values of force measured are corrected to correspond to a hydraulic pressure equivalent to 90% of the actual relief valve pressure setting.

(**) Lifting heights relative to the horizontal plane including the lower link pivot points.

## 3.3 DRAWBAR POWER TEST

Date of Tests: 1st, 2nd and 6th March, 2000

Type of track: Concrete

| | | | | front | rear | | | |
|---|---|---|---|---|---|---|---|---|
| Tire size: | front: | 9.5-22 | Tyre inflation pressure: | unballasted: | 196 kPa | 137 kPa | Height of drawbar above ground: | unballasted: 478 mm |
| | rear: | 14.9-28 | | ballasted: | 196 kPa | 137 kPa | | ballasted: 468 mm |

| Gear No. and range | Power | Drawbar pull | Travelling speed | Engine speed | Slip of wheels | Specific fuel consumption | Specific energy | Temperature | | | Atomospheric condition | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Fuel | Coolant | Engine oil | Temperature | Relative humidity | Pressure |
| | [kW] | [kN] | [km/h] | [min$^{-1}$] | [%] | [g/kWh] | [kWh/L] | [°C] | [°C] | [°C] | [°C] | [%] | [kPa] |
| 3.3.1 MAXIMUM POWER IN TESTED GEARS (unballasted tractor) | | | | | | | | | | | | | |
| L-1 | 12.4 | 19.67 | 2.27 | 2705 | 15.0 | 506 | 1.654 | 18 | 74 | 98 | 11 | 20 | 102.5 |
| L-2 | 16.6 | 19.79 | 3.02 | 2687 | 15.0 | 432 | 1.941 | 17 | 74 | 96 | 11 | 20 | 102.5 |
| L-3 | 25.0 | 19.69 | 4.57 | 2647 | 15.1 | 371 | 2.259 | 18 | 75 | 97 | 11 | 21 | 102.5 |
| L-4 | 30.3 | 15.15 | 7.20 | 2592 | 8.2 | 328 | 2.555 | 13 | 74 | 94 | 9 | 25 | 102.6 |
| H-1 | 30.0 | 12.44 | 8.68 | 2588 | 6.0 | 331 | 2.530 | 13 | 74 | 95 | 10 | 22 | 102.6 |
| H-2 | 29.5 | 8.94 | 11.88 | 2591 | 4.1 | 337 | 2.487 | 14 | 75 | 98 | 10 | 23 | 102.6 |
| 3.3.2 MAXIMUM POWER IN TESTED GEARS (ballasted tractor) | | | | | | | | | | | | | |
| L-1 | 17.2 | 27.77 | 2.23 | 2684 | 15.1 | 487 | 1.721 | 24 | 75 | 99 | 18 | 20 | 102.4 |
| L-2 | 22.9 | 27.95 | 2.95 | 2662 | 15.1 | 382 | 2.192 | 23 | 75 | 99 | 17 | 16 | 102.4 |
| L-3 | 30.0 | 23.28 | 4.64 | 2567 | 10.0 | 325 | 2.579 | 23 | 75 | 99 | 17 | 17 | 102.4 |
| L-4 | 30.5 | 15.02 | 7.31 | 2570 | 5.5 | 319 | 2.628 | 21 | 75 | 97 | 15 | 18 | 102.4 |
| H-1 | 29.8 | 12.26 | 8.75 | 2587 | 4.3 | 333 | 2.513 | 22 | 76 | 100 | 16 | 18 | 102.4 |
| H-2 | 28.6 | 8.72 | 11.81 | 2564 | 2.7 | 347 | 2.411 | 22 | 75 | 99 | 16 | 18 | 102.4 |
| 3.3.3 FIVE HOURS TEST<br>3.3.3.1 FIVE HOUR TEST at 75 % of the pull corresponding to maximum power | | | | | | | | | | | | | |
| L-4 | 24.0 | 11.27 | 7.67 | 2662 | 3.9 | 359 | 2.328 | 28 | 74 | 102 | 20 | 16 | 102.0 |
| 3.3.3.2 FIVE HOURS TEST at pull corresponding to 15 % wheelslip | | | | | | | | | | | | | |
| L-2 | 22.9 | 27.95 | 2.95 | 2662 | 15.0 | 382 | 2.192 | 23 | 75 | 84 | 19 | 32 | 101.3 |

(*) Oil consumption during ten hours duration of tests 3.3.3.1 and 3.3.3.2: 9.4 g/h

## 3.4 TURNING AREA AND TURNING CIRCLE

3.4.1 Front wheel drive disengaged

| | With brakes | | Without brakes | |
|---|---|---|---|---|
| | Left-hand [m] | Right-hand [m] | Left-hand [m] | Right-hand [m] |
| Radius of turning area | 3.20 | 3.20 | 3.50 | 3.51 |
| Radius of turning circle | 2.98 | 2.98 | 3.26 | 3.27 |

3.4.2 Front wheel drive engaged

| | With brakes | | Without brakes | |
|---|---|---|---|---|
| | Left-hand [m] | Right-hand [m] | Left-hand [m] | Right-hand [m] |
| Radius of turning area | 3.17 | 3.15 | 3.99 | 3.99 |
| Radius of turning circle | 2.93 | 2.91 | 3.70 | 3.70 |

## 3.5 LOCATION OF CENTER OF GRAVITY

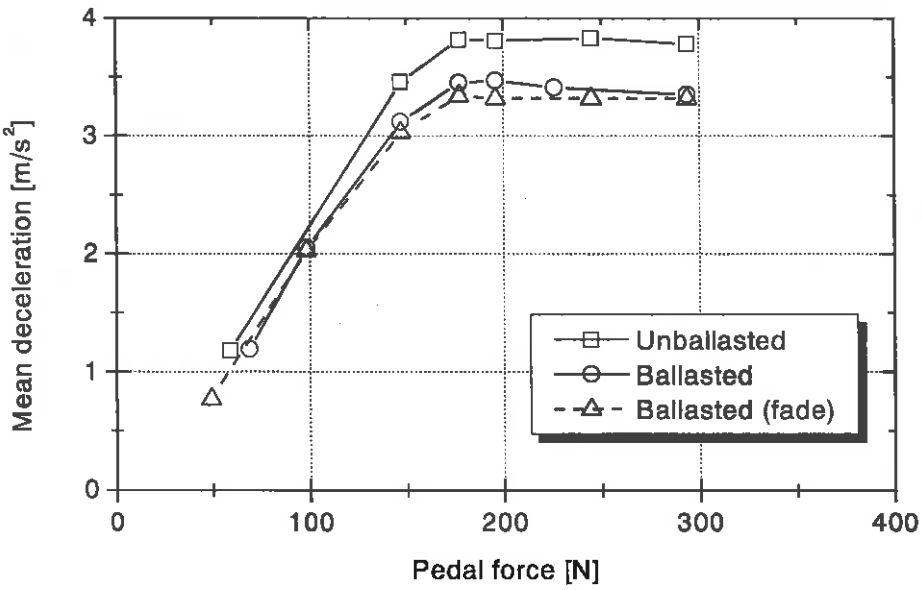
Height above ground: 788 mm

Distance forward from the vertical plane containing the axis of the rear-wheels: 782 mm

Distance from the median plane of the tractor (to the right): 6 mm

## 3.6 BRAKING (front wheel drive disengaged)

Date of tests: 1st and 6th August, 1996




Figure

**COLD SERVICE BRAKING DEVICE TEST AND FADE TEST**

3.6.1 Cold service braking device test

| | Speed before application of brakes [km/h] | Braking device control force [N] | Mean deceleration [m/s²] |
|---|---|---|---|
| Ballasted tractor | 29.4 | 68.6 | 1.19 |
| | | 98.1 | 2.05 |
| | | 147 | 3.12 |
| | | 177 | 3.45 |
| | | 196 | 3.47 |
| | | 226 | 3.41 |
| | | 294 | 3.35 |
| Unballasted tractor | 30.3 | 58.8 | 1.18 |
| | | 147 | 3.46 |
| | | 177 | 3.82 |
| | | 196 | 3.81 |
| | | 245 | 3.83 |
| | | 294 | 3.78 |

Maximum deviation of tractor from its original course: None

Abnormal vibration: None

3.6.2 Fade test

| Speed before application of brakes [km/h] | Braking device control force [N] | Mean deceleration [m/s²] |
|---|---|---|
| 29.4 | 49.0 | 0.77 |
| | 98.1 | 2.03 |
| | 147 | 3.03 |
| | 177 | 3.34 |
| | 196 | 3.32 |
| | 245 | 3.32 |
| | 294 | 3.32 |

Maximum deviation of tractor from its original course: None

Abnormal vibration: None

Brake heating method: By means of towing the tractor for 1 km at 23.5 km/h with the towing force of 2.94 kN

3.6.3 Parking braking device test

| | Ballasted tractor on 18% slope | |
|---|---|---|
| | Uphill | Downhill |
| Braking device control force [N] | 559 | 333 |

## 3.7 MEASUREMENT OF EXTERNAL NOISE LEVEL

| | |
|---|---|
| Date of tests: | 1st March, 2000 |
| Sound level meter | |
| Make: | RION Corporation |
| Model: | NL-14 |
| Type: | Precision sound level meter |
| Type of track: | Concrete |
| Gear number: | H-4 |
| Travelling speed before acceleration: | 23.8 km/h |
| Sound level: | 83.5 dB(A) |

## REPAIRS AND ADJUSTMENTS DURING TESTS

None

## REMARKS

None