I. S. M. A.

*ISTITUTO SPERIMENTALE PER*
*LA MECCANIZZAZIONE AGRICOLA*
*Sezione di Treviglio*

# REPORT ON TEST IN ACCORDANCE WITH OECD STANDARD CODE FOR THE OFFICIAL TESTING OF AGRICULTURAL AND FORESTRY TRACTOR PERFORMANCE (CODE 1)



## SAME LASER 150
## LAMBORGHINI 1506
## DEUTZ-FAHR AGROTRAC 150

24 forward and 12 reverse speeds
30 km/h
four-wheel drive agricultural tractors

| | |
|---|---|
| Manufactured by: | SAME DEUTZ-FAHR ITALIA S.p.A<br>Viale F. Cassani 15<br>24047 Treviglio BG<br>Italy |
| | SAME DEUTZ-FAHR DEUTSCHLAND GmbH<br>89415 Lauingen<br>Deutschland |
| OECD approval No.: | 1/2 135 |
| Date of approval: | 8 June 2004 |
| Period of test: | November – December 2003 |

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The Same Laser 150 (4WD) and Lamborghini 1506 (4WD) tractors are manufactured by SAME DEUTZ-FAHR ITALIA S.p.A.
The Deutz-Fahr Agrotrac 150 (4WD) tractor is manufactured by SAME DEUTZ-FAHR DEUTSCHLAND GmbH.

All tractors are assembled in Treviglio at the SAME DEUTZ-FAHR ITALIA S.p.A. factory and are technically identical in all main respects except with regard to model designation and colours.

All tests were carried out on the Same Laser 150 (4WD).

| | | |
|---|---|---|
| C | - Tractor manufacturer's name and address: | SAME DEUTZ-FAHR ITALIA S.p.A.; V.le F. Cassani 15, 24047 Treviglio BG, Italy; |
| D | - Location of tractor assembly: | Treviglio BG, Italy; |
| D | - Submitted for test by: | the manufacturer; |
| C | - Selected for test by: | the manufacturer with the agreement of ISMA; |
| D | - Place of running-in: | Treviglio BG, Italy; |
| D | - Duration of running-in: | 50 hours; |
| C | - Location of test: | ISMA, Via Milano 43, Treviglio BG, Italy. |

# 1. SPECIFICATIONS OF TRACTOR

## 1.1 Identification

| | | |
|---|---|---|
| C | 1.1.1 - Make: | SAME; |
| C | - Model: | LASER 150; |
| C | - Type: | four-wheel drive, unit construction. |

### 1.1.2 Numbers

| | | |
|---|---|---|
| D | - First serial number: | S33S506WT6001; |
| C | - Serial number: | S33S506WT6002. |

### 1.1.3 Other specification

| | | |
|---|---|---|
| C | - Speed version: | 30 km/h; |
| C | - Technical type number: | S33S506WT. |

## 1.2 Engine

| | | |
|---|---|---|
| C | - Make/Model/Type: | SAME DEUTZ-FAHR ITALIA / 1000.6 WTI10 / water cooled 4-stroke diesel, direct injection, turbo charged with intercooler; |
| C | - Serial number: | 1002. |

### 1.2.1 Cylinders

| | | |
|---|---|---|
| C | - Number and disposition: | 6 vertical in line; |
| D | - Bore x stroke: | 105 x 115.5 mm; |
| D | - Capacity: | 6000 $cm^3$; |
| D | - Compression ratio: | 16:1; |
| D | - Arrangement of valves: | overhead valves, 2 per cylinder; |
| D | - Cylinder liners: | wet liners. |

1.2.2 Supercharging

| | | |
|---|---|---|
| C | - Make/Model/Type: | SCHWITZER / S2B / exhaust driven supercharger with intercooler; |
| D | - Pressure: | 93 kPa. |

1.2.3 Fuel system

| | | |
|---|---|---|
| C | - Fuel feed system: | AC corone fuel feed pump; |
| C | - Make/Model/Type of fuel filter: | FIAMM / FNA 255/00 / replaceable paper element filter; |
| D | - Total capacity of fuel tanks: | 250 $dm^3$; |
| C | - Make/Model/Type of injection pump: | BOSCH PFR 1 K-90A 535, immersed, one per cylinder in line; |
| C | - Serial number: | without serial number; |
| | - Manufacturer's production setting of injection pump: | |
| C | . Flow rate: | 75 ± 2 $mm^3$/stroke at rated speed and full load corresponding 30.9 $dm^3$/h; |
| D | . Timing: | 13° before TDC; |
| D | - Make/Model/Type of injectors: | BOSCH DLLA 150 S 1322 multihole injection nozzles; |
| D | - Injection pressure: | 18 ± 1 MPa. |

1.2.4 Governor

| | | |
|---|---|---|
| C | - Make/Model/Type: | SAME DEUTZ-FAHR ITALIA / SAME 06516510 / mechanical; |
| C | - Governed range of engine speed: | from 650 to 2515 $min^{-1}$; |
| C | - Rated engine speed: | 2300 $min^{-1}$. |

1.2.5 Air cleaner

| | | |
|---|---|---|
| | - Pre-cleaner: | |
| C | . Make/Model/Type: | DONALDSON / P01-6330 / cyclone; |
| C | . Location of air intake: | front of engine, above the bonnet; |
| | - Main cleaner | |
| C | . Make/Model/Type: | DONALDSON / 2.4249.380.0 / dry paper element filter with two replaceable cartridge elements: |
| C | - Maintenance indicator: | with warning lamp on the dashboard. |

1.2.6 Lubrication system

| | | |
|---|---|---|
| D | - Type of feed pump: | forced feed from gear pump; |
| C | - Type of filter: | FIAMM FT 4803 IN; |
| C | - Number of filters: | 2. |

1.2.7 Cooling system

| | | |
|---|---|---|
| C | - Type of coolant: | water cooling; |
| D | - Type of pump: | impeller pump; |
| | - Specification of fan: | |
| C | . Number of fan blades: | 7; |
| C | . Fan diameter: | 520 mm; |
| D | - Coolant capacity: | 16 $dm^3$; |
| C | - Type of temperature control: | electrical control; |
| D | - Superpressure system: | 60 kPa. |

1.2.8 Starting system

| | | |
|---|---|---|
| C | - Make/Model/Type: | BOSCH / 12V / 0001 230 012 / electromagnetic engagement; |
| D | - Starter motor power rating: | 3 kW; |
| C | - Cold starting aid: | not fitted; |
| C | - Safety device: | gear lever shifted in neutral position; and pto disengaged at engine shut off. |

1.2.9 Electrical system

| | | |
|---|---|---|
| C | - Voltage: | 12 V; |
| | - Generator | |
| C | . Make/Model/Type: | ISKRA / 14V 65A / alternator; |
| D | . Power: | 780 W; |
| | - Battery: | |
| C | . Number: | 1 lead acid; |
| D | . Rating: | 120 Ah at 20 hours. |

1.2.10 Exhaust system

| | | |
|---|---|---|
| C | - Make/Model/Type: | SAME DEUTZ-FAHR ITALIA / DGM-SA 1686 / one reflection absorption chamber; |
| C | - Location: | on the left hand side of engine, vertical position above side bonnet. |

1.3 Transmission

1.3.1 Clutch (utilized only for travelling of tractor)

| | | |
|---|---|---|
| D | - Make/Model/Type: | SAME DEUTZ-FAHR ITALIA / C52.22 / independent multidisk in oil bath with axial piston; |
| D | - Number of plates: | 1; |
| D | - Diameter of plates: | 360 mm; |
| C | - Method of operation: | hydraulic operated by pedal. |

1.3.2 Gear box

D - Make/Model/Type: SAME DEUTZ-FAHR ITALIA / C52.23 / mechanical synchromesh;

- Description: 4 speeds forward with 3 ranges (S/N/F) and 2 reduction gears (high/low), 4 speeds reverse with 3 ranges (S/N/F).

| | | Forward | Reverse |
|---|---|---|---|
| C | Number of gears | 4 | 4 |
| C | Number of ranges | 3 | 3 |
| C | Number of reduction gears | 2 | - |
| C | Total of arrangements | 24 | 12 |

D - Available option: 4 speeds forward with 3 ranges (S/N/F) and 2 reduction gears ( high/low), when the reduction gear lever is in position low the range selector lever cannot be moved to position N and F, 4 speeds reverse with 3 ranges (S/N/F).

| | | Forward | Reverse |
|---|---|---|---|
| C | Number of gears | 4 | 4 |
| C | Number of ranges | 3 | 3 |
| C | Number of reduction gears | 2 | - |
| C | Total of arrangements | 16 | 12 |

1.3.3 Rear axle and final drives

D - Make/Model/Type: SAME DEUTZ-FAHR ITALIA / C52.44 / bevel gear differential and epyciclic final drives.

- Differential lock

D . Type: wet multiplate;

C . Method of engagement: pedal operated;

C . Method of disengagement: pedal operated.

1.3.4 Front axle and final drives

D - Make/Model/Type: SAME DEUTZ-FAHR ITALIA / C52.43 / central shaft bevel gear drive, differential and epicyclic final drives.

- Differential lock

D . Type: wet multiplate;

C . Method of engagement: pedal operated;

C . Method of disengagement: pedal operated.

## 1.3.5 Total ratios and travelling speeds

| Gear | Range | Number of engine revolutions for one revolution of the driving wheels | | Nominal travelling speed at rated engine speed of 2300 $min^{-1}$ (*) km/h | |
|---|---|---|---|---|---|
| FORWARD | | Low | High | Low | High |
| 1 | Slow | 556.0 | 474.5 | 1.33 | 1.56 |
| 2 | Slow | 413.1 | 352.5 | 1.79 | 2.10 |
| 3 | Slow | 318.2 | 271.6 | 2.33 | 2.73 |
| 4 | Slow | 247.2 | 211.0 | 3.00 | 3.51 |
| 1 | Normal | 185.3 | 158.2 | 4.00 | 4.69 |
| 2 | Normal | 137.7 | 117.5 | 5.38 | 6.31 |
| 3 | Normal | 106.1 | 90.5 | 6.99 | 8.19 |
| 4 | Normal | 82.4 | 70.3 | 9.00 | 10.55 |
| 1 | Fast | 61.8 | 52.7 | 12.00 | 14.07 |
| 2 | Fast | 45.9 | 39.2 | 16.15 | 18.91 |
| 3 | Fast | 35.4 | 30.2 | 20.94 | 24.55 |
| 4 | Fast | 27.5 | 23.4 | 26.96 | 31.68 |
| REVERSE | | | | | |
| 1 | Slow | 544.8 | | 1.36 | |
| 2 | Slow | 404.7 | | 1.83 | |
| 3 | Slow | 311.8 | | 2.38 | |
| 4 | Slow | 242.2 | | 3.06 | |
| 1 | Normal | 181.6 | | 4.08 | |
| 2 | Normal | 134.9 | | 5.50 | |
| 3 | Normal | 103.9 | | 7.14 | |
| 4 | Normal | 80.7 | | 9.19 | |
| 1 | Fast | 60.5 | | 12.25 | |
| 2 | Fast | 45.0 | | 16.47 | |
| 3 | Fast | 34.6 | | 21.43 | |
| 4 | Fast | 26.9 | | 27.56 | |

(*)*Calculated with a tyre dynamic radius index of 855 mm. (ETRTO 2002)*

- Number of revolutions of front wheels for one revolution of rear wheels: 1.2255

## 1.4 Power take-off

### 1.4.1 Main power take-off

| | | |
|---|---|---|
| C | - Type: | independent, at rear of tractor; |
| C | - Method of engagement: | engaged or disengaged by hand lever, driven by multiplate wet clutch independent of travel clutch; |
| C | - Number of shafts: | 1; |
| C | - Method of changing power take-off shaft ends and speeds: | operated through 6 screws, to mount at 6 or 21 spline PTO shaft end, speed shiftable by external hand lever. |

#### 1.4.1.1 Power take-off proportional to engine speed

Power take-off at 540 $min^{-1}$

| | | |
|---|---|---|
| C | - Location: | at rear of tractor; |
| C | - Diameter of power take-off shaft ends: | 35 mm; |
| C | - Number of splines: | 6, in conformity with ISO 500:1991, type 1; |
| C | - Height above ground: | 840 mm; |
| C | - Distance from the median plane of the tractor: | 0 mm; |
| C | - Distance behind rear axle: | 500 mm; |
| C | - PTO speed at rated engine speed: | 596 $min^{-1}$ ; |
| C | - Engine speed at standard power take-off speed: | 2083 $min^{-1}$ ; |
| C | - Ratio of rotation speeds (engine speed/p.t.o. speed): | 3.8571; |
| D | - Power restriction: | not specified; |
| D | - Maximum torque transmissible: | not specified; |
| C | - Direction of rotation (viewed from behind tractor): | clockwise. |

Power take-off at 1000 $min^{-1}$

| | | |
|---|---|---|
| C | - Location: | at rear of tractor; |
| C | - Diameter of power take-off shaft ends: | 35 mm; |
| C | - Number of splines: | 6, in conformity with ISO 500:1991, type 1; |
| C | - Height above ground: | 840 mm; |
| C | - Distance from the median plane of the tractor: | 0 mm; |
| C | - Distance behind rear axle: | 500 mm; |
| C | - PTO speed at rated engine speed: | 1076 $min^{-1}$ ; |
| C | - Engine speed at standard power take-off speed: | 2136 $min^{-1}$ ; |
| C | - Ratio of rotation speeds (engine speed/p.t.o. speed): | 2.1364; |
| D | - Power restriction: | not specified; |
| D | - Maximum torque transmissible: | not specified; |
| C | - Direction of rotation (viewed from behind tractor): | clockwise. |

1.4.1.2 Power take-off proportional to ground speed: not available.

1.4.2 Optional power take-off: none.

## 1.5 Hydraulic power lift

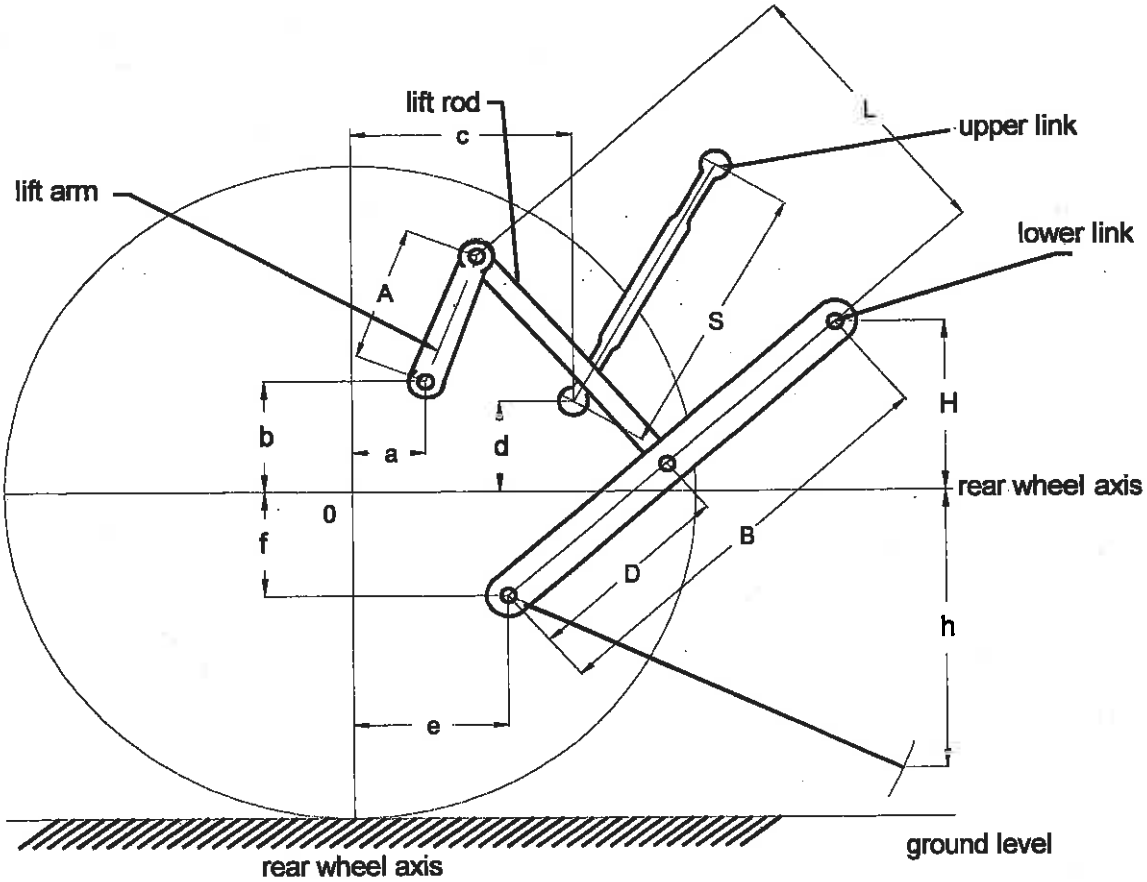
| | | |
|---|---|---|
| C | - Make/Model/Type: | SAME DEUTZ-FAHR ITALIA / C52.59 / open centre system, load sensing; |
| C | - Type and number of cylinders: | 1 internal and 2 external single-acting; |
| C | - Type of linkage lock for transport: | not available; |
| D | - Relief valve pressure setting: | 19.0 ± 0.5 MPa; |
| D | - Opening pressure of cylinder safety valve: | 21.0 ± 0.5 MPa; |
| D | - Lift pump type: | hydraulic rotary pump, driven by engine shaft; |
| D | - Transmission between pump and engine: | mechanical; |
| C | - Type and number of filters: | 1, replaceable paper cartridge; |
| C | - Site of oil reservoir: | gear box; |
| C | - Type, number and location of tapping points: | 4, double acting, at rear of tractor; |
| D | - Maximum volume of oil available to external cylinders: | 20 $dm^3$ . |

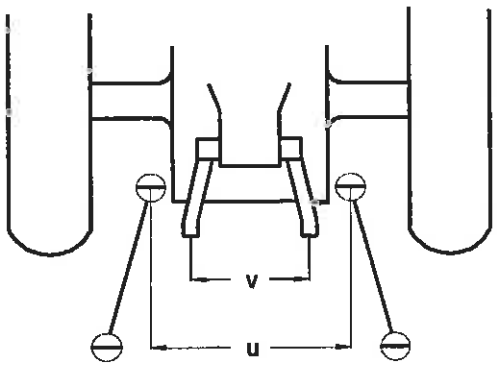
## 1.6 Three-point linkage

C - Category: 3, in conformity with category 3 of ISO 730-1:1994 + corrigendum 1:1995 and ISO 730-2:1979;

C - Category adapter: 2.

Linkage geometry



## Dimensions of linkage geometry when connected to the standard frame

| | | | Dimension or range | | Settings used in test |
|---|---|---|---|---|---|
| | | | mm | | mm |
| C | Length of lift arms | (A) | 300 | | 300 |
| C | Length of lower links | (B) | 935 | | 935 |
| | Distance of lift arm pivot point from rear wheel axis (behind) | | | | |
| C | - horizontally | (a) | 140 | | 140 |
| C | - vertically | (b) | 450 | | 450 |
| C | Horizontal distance between the 2 lower link points | (u) | 550 | | 550 |
| C | Horizontal distance between the 2 lift arm end points | (v) | 650 | | 650 |
| C | Length of upper link | (S) | from 585 to 820 | | 678 |
| | Distance of upper link pivot point from rear wheel axis | | | | |
| C | - horizontally | (c) | 420 | | 420 |
| C | - vertically | (d) | 245-310-375 | | 310 |
| | Distance of lower link pivot point from rear wheel axis | | | | |
| C | - horizontally | (e) | 165 | | 165 |
| C | - vertically | (f) | 195 | | 195 |
| C | Distance of lower link pivot points to lift rod pivot points on lower links | (D) | 425-465-505 | | 465 |
| C | Length of lift rods | (L) | from 780 to 910 | | 825 |
| | Height of lower hitch points relative to the rear wheel axis: | | | | |
| C | Length of lift rods | (L) | 780 | 910 | 825 |
| C | Linkage distance of lift rods | (D) | 465 | 465 | 465 |
| C | Lowest position | (h) | 550 | 840 | 650 |
| C | Highest position | (H) | 249 | 27 | 167 |
| C | Height above ground of lower hitch points when locked in transport position(*) | | 1104 | 882 | 1022 |

(*) *Assuming the dynamic radius index = 855 mm (ETRTO 2002)*

| | | |
|---|---|---|
| **1.7** | **Swinging drawbar** | (not available) |
| **1.8** | **Trailer hitch** | |
| C | - Type: | GRASSI DGM-GA 4513 C; |
| C | - Hole diameter: | 28 mm; |
| C | - Height above ground: | centre of clevis adjustable in 9 steps to 595, 635, 685, 775, 865, 915, 965, 1015, 1065, mm; |
| C | - Distance of hitch point from rear wheel axis<br>. Horizontally: | 695 mm; |
| C | - Distance of hitch point from power take-off shaft end<br>. Vertically: | below 245, 205, 155, 65, mm;<br>above 25, 75, 125, 175, 225, mm; |
| C | . Horizontally: | 195 mm; |
| D | - Maximum vertical permissible load: | 25 kN. |
| **1.9** | **Holed drawbar** | (optional, not fitted on tested tractor) |
| D | - Number of holes: | 9; |
| D | - Distance between holes: | 100 mm; |
| D | - Hole diameter: | 33 mm; |
| D | - Thickness x width of the drawbar: | 30 x 80 mm; |
| | - Height above ground, | |
| D | . Min.: | 125 mm; |
| D | . Max.: | 1129 mm; |
| D | - Horizontal distance behind power take-off shaft end: | 635 mm. |
| **1.10** | **Steering** | |
| D | - Make/Model/Type: | DANFOSS / OSPC 200 OR / hydrostatic steering, acting on front wheels. |
| | - Method of operation | |
| D | . Pump: | hydraulic gear pump; |
| D | . Rams: | 2 simple acting directly on front axle; |
| D | - Working pressure: | 15 MPa. |

## 1.11 Brakes

### 1.11.1 Service brake

D - Make/Model/Type: SAME DEUTZ-FAHR ITALIA / C52.54 / oil bath disc, total 8 discs, 4 at front (2 per wheel, diameter 224 mm) and 4 at rear (2 per wheel, diameter 302 mm), all mounted before the final drive;

C - Method of operation: hydraulically actuated with 2 pedals;

C - Trailer braking take-off: none.

### 1.11.2 Parking brake

D - Type: fully independent of service brake, 3 oil bath disc mounted on the pinion shaft in the gear box;

C - Method of operation: mechanical by hand lever.

## 1.12 Wheels

- Number

C . Front: 2, steering and driving;

C . Rear: 2, driving;

C - Wheelbase: 2750 mm.

-Track width adjustment:

| | | Minimum mm | Maximum mm | Adjustment method |
|---|---|---|---|---|
| D | Front | 1930 | 2250 | changing the position of the rims with respect to the disc |
| D | Rear | 1800 | 2150 | |

## 1.13 Protective structure

C - Make/Model/Type: SAME DEUTZ-FAHR ITALIA / C 27/ cab, not tiltable;

C - Manufacturer's name and address: SAME DEUTZ-FAHR ITALIA S.p.A., Viale F. Cassani 15, 24047 Treviglio BG, Italy.

C - OECD approval

. Approval number: CSD-0760-2;

C . Date of approval: 28 December 1983;

C . Modification certificate: IIA MOD 001/2004.

## 1.14 Seat

### 1.14.1 Driver's seat

| | | |
|---|---|---|
| C | - Make/Model/Type: | GRAMMER / DS85H/90AR / upholstered seat with back rest; |
| C | - Seat and steering wheel reversible: | no; |
| C | - Type of suspension: | adjustable spring; |
| C | - Type of damping: | shock absorber; |
| | - Range of adjustment | |
| C | . Longitudinally | 150 mm; |
| C | . Vertically | 60 mm; |
| C | - Safety belt: | no. |

1.14.2 Optional driver's seats — not available.

### 1.14.3 Passenger's seat

| | | |
|---|---|---|
| C | - Location: | on left side of driver's seat; |
| C | - Capacity (number): | 1. |

## 1.15 Lighting

| | | Height above ground of centre mm | Size mm | Distance from out side edge of lights to median plane of tractor mm |
|---|---|---|---|---|
| C | Headlights | 1125 | 160 x 110 | 215 |
| C | Side lights | 1805 | 70 x 100 | 950 |
| C | Rear lights | 1825 | 120 x 70 | 743 |
| C | Reflectors | 1760 | 110 x 35 | 975 |
| | | 800 | ∅ 80 | 480 |

# 2. TEST CONDITIONS

## 2.1 Overall dimensions

| | Length | Width | | Height at top of | |
|---|---|---|---|---|---|
| | | minimum | maximum | protective structure | exhaust pipe |
| | mm | mm | mm | mm | mm |
| Ballasted | 4805 | 2360 | 2410 | 2820 | 2950 |
| Unballasted | 4450 | 2360 | 2410 | 2820 | 2950 |

## 2.2 Ground clearance:

550 mm bracket of trailer hitch (unballasted tractor).

## 2.3 Tractor mass (with full fuel tanks, cab)

| | Ballasted | | Unballasted | |
|---|---|---|---|---|
| | Without driver | With driver | Without driver | With driver |
| | kg | kg | kg | kg |
| Front | 2505 | 2530 | 2170 | 2195 |
| Rear | 3870 | 3920 | 3525 | 3575 |
| Total | 6375 | 6450 | 5695 | 5770 |

## 2.4 Ballast

| | Weights | | Water |
|---|---|---|---|
| | Number | Total mass | |
| | | kg | kg |
| Front | 8 | 320 | - |
| Rear wheels | 4 + 4 | 360 | - |

## 2.5 Track specifications

Not applicable

## 2.6 Tyres and track width specifications

| | Front | Rear |
|---|---|---|
| Tyres | | |
| - make | FIRESTONE | FIRESTONE |
| - model | RADIAL 8000 | RADIAL 8000 |
| - dimensions | 480/70R30 | 580/70R38 |
| - ply rating | - | - |
| - load index/speed index | 141 A8 | 155 A8 |
| - type | radial | radial |
| - maximum load (tyre manufacturer's) | 25.75 kN | 38.75 kN |
| - maximum load (tractor manufacturer's) | 26.48 kN | 58.86 kN |
| - inflation pressure (tyre manufact.'s) | 160 kPa | 160 kPa |
| - dynamic radius index | 695 mm | 855 mm |
| Chosen track width | 1955 mm | 1870 mm |

## 2.7 Fuel

- Type: AGIP DIESEL, DIN 51601; (in accordance with the national standard)
- Density at 15 °C: 0.838 g/cm$^3$ .

## 2.8 Oils and lubricants

### 2.8.1 Capacity and change interval

| | Capacity dm$^3$ | Oil change h | Filter change h |
|---|---|---|---|
| Engine | 15 | 150 | 300 |
| Gear box with rear axle and final drives, hydraulic system, steering | 118 | 1200 | 2400(*) |
| Front axle/final drives | 13/2.5 x 2 | 1200 | 2400 |
| Brakes | max level | 1200 | 2400 |

*(*) Or when the warning lamp is lighted*

## 2.8.2 Specifications

| | Recommended | Using during test |
|---|---|---|
| **Engine oil** | | |
| Type | AKROS TURBO | AKROS TURBO |
| Viscosity | 12.5 cSt | 12.5 cSt |
| Classification | API CE MIL | API CE MIL |
| **Transmission oil** used in gear box, front/rear axle and final drives | | |
| Type | AKROS MULTI FCT | AKROS MULTI FCT |
| Viscosity | 11.5 cSt | 11.5 cSt |
| Classification | API GL 4 | API GL 4 |
| **Hydraulic fluid** | | |
| Type | AKROS MULTI FCT | AKROS MULTI FCT |
| Viscosity | 11.5 cSt | 11.5 cSt |
| Classification | API GL 4 | API GL 4 |
| **Steering oil** | | |
| Type | AKROS MULTI FCT | AKROS MULTI FCT |
| Viscosity | 11.5 cSt | 11.5 cSt |
| Classification | API GL 4 | API GL 4 |
| **Braking oil** | | |
| Type | AKROS MATIC | AKROS MATIC |
| Viscosity | 6.7 cSt | 6.7 cSt |
| Classification | API GL 4 | API GL 4 |

## 2.8.3 Grease

- Type: AKROS GREASE T2;
- Number of lubrication points: 18.

# 3. COMPULSORY TESTS RESULTS

## 3.1 Main power take-off

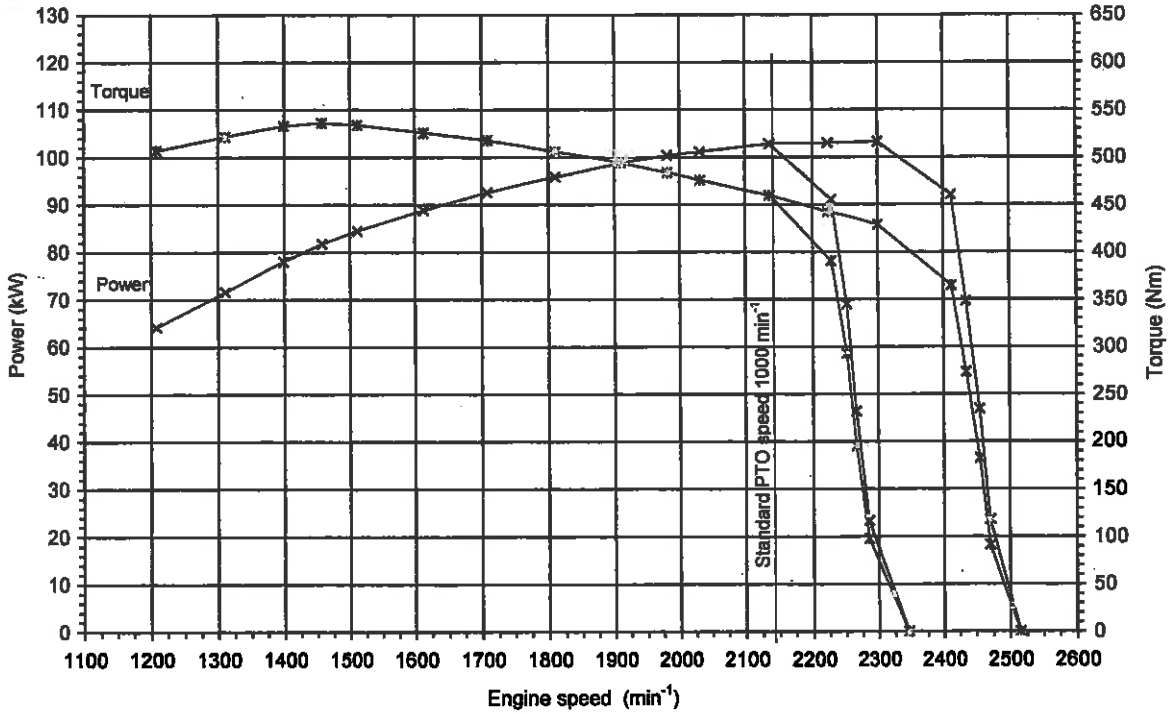
- Date and location of tests: 10 November 2003, ISMA, Treviglio BG, Italy;
- Type of dynamometer bench: eddy-current, ZÖLLNER B500.

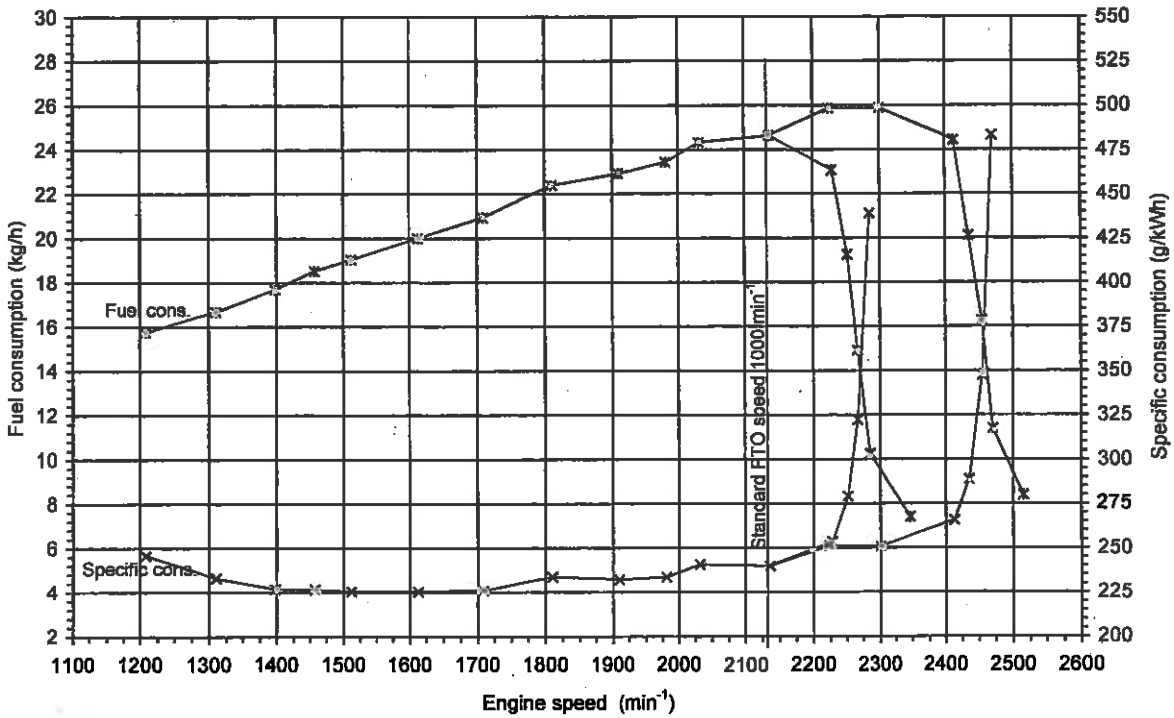
| Power | Speed | | | Fuel consumption | | | Specific energy |
|---|---|---|---|---|---|---|---|
| | Engine | P.T.O. | Fan | Hourly | | specific | |
| kW | $min^{-1}$ | | | kg/h | l/h | g/kWh | kWh/l |
| 3.1.1 MAXIMUM POWER - TWO-HOUR TEST | | | | | | | |
| 103.2 | 2300 | 1077 | 2760 | 25.88 | 30.88 | 251 | 3.34 |
| 3.1.2 POWER AT RATED ENGINE SPEED | | | | | | | |
| 103.2 | 2300 | 1077 | 2760 | 25.88 | 30.88 | 251 | 3.34 |
| 3.1.3 STANDARD POWER TAKE-OFF SPEED (1000 ± 25 $min^{-1}$) | | | | | | | |
| 102.7 | 2136 | 1000 | 2536 | 24.62 | 29.38 | 240 | 3.50 |
| 3.1.4 PART LOADS<br>3.1.4.1 The torque corresponding to maximum power at rated engine speed | | | | | | | |
| 103.2 | 2300 | 1077 | 2760 | 25.88 | 30.88 | 251 | 3.34 |
| 3.1.4.2 85% of torque obtained in 3.1.4.1 | | | | | | | |
| 92.0 | 2413 | 1129 | 2895 | 24.43 | 29.15 | 265 | 3.16 |
| 3.1.4.3 75% of torque defined in 3.1.4.2 | | | | | | | |
| 69.7 | 2435 | 1140 | 2922 | 20.11 | 24.00 | 289 | 2.90 |
| 3.1.4.4 50% of torque defined in 3.1.4.2 | | | | | | | |
| 46.8 | 2455 | 1149 | 2946 | 16.26 | 19.40 | 347 | 2.41 |
| 3.1.4.5 25% of torque defined in 3.1.4.2 | | | | | | | |
| 23. 6 | 2470 | 1156 | 2964 | 11.38 | 13.58 | 483 | 1.74 |
| 3.1.4.6 unloaded | | | | | | | |
| 0 | 2515 | 1177 | 3018 | 8.39 | 10.01 | - | - |

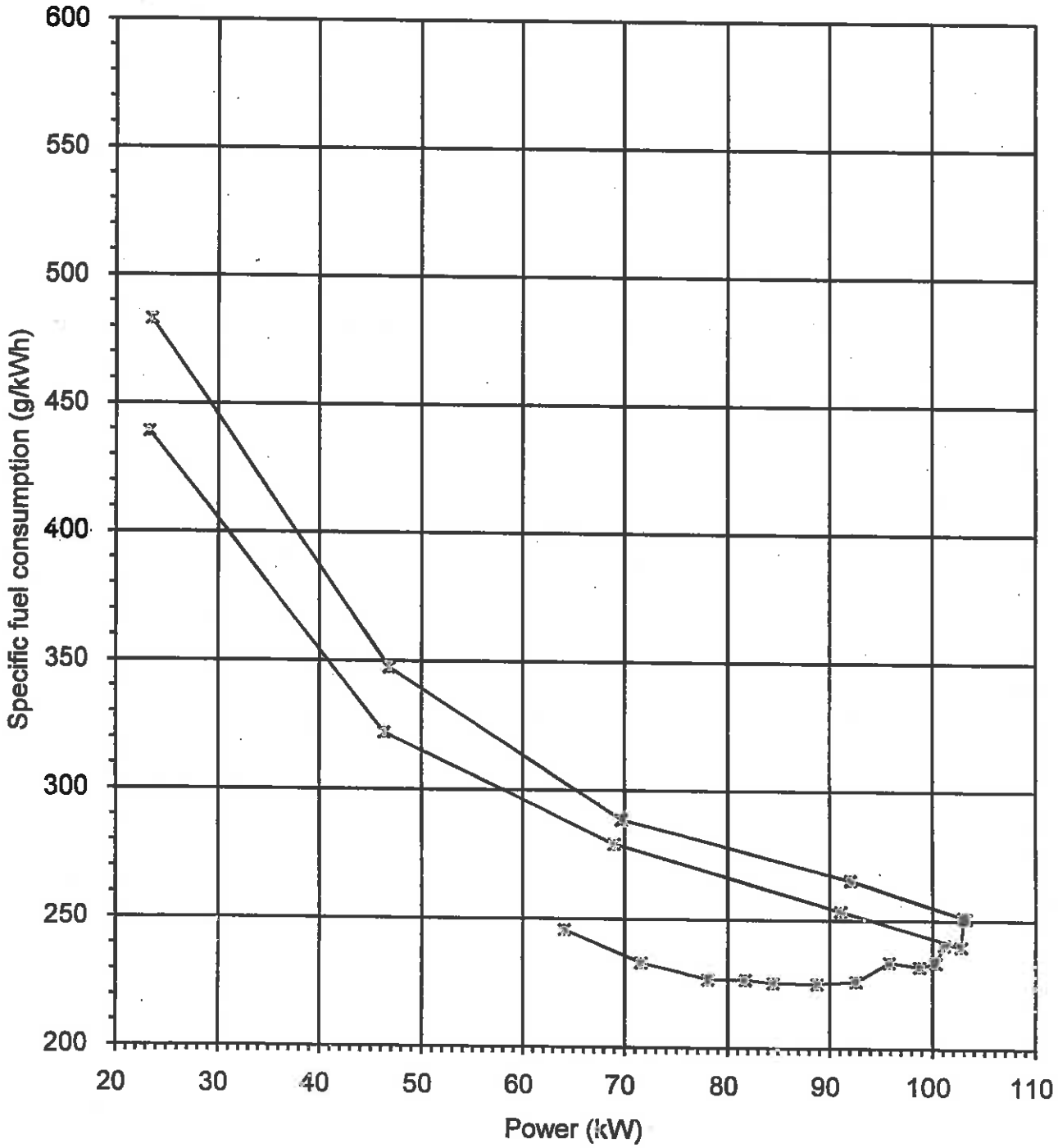
| Power | Speed | | | Fuel consumption | | | Specific energy |
|---|---|---|---|---|---|---|---|
| | Engine | P.T.O. | Fan | Hourly | | specific | |
| kW | $min^{-1}$ | | | kg/h | l/h | g/kWh | kWh/l |
| 3.1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED (1000 ± 25 $min^{-1}$) | | | | | | | |
| 3.1.5.1 The torque corresponding to maximum power available | | | | | | | |
| 102.7 | 2136 | 1000 | 2536 | 24.62 | 29.38 | 240 | 3.50 |
| 3.1.5.2 85% of torque obtained in 3.1.5.1 | | | | | | | |
| 91.0 | 2228 | 1043 | 2673 | 23.07 | 27.53 | 253 | 3.31 |
| 3.1.5.3 75% of torque defined in 3.1.5.2 | | | | | | | |
| 69.0 | 2251 | 1054 | 2701 | 19.25 | 22.97 | 279 | 3.00 |
| 3.1.5.4 50% of torque defined in 3.1.5.2 | | | | | | | |
| 46.3 | 2266 | 1061 | 2719 | 14.91 | 17.79 | 322 | 2.60 |
| 3.1.5.5 25% of torque defined in 3.1.5.2 | | | | | | | |
| 23.3 | 2285 | 1069 | 2742 | 10.24 | 12.22 | 439 | 1.91 |
| 3.1.5.6 unloaded | | | | | | | |
| 0 | 2346 | 1098 | 2815 | 7.39 | 8.82 | - | - |

- No load maximum engine speed: 2515 $min^{-1}$;
- Equivalent flywheel torque at rated engine speed: 428.8 Nm;
- Equivalent flywheel torque at 2-hour test: 428.8 Nm;
- Maximum equivalent flywheel torque: 536.0 Nm at 1457 $min^{-1}$ of the engine.

| Mean atmospheric conditions: | |
|---|---|
| Temperature | 21 °C |
| Pressure | 100.1 kPa |
| Relative humidity | 58 % |
| Maximum temperatures: | |
| Coolant | 89 °C |
| Engine oil | 116 °C |
| Fuel | 32 °C |
| Engine air intake | 27 °C |


Torque
Power
Power (kW)
Torque (Nm)
Standard PTO speed 1000 min-1
Engine speed (min-1)


Fuel cons.
Specific cons.
Fuel consumption (kg/h)
Specific consumption (g/kWh)
Standard PTO speed 1000/min-1
Engine speed (min-1)


Specific fuel consumption (g/kWh)
600
550
500
450
400
350
300
250
200
20
30
40
50
60
70
80
90
100
110
Power (kW)

## 3.2 Hydraulic power and lifting force

- Date of tests: 19 November 2003

### 3.2.1 *Hydraulic power test*

#### 3.2.1.1 Hydraulic fluid data

- Hydraulic fluid type: AKROS MULTI FCT;
- Viscosity index (ISO 3448 + Corr. 1:1993): 160;
- Viscosity at 65°C: 29 $mm^2/s$

#### 3.2.1.2 Compulsory Reporting (Test Results)

| | Pressure | Reservoir oil Temperature °C | | Engine Speed | Flow rate | Power |
|---|---|---|---|---|---|---|
| | MPa | Min. | Max. | $min^{-1}$ | l/min | kW |
| Rated engine speed | | | | - | | |
| 3.2.1.2.1 Maximum pressure with relief valve open as measured at the coupler Pump stalled: No | 18.5 | 60 | 68 | 2481 | | |
| 3.2.1.2.2 Flow rate corresponding to a hydraulic pressure equivalent to 90% of the actual relief valve pressure setting and corresponding hydraulic power | 16.6 | 67 | | 2477 | 60.5 | 16.7 |
| 3.2.1.2.3 Maximum available flow and maximum power from one coupler pair | 16.4 | 66 | | 2483 | 61.9 | 16.9 |
| 3.2.1.2.4 Maximum available flow and maximum power from coupler pairs operating simultaneously | Simultaneous operation not available | | | | | |

### 3.2.2 *Power lift test*

Linkage setting for test - see paragraph 1.6

| | | At the hitch point | On the frame |
|---|---|---|---|
| Height of lower hitch point above ground in down position | mm | 205 | 141 |
| Vertical movement | | | |
| without lifting forces | mm | 817 | 1008 |
| with lifting forces | mm | 757 | 916 |
| Maximum corrected force exerted through full range | kN | 50.72 | 48.75 |
| Corresponding pressure of hydraulic fluid | MPa | 16.6 | 16.6 |
| Moment about rear-wheel axis | kNm | 55.79 | 83.36 |
| Maximum tilt angle of mast from vertical | degrees | - | 12 |

| Lifting heights relative to the horizontal plane including the lower link pivot points (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| -519 | -455 | -400 | -300 | -200 | -100 | 0 | +100 | +200 | +300 | +302 | +397 |
| Lifting forces (the values of force measured shall be corrected to correspond to a hydraulic pressure equivalent to 90% of the actual relief valve setting of the hydraulic lift system): | | | | | | | | | | | |
| at the hitch points (kN), corrected to 16.6 MPa | | | | | | | | | | | |
| - | 50.72 | 52.58 | 57.31 | 60.47 | 63.24 | 65.50 | 67.85 | 71.02 | 73.14 | 73.14 | - |
| at the frame (kN), corrected to 16.6 MPa | | | | | | | | | | | |
| 48.75 | - | 53.76 | 55.54 | 56.61 | 57.03 | 56.87 | 56.60 | 56.68 | 56.59 | - | 56.53 |

## 3.3 Drawbar performance

- Date of tests: 11, 12, 13 and 14 November 2003;
- Type of track: concrete.

| | Height of drawbar above ground mm | Tyre inflation pressure | |
|---|---|---|---|
| | | Front kPa | Rear kPa |
| Unballasted | 635 | 160 | 160 |
| Ballasted | 631 | 160 | 160 |

| Gear and range | Power kW | Drawbar pull kN | Speed km/h | Engine speed $min^{-1}$ | Fan speed $min^{-1}$ | Slip of wheels % | Specific fuel consumption g/kWh | Specific energy kWh/l | Temperatures | | | Atmospheric conditions | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Fuel °C | Coolant °C | Engine oil °C | Temperature °C | Relative humidity % | Pressure kPa |
| 3.3.1 MAXIMUM POWER IN TESTED GEARS (unballasted tractor) | | | | | | | | | | | | | | |
| 1SL | 16,4 | 48,07 | 1,23 | 2442 | 2930 | 15,0 | 1127 | 0,74 | 27 | 84 | 102 | 8 | 61 | 100.1 |
| 1SH | 19,3 | 48,21 | 1,44 | 2438 | 2926 | 15,2 | 1017 | 0,82 | 27 | 84 | 102 | 8 | 61 | 100.1 |
| 2SL | 22,0 | 47,93 | 1,65 | 2438 | 2926 | 15,0 | 895 | 0,94 | 27 | 84 | 103 | 8 | 61 | 100.1 |
| 2SH | 26,1 | 48,40 | 1,94 | 2434 | 2921 | 14,9 | 783 | 1,07 | 28 | 85 | 103 | 8 | 61 | 100.1 |
| 3SL | 28,6 | 48,10 | 2,14 | 2430 | 2916 | 15,2 | 735 | 1,14 | 28 | 85 | 103 | 9 | 61 | 100.0 |
| 3SH | 33,7 | 48,36 | 2,51 | 2422 | 2906 | 15,0 | 666 | 1,26 | 28 | 85 | 102 | 8 | 60 | 100.0 |
| 4SL | 37,1 | 48,60 | 2,75 | 2418 | 2902 | 14,9 | 624 | 1,34 | 27 | 85 | 103 | 9 | 60 | 100.1 |
| 4SH | 43,7 | 49,05 | 3,21 | 2415 | 2898 | 15,1 | 556 | 1,51 | 27 | 84 | 102 | 9 | 61 | 100.1 |
| 1NL | 49,8 | 49,25 | 3,64 | 2407 | 2888 | 15,1 | 488 | 1,72 | 29 | 84 | 103 | 10 | 61 | 100.1 |
| 1NH | 59,0 | 49,96 | 4,25 | 2395 | 2874 | 15,0 | 417 | 2,01 | 29 | 85 | 107 | 10 | 61 | 100.1 |
| 2NL | 67,6 | 49,85 | 4,88 | 2384 | 2861 | 14,8 | 366 | 2,29 | 29 | 85 | 109 | 10 | 60 | 100.1 |
| 2NH | 77,6 | 49,96 | 5,59 | 2330 | 2796 | 14,7 | 328 | 2,56 | 28 | 85 | 109 | 10 | 60 | 100.0 |

## 3.3 Drawbar performance (continued)

| Gear and range | Power | Drawbar pull | Speed | Engine speed | Fan speed | Slip of wheels | Specific fuel consumption | Specific energy | Temperatures | | | Atmospheric conditions | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Fuel | Coolant | Engine oil | Temperature | Relative humidity | Pressure |
| | kW | kN | km/h | $min^{-1}$ | $min^{-1}$ | % | g/kWh | kWh/l | °C | °C | °C | °C | % | kPa |
| 3.3.1 MAXIMUM POWER IN TESTED GEARS (unballasted tractor) | | | | | | | | | | | | | | |
| 3NL | 82,4 | 45,39 | 6,54 | 2300 | 2760 | 8,7 | 315 | 2,66 | 31 | 86 | 111 | 9 | 59 | 100.0 |
| 3NH | 84,4 | 38,40 | 7,91 | 2303 | 2764 | 6,0 | 308 | 2,72 | 31 | 86 | 113 | 10 | 59 | 100.0 |
| 4NL | 82,7 | 34,00 | 8,76 | 2300 | 2760 | 4,9 | 314 | 2,66 | 32 | 86 | 113 | 10 | 59 | 100.0 |
| 4NH | 82,7 | 28,56 | 10,43 | 2310 | 2772 | 3,9 | 313 | 2,67 | 31 | 85 | 115 | 10 | 59 | 100.0 |
| 1FL | 82,6 | 25,15 | 11,83 | 2300 | 2760 | 3,7 | 313 | 2,67 | 32 | 85 | 116 | 11 | 59 | 100.1 |
| 1FH | 84,9 | 21,73 | 14,06 | 2303 | 2764 | 2,6 | 305 | 2,75 | 32 | 85 | 117 | 11 | 59 | 100.1 |
| 2FL | 82,1 | 18,16 | 16,28 | 2307 | 2768 | 2,0 | 314 | 2,67 | 30 | 86 | 115 | 11 | 59 | 100.1 |

| Gear and range | Power | Drawbar pull | Speed | Engine speed | Fan speed | Slip of wheels | Specific fuel consumption | Specific energy | Temperatures | | | Atmospheric conditions | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Fuel | Coolant | Engine oil | Temperature | Relative humidity | Pressure |
| | kW | kN | km/h | $min^{-1}$ | $min^{-1}$ | % | g/kWh | kWh/l | °C | °C | °C | °C | % | kPa |
| 3.3.2 MAXIMUM POWER IN TESTED GEARS (ballasted tractor) | | | | | | | | | | | | | | |
| 1SL | 19,4 | 56,82 | 1,23 | 2438 | 2926 | 15,1 | 1010 | 0,83 | 29 | 84 | 101 | 10 | 62 | 100.4 |
| 1SH | 22,7 | 56,86 | 1,44 | 2434 | 2921 | 14,9 | 896 | 0,94 | 29 | 83 | 101 | 10 | 62 | 100.4 |
| 2SL | 26,1 | 56,99 | 1,65 | 2426 | 2911 | 14,9 | 833 | 1,01 | 29 | 84 | 105 | 10 | 62 | 100.4 |
| 2SH | 30,6 | 56,86 | 1,94 | 2426 | 2911 | 14,7 | 712 | 1,18 | 28 | 84 | 108 | 10 | 62 | 100.4 |
| 3SL | 33,9 | 57,02 | 2,14 | 2422 | 2906 | 14,8 | 666 | 1,26 | 29 | 85 | 108 | 10 | 62 | 100.4 |
| 3SH | 39,8 | 57,36 | 2,50 | 2418 | 2902 | 14,9 | 593 | 1,41 | 31 | 85 | 109 | 11 | 62 | 100.4 |
| 4SL | 44,2 | 58,08 | 2,74 | 2411 | 2893 | 14,9 | 555 | 1,51 | 31 | 85 | 110 | 11 | 61 | 100.3 |

**3.3 Drawbar performance** (continued)

| Gear and range | Power | Drawbar pull | Speed | Engine speed | Fan speed | Slip of wheels | Specific fuel consumption | Specific energy | Temperatures | | | Atmospheric conditions | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Fuel | Coolant | Engine Oil | Temperature | Relative humidity | Pressure |
| | kW | kN | km/h | $min^{-1}$ | $min^{-1}$ | % | g/kWh | kWh/l | °C | °C | °C | °C | % | kPa |
| 3.3.2 MAXIMUM POWER IN TESTED GEARS (ballasted tractor) | | | | | | | | | | | | | | |
| 4SH | 51,4 | 58,00 | 3,19 | 2403 | 2884 | 15,1 | 480 | 1,75 | 33 | 85 | 111 | 11 | 61 | 100.3 |
| 1NL | 57,7 | 57,06 | 3,64 | 2399 | 2879 | 14,8 | 428 | 1,96 | 33 | 84 | 113 | 11 | 61 | 100.3 |
| 1NH | 67,6 | 57,11 | 4,26 | 2388 | 2866 | 14,6 | 367 | 2,29 | 32 | 85 | 112 | 12 | 61 | 100.3 |
| 2NL | 76,7 | 56,63 | 4,88 | 2364 | 2837 | 14,0 | 327 | 2,56 | 32 | 85 | 113 | 12 | 61 | 100.3 |
| 2NH | 84,8 | 51,92 | 5,88 | 2299 | 2759 | 9,1 | 306 | 2,74 | 33 | 86 | 113 | 12 | 60 | 100.3 |
| 3NL | 84,7 | 45,61 | 6,69 | 2303 | 2764 | 6,9 | 306 | 2,74 | 33 | 86 | 113 | 12 | 60 | 100.3 |
| 3NH | 85,3 | 38,59 | 7,96 | 2299 | 2759 | 5,3 | 303 | 2,77 | 32 | 85 | 114 | 12 | 61 | 100.2 |
| 4NL | 84,7 | 34,63 | 8,81 | 2299 | 2759 | 4,5 | 305 | 2,75 | 32 | 85 | 113 | 12 | 61 | 100.2 |
| 4NH | 84,8 | 29,30 | 10,42 | 2303 | 2764 | 3,7 | 304 | 2,76 | 32 | 86 | 114 | 12 | 60 | 100.2 |
| 1FL | 84,4 | 25,63 | 11,86 | 2295 | 2754 | 3,6 | 306 | 2,74 | 33 | 86 | 114 | 13 | 60 | 100.2 |
| 1FH | 85,2 | 21,79 | 14,08 | 2303 | 2764 | 2,5 | 303 | 2,77 | 33 | 84 | 115 | 12 | 60 | 100.3 |
| 2FL | 81,8 | 18,16 | 16,22 | 2299 | 2759 | 2,1 | 317 | 2,64 | 33 | 84 | 114 | 12 | 59 | 100.3 |
| 3.3.3 FIVE HOUR TESTS | | | | | | | | | | | | | | |
| 3.3.3.1 FIVE HOUR TEST at 75% of pull at maximum power | | | | | | | | | | | | | | |
| 3NL | 67,3 | 34,23 | 7,08 | 2384 | 2861 | 4,1 | 369 | 2,27 | 34 | 85 | 117 | 11 | 58 | 100.0 |
| 3.3.3.2 FIVE HOUR TEST at pull corresponding to 15% wheelslip, with additional ballast: 180 kg | | | | | | | | | | | | | | |
| 2NL | 80,5 | 56,58 | 5,12 | 2357 | 2828 | (*) | (*) | 2,69 | 33 | 85 | 119 | 13 | 58 | 100.2 |

(*) Those figures not quoted are irrelevant due to additional ballast.

Oil consumption during ten hours duration of test 3.3.3.1 and 3.3.3.2: 80 g/h.

## 3.4 Turning area and turning circle

| | Without brakes | |
|---|---|---|
| | Right-hand | Left-hand |
| | m | m |
| Radius of turning area | 5.40 | 5.40 |
| Radius of turning circle | 5.20 | 5.20 |

## 3.5 Location of centre of gravity

| | | |
|---|---|---|
| Height above ground: | 1011 | mm |
| Distance from the vertical plane containing the axis of the rear-wheels: | 1040 | mm |
| Distance from the median longitudinal plane to the left of the tractor: | 12 | mm |
| Angle of suspension of the tractor: | 21 | ° |

## 3.6 Braking

Date of tests: 18 November 2003

### 3.6.1 *Cold service braking device test*

| | Speed before application of brakes | Braking device control force | Mean deceleration |
|---|---|---|---|
| | km/h | kN | $m/s^2$ |
| Ballasted tractor | 33.6 | 0.11 | 0.88 |
| | 33.7 | 0.21 | 2.36 |
| | 33.4 | 0.30 | 3.58 |
| | 34.5 | 0.37 | 4.13 |
| | 34.1 | 0.45 | 4.33 |
| | 33.9 | 0.57 | 4.86 |
| | | | |
| Unballasted tractor | 34.5 | 0.12 | 1.18 |
| | 34.1 | 0.24 | 3.00 |
| | 34.3 | 0.33 | 4.08 |
| | 33.4 | 0.39 | 4.44 |
| | 34.7 | 0.47 | 4.72 |
| | 34.9 | 0.58 | 5.15 |

3.6.1 *Cold service braking device test* (continued)

| | Speed before application of brakes | Braking device control force | Minimum stopping distance without locking the wheels |
|---|---|---|---|
| | km/h | kN | m |
| Ballasted tractor | 33.7 | 0.34 | 10.8 |
| Unballasted tractor | 34.3 | 0.33 | 11.1 |

- Maximum deviation of tractor from its original course: none;
- Abnormal vibration: none;

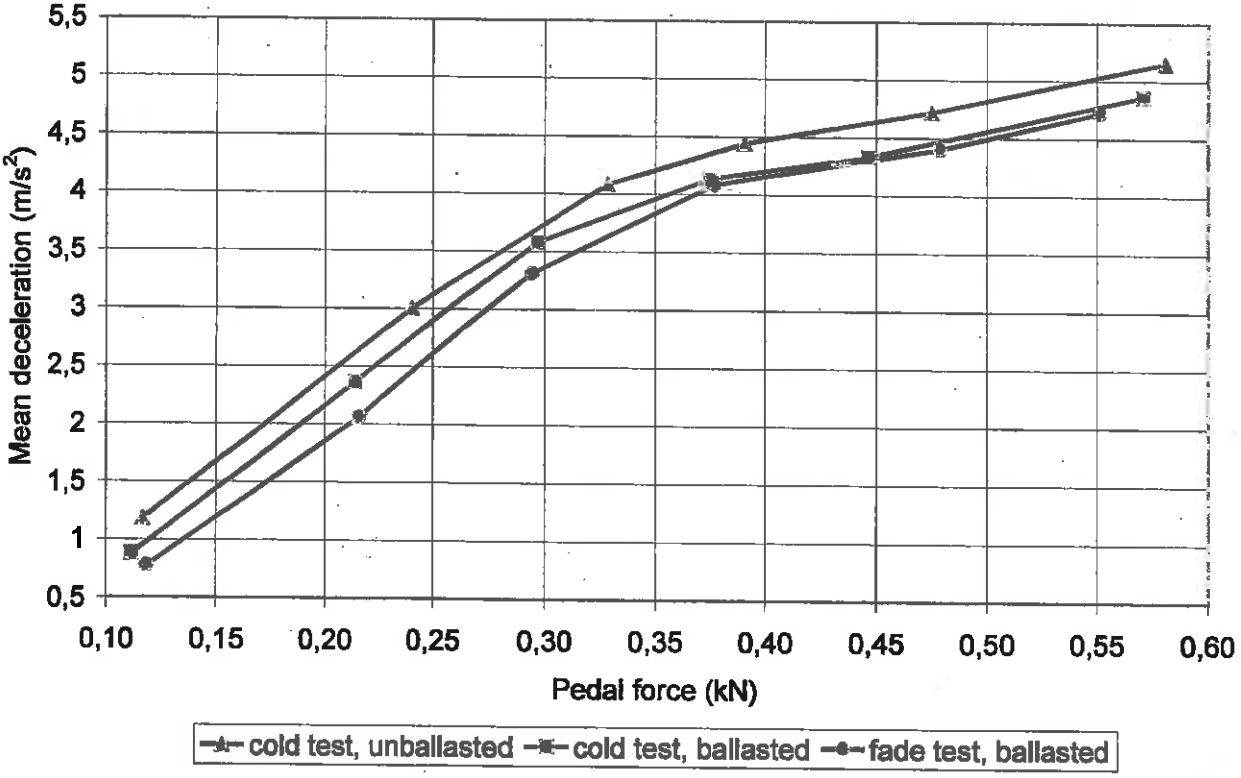
3.6.2 *Fade test*

| | Speed before application of brakes | Braking device control force | Mean deceleration |
|---|---|---|---|
| | km/h | kN | $m/s^2$ |
| Ballasted tractor | 34.2 | 0.12 | 0.78 |
| | 34.0 | 0.22 | 2.06 |
| | 33.9 | 0.29 | 3.31 |
| | 34.5 | 0.38 | 4.08 |
| | 34.4 | 0.48 | 4.40 |
| | 35.3 | 0.55 | 4.72 |

- Maximum deviation of tractor from its original course: none;
- Abnormal vibration: none;
- Brake heating method: heated by towing of the tractor for 1 km.

| | Speed before application of brakes | Braking device control force | Minimum stopping distance without locking the wheels |
|---|---|---|---|
| | km/h | kN | m |
| Ballasted tractor | 34.3 | 0.35 | 11.7 |

Service brake test




### 3.6.3 *Parking brake device test*

| | Ballasted tractor on 18% slope | |
|---|---|---|
| | Uphill | Downhill |
| Braking device control force | 0.20 kN | 0.20 kN |

### 3.7 Measurement of external noise level

- Date of test: 10 December 2003;
- Type of sound level meter: BRÜEL & KJÆR model 2231;
- Type of track: concrete.

| Gear | Travelling speed before acceleration km/h | Sound level dB(A) |
|---|---|---|
| 4FH | 26.7 | 85.0 |

**4. OPTIONAL TEST RESULTS:** none.

**5. REPAIRS:** none.

**6. REMARKS:** none.

TEST ENGINEER
( Dr. Carlo BISAGLIA)

HEAD OF ISMA
(Ing. Giovanni SANTORO)