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 S35S506WVT

trade name:
SAME RUBIN 150

HÜRLIMANN H35S506WVT

trade name:
HÜRLIMANN SX 1500

27 forward and 27 reverse speeds
40 km/h
four-wheel drive agricultural tractors

Manufactured by:	SAME DEUTZ-FAHR Group Viale F. Cassani 15 24047 Treviglio BG Italy
OECD approval No.:	**1/1 905**
Date of approval:	28 april 2000
Period of test:	October - November 1999

Table of contents

1. SPECIFICATION OF TRACTOR 1

2. TEST CONDITIONS 18

3. TEST RESULTS 21

3.1 Main power take-off performance 21

3.2 Hydraulic power and lifting force 25

3.3 Drawbar performance 27

3.4 Turning area and turning circle 29

3.5 Location of centre of gravity 29

3.6 Braking performance 29

3.7 Measurement of external noise level 31

4. OPTIONAL TEST RESULTS 31

5. REPAIRS 31

6. REMARKS 31

The Same Rubin 150 (4WD) and Hürlimann SX 1500 (4WD) tractors are technically identical in all main respects except with regard to model designation and colour.

All test were carried out on the Same Rubin 150 (4WD)

All stated dimensions and tests refer to tyre size 540/65R30 at front and 650/65R38 at rear, as well as to track widths 1940 mm at front and 1830 mm at rear.

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

1. SPECIFICATION OF TRACTOR

1.1 Identification

- Make: SAME;
- Model: S35S506WVT with 27 forward and 27 reverse speeds 40 km/h version;
- Trade name: RUBIN 150;
- Type: four-wheel drive, unit construction;
- Number of driving wheels: 4;
- Serial number: 1061;
- First serial number: 1001.

1.2 Engine

- Make: SAME DEUTZ-FAHR Group;
- Model: 1000.6 WTI1;
- Type: water cooled 4-stroke diesel, direct injection, turbo charged;
- Serial number: E2446.

1.2.1 *Cylinders*

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

1.2.2 *Supercharging*

- Make: GARRET;
- Model: TO4E49;
- Type: exhaust driven supercharger, with intercooler;
- Pressure: 93 kPa.

1.2.3 *Fuel system*

- Fuel feed system:	AC corone fuel feed pump;
- Make, model and type of fuel filter:	FIAMM FNA 255/00;
- Total capacity of fuel tanks:	380 dm^3;
- Make, model and type of injection pump:	BOSCH PFR 1 K-90A 535, immersed, one per cylinder in line;
- Serial number:	without serial number;
- Manufacturer's production setting of injection pump:	
. Flow rate:	73 ± 2 mm^3/stroke at rated speed and full load corresponding 31 dm^3/h;
. Timing:	13° before TDC;
- Make, model and type of injectors:	BOSCH DLLA 150 S 1322 multihole injection nozzles;
- Injection pressure:	18 ± 1 MPa.

1.2.4 *Governor*

- Make:	SAME DEUTZ-FAHR Group;
- Model:	ATS9-12V;
- Type:	electronic;
- Governed range of engine speed:	from 650 to 2510 rev/min;
- Rated engine speed:	2350 rev/min.

1.2.5 *Air cleaner*

- Pre-cleaner:	(optional, fitted on tested tractor)
. Make:	DONALDSON;
. Model:	P01-6330;
. Type:	cyclone;
. Location:	above the bonnet;
- Main filter	
. Make:	DONALDSON;
. Model:	2.4249.670.0;
. Type:	dry paper element filter with two replaceable cartridge elements: P77-2555 type for the external one and P13-3138 for the internal one;
. Location of air intake :	front of engine, above bonnet;
- Maintenance indicator	with warning lamp on the dashboard.

1.2.6 *Lubrication system*

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

1.2.7 *Cooling system*

- Type of coolant:	water cooling with inpeller pump;
- Specification of fan:	propeller fan driven by engine shaft;
- Number of fan blades:	9;
- Fan diameter:	520 mm;
- Coolant capacity:	16 dm^3;
- Type of temperature control:	electrical control;
- Superpressure system:	60 kPa.

1.2.8 *Starting system*

- Make:	ISKRA;
- Model:	AZJ 3537 12 V;
- Type:	electromagnetic engagement;
- Starter motor power rating:	3 kW;
- Cold starting aid:	thermostarter;
- Safety device:	preventing engine start in gear;

1.2.9 *Electrical equipment*

- Voltage:	12 V;
- Generator	
. Make:	BOSCH;
. Model:	K1 14V 65 A 20;
. Type:	alternator;
. Power:	780 W;
- Battery:	1 lead acid;
. capacity:	150 Ah at 20 hours rating.

1.2.10 *Exhaust system*

- Make:	SAME DEUTZ-FAHR Group;
- Model:	011.0556.3/10;
- Type:	one reflection absorption chamber;
- Location:	on the left hand side of engine, vertical position under side bonnet;
- Height of outlet above ground:	2860 mm.

1.3 Transmission

1.3.1 *Clutch (utilized only for travelling of tractor)*

- Make:	SAME DEUTZ-FAHR Group;
- Model:	116.22;
- Type:	independent multidisk in oil bath with axial piston;
- Number of plates:	8;
- Plates diameter:	168 mm;
- Control system:	hydraulic operated by pedal.

1.3.2 *Gear box*

- Make: SAME DEUTZ-FAHR Group;
- Model: 116.23;
- Type: electronic power shift, with 9 speeds 2 ranges of speed (N/F) and mechanical reduction gear (S), forward and reverse;

	Forward	Reverse
Number of gears	9	9
Number of ranges	3	3
Total of arrangements	27	27

1.3.3 *Rear axle and final drives*

- Make: SAME DEUTZ FAHR Group;
- Model: 116.44;
- Type: bevel gear differential and epyciclic final drive.
- Differential lock
  . Make: SAME DEUTZ FAHR Group;
  . Model: 116.35;
  . Type: electrohydraulic;
  . Control system: engaged or disengaged by button.

1.3.4 *Front axle and final drives*

- Make: SAME DEUTZ FAHR Group;
- Model: 116.43;
- Type: original SAME DEUTZ-FAHR system with central shaft bevel gear drive, differential and epicyclic final drives.
- Differential lock
  . Make: SAME DEUTZ FAHR Group;
  . Model: SBA original SAME system;
  . Type: electrohydraulic;
  . Control system: engaged or disengaged by button or automatically by SBA system (depending on travelling speed and steering angle).

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 2350 rev/min (*) km/h
FORWARD			
1	Slow	1319.90	0.57
2	Slow	1093.70	0.69
3	Slow	909.30	0.83
4	Slow	767.40	0.99
5	Slow	635.80	1.19
6	Slow	528.60	1.43
7	Slow	443.40	1.71
8	Slow	367.40	2.06
9	Slow	305.40	2.48
1	Normal	303.40	2.50
2	Normal	251.40	3.01
3	Normal	209.00	3.62
4	Normal	176.40	4.29
5	Normal	146.30	5.18
6	Normal	121.50	6.23
7	Normal	101.90	7.43
8	Normal	84.50	8.96
9	Normal	70.20	10.79
1	Fast	80.30	9.43
2	Fast	66.50	11.39
3	Fast	55.30	13.70
4	Fast	46.70	16.22
5	Fast	38.70	19.57
6	Fast	32.10	23.60
7	Fast	27.00	28.05
8	Fast	22.30	33.97
9	Fast	18.60	40.00

(*) *Calculated with a tyre dynamic radius index of 855 mm. (ISO 4251-1:1992)*

- Number of revolutions of front wheels for one revolution of rear wheels: 1.2515

1.3.5 *Total ratios and travelling speeds* (continued)

Gear	Range	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed at rated engine speed of 2350 rev/min (*) km/h
REVERSE			
1	Slow	1244.53	0.61
2	Slow	1031.25	0.73
3	Slow	857.38	0.88
4	Slow	723.58	1.05
5	Slow	599.50	1.26
6	Slow	498.42	1.52
7	Slow	418.08	1.81
8	Slow	346.42	2.19
9	Slow	287.96	2.63
1	Normal	286.08	2.65
2	Normal	237.05	3.20
3	Normal	197.07	3.84
4	Normal	166.33	4.55
5	Normal	137.95	5.49
6	Normal	114.56	6.61
7	Normal	96.08	7.88
8	Normal	79.68	9.51
9	Normal	66.19	11.44
1	Fast	75.71	10.00
2	Fast	62.70	12.08
3	Fast	52.14	14.53
4	Fast	44.03	17.20
5	Fast	36.49	20.76
6	Fast	30.27	25.03
7	Fast	25.46	29.75
8	Fast	21.03	36.02
9	Fast	17.54	40.00

(*) *Calculated with a tyre dynamic radius index of 855 mm. (ISO 4251-1:1992)*

- Number of revolutions of front wheels for one revolution of rear wheels: 1.2515

1.4 Power take-off

1.4.1 *Main power take-off*

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

1.4.1.1 Power take-off proportional to engine speed

Power take-off at 540 (rev/min)

- Location: at rear of tractor;
- Diameter of power take-off shaft ends: 35 mm;
- Number of splines: 6, in conformity with ISO 500:1991, type 1;
- Height above ground: 835 mm;
- Distance from the median plane of the tractor: 0 mm;
- Distance behind rear axle: 485 mm;
- PTO speed at rated engine speed: 609 rev/min;
- Engine speed at standard power take-off speed: 2083 rev/min;
- Ratio of rotation speeds (engine speed/p.t.o. speed): 3.8571;
- Power restriction: none;
- Maximum torque transmissible: none;
- Direction of rotation (viewed from behind tractor): clockwise.

Power take-off at 1000 (rev/min)

- Location: at rear of tractor;
- Diameter of power take-off shaft ends: 35 mm;
- Number of splines: 6, in conformity with ISO 500:1991, type 1;
- Height above ground: 835 mm;
- Distance from the median plane of the tractor: 0 mm;
- Distance behind rear axle: 485 mm;
- PTO speed at rated engine speed: 1028 rev/min;
- Engine speed at standard power take-off speed: 2285 rev/min;
- Ratio of rotation speeds (engine speed/p.t.o. speed): 2.2857;
- Power restriction: none;
- Maximum torque transmissible: none;
- Direction of rotation (viewed from behind tractor): clockwise.

1.4.1.2 *Power take-off proportional to ground speed*
(not available)

1.4.2 *Secondary power take-off proportional to engine speed*
(optional, fitted on tested tractor)

- Type: independent at front of tractor;
- Method of engagement: engaged or disengaged by push button, driven by multiplate wet clutch independent of travel clutch;
- Number of shafts: 1;
- Method of changing power take-off shaft ends: not changeable;
- Method of changing speeds: none;
- Location: at front of tractor;
- Diameter of power take-off shaft ends: 35 mm;
- Number of splines: 6, in conformity with ISO 500:1991, type 1;
- Height above ground: 545 mm;
- Distance from the median plane of the tractor: 0 mm;
- Distance forward front axle: 630 mm;
- PTO speed at rated engine speed: 979 rev/min;
- Engine speed at standard power take-off speed: 2400 rev/min;
- Ratio of rotation speeds (engine speed/p.t.o. speed): 2.4;
- Power restriction: none;

1.4.2 *Secondary power take-off proportional to engine speed* (continued)

- Maximum torque transmissible: none;
- Direction of rotation (viewed facing driving end): anticlockwise.

1.5 Hydraulic power lift

1.5.1 *Rear power lift*

- Make: SAME DEUTZ-FAHR Group;
- Model: 116.59;
- Type: load sensing;
- Type of hydraulic system: open centre system;
- Number and type of cylinders: 1 internal and 2 external single-acting;
- Type of lock for transport: hydraulic;
- Relief valves pressure setting: 18.0 ± 0.5 Mpa;
- Opening pressure of anti-shock valve: 21.0 ± 0.5 MPa;
- Lift pump
  . Make: BOSCH;
  . Type: hydraulic rotary pump, driven by engine shaft;
- Transmission between pump and engine: mechanical;
- Number and type of filters: 1, replaceable paper cartridge;
- Oil capacity: 118 dm^3;
- Site of oil reservoir: gear box;
- Number, type and location of tapping points: 8, double acting, at rear of tractor;
- Maximum volume of oil available to external cylinders: 20 dm^3 .

1.5.2 *Front power lift* (optional, fitted on tested tractor)

- Make:	SAME DEUTZ-FAHR Group;
- Model:	116.59;
- Type of hydraulic system:	open centre system;
- Type and number of cilinders:	2 at single acting;
- Type of lock for transport:	none;
- Relief valve pressure setting:	18.0 ± 0.5 Mpa;
- Opening pressure of anti-shock valve:	21.0 Mpa;
- Lift pump type:	hydraulic rotary pump, driven by engine shaft, pump make BOSCH;
- Trasmission between pump and engine:	mechanical;
- Number and type of filters:	1, replaceable paper cartridge;
- Oil capacity:	118 dm^3 ;
- Site of oil reservoir:	gear box;
- Number, type and location of tapping points:	none;
- Maximum volume of oil available to external cylinders:	none;

1.6 Three-point linkage

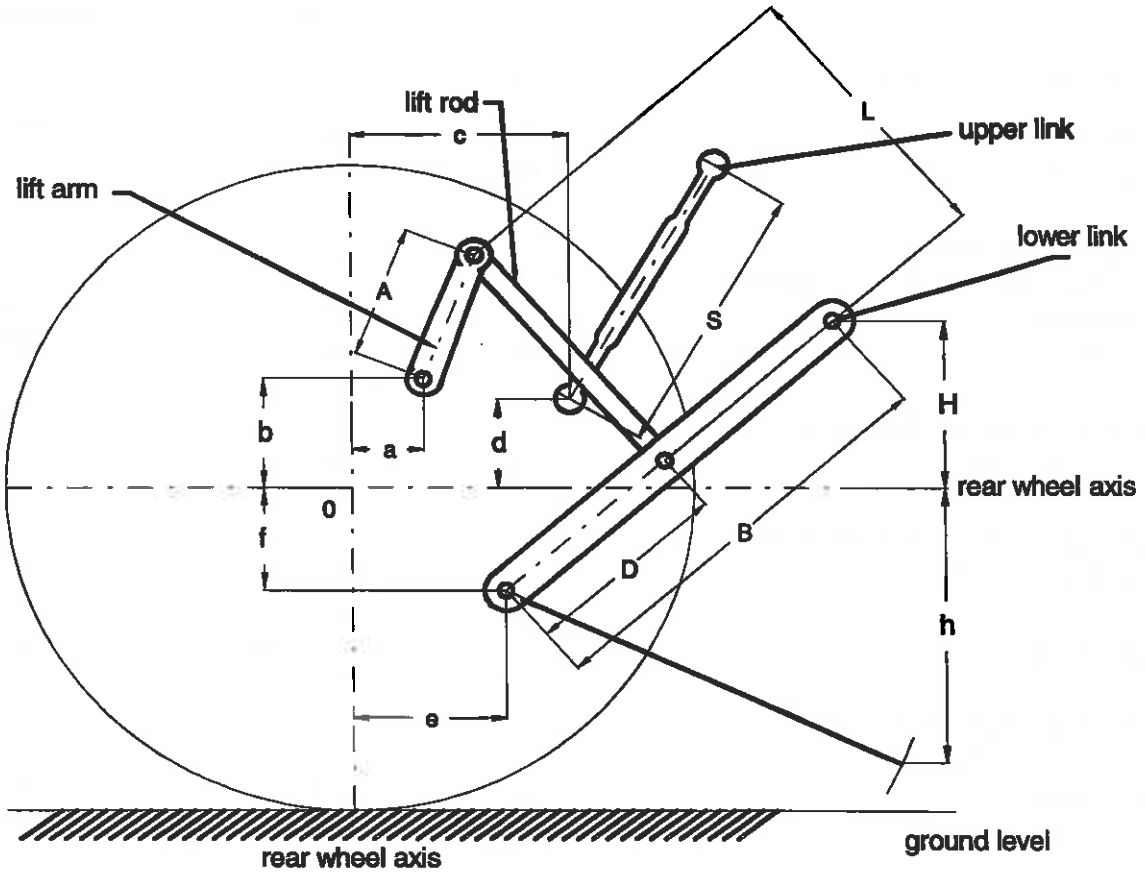
1.6.1 *Rear three point linkage*

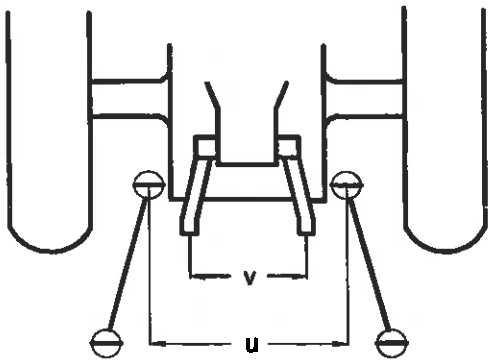
- Category:	3, in conformity with category 3 of ISO 730-1:1994 + technical corrigendum;
- Category adapter:	none.

1.6.2 *Front three point linkage*

- Category:	2, in conformity with category 2 of ISO 730-1:1994 + technical corrigendum;
- Category adapter:	none.

Rear linkage geometry



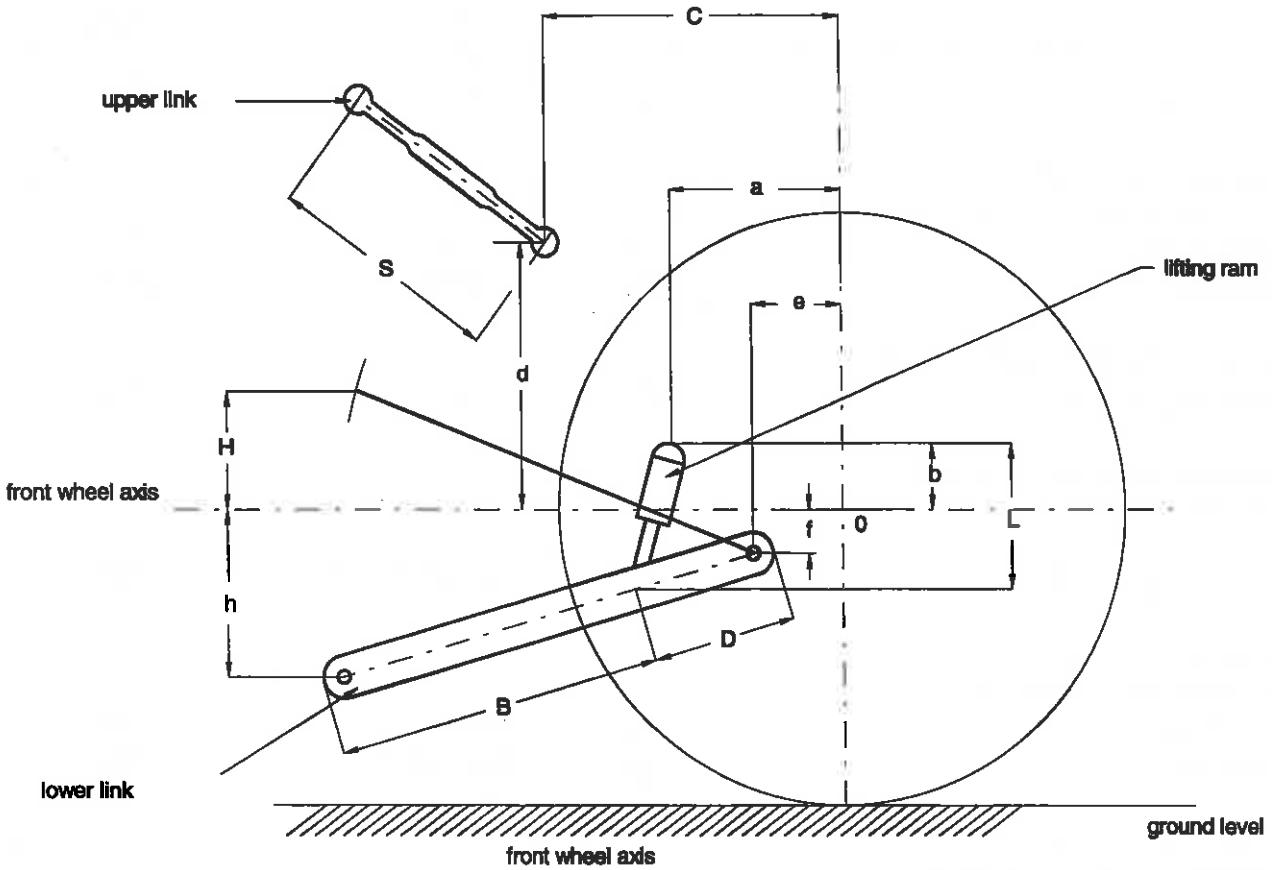


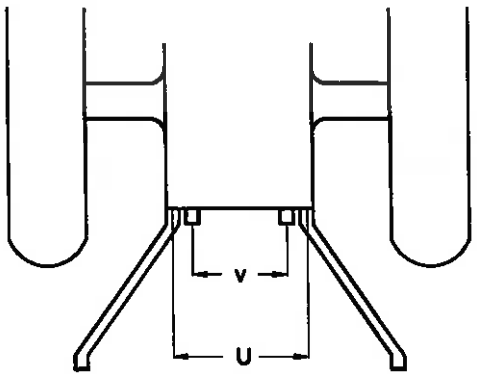
Dimensions of rear linkage geometry when connected to the standard frame

		Dimension or range mm	Settings used in test mm
Length of lift arms	(A)	305	305
Length of lower links	(B)	910	910
Distance of lift arm pivot point from rear wheel axis (behind)			
- horizontally	(a)	141	141
- vertically	(b)	450	450
Horizontal distance between the 2 lower link points	(u)	650	650
Horizontal distance between the 2 lift arm end points	(v)	540	540
Length of upper link	(S)	from 615 to 785	680
Distance of upper link pivot point from rear wheel axis			
- horizontally	(c)	410	410
- vertically	(d)	245-310-375	310
Distance of lower link pivot point from rear wheel axis			
- horizontally	(e)	170	170
- vertically	(f)	240	240
Distance of lower link pivot points to lift rod pivot points on lower links	(D)	465	465
Length of lift rods	(L)	from 780 to 910	875
Height of lower hitch points relative to the rear wheel axis:			
Length of lift rods	(L)	780 910	875
Linkage distance of lift rods	(D)	465 465	465
Lowest position	(h)	451 731	655
Highest position	(H)	301 77	140
Height above ground of lower hitch points when locked in transport position (*)			995

(*) *Assuming the dynamic radius index = 855 mm (ISO 4251-1:1992)*

Front linkage geometry





Dimensions of front linkage geometry when connected to the standard frame

		Dimension or range mm	Settings used in test mm
Length of lower links	(B)	790	790
Distance of cilinders pivot point from front wheel axis (forward)			
- horizontally	(a)	290	290
- vertically	(b)	285	285
Horizontal distance between the 2 lower link points	(u)	535	535
Horizontal distance between the 2 lift arm end points	(v)	385	385
Length of upper link	(S)	from 480 to 690	523
Distance of upper link pivot point from front wheel axis			
- horizontally	(c)	691 - 758	758
- vertically	(d)	465 - 322	322
Distance of upper link pivot point from front wheel axis			
- horizontally	(e)	460	460
- vertically	(f)	95	95
Distance of lower link pivot points to cylinders pivot points on lower links	(D)	285	285
Length of cylinders			
- in low position	(L)	624	624
- in high position	(L)	366	366
Height of lower hitch points relative to the front wheel axis			
- in low position	(h)	500	500
- in high position	(H)	275	275
Height above ground of lower hitch points (*)			970

(*) Assuming the dynamic radius index = 695 mm (ISO 4251-1:1992)

1.7 Swinging drawbar

(not available)

1.8 Trailer hitch

- Type:	GRASSI DGM-GA 4513 C;
- Hole diameter:	28 mm;
- Height above ground	
. Min.:	520 mm;
. Max.:	1010 mm;
- Distance of hitch point from rear wheel axis	
. Horizontally:	680 mm;
- Distance of hitch point from power take-off shaft end	
. Vertically:	205 mm below, 125 mm above;
. Horizontally:	195 mm;
- Maximum vertical permissible load:	14.7 kN.

1.9 Holed drawbar

(optional, not fitted on tested tractor)

- Number of holes:	9;
- Distance between holes:	100 mm;
- Hole diameter:	33 mm;
- Thickness x width of the drawbar:	30 x 80 mm;
- Height above ground,	
. Min.:	125 mm;
. Max.:	1155 mm;
- Horizontal distance behind power take-off shaft end:	635 mm;

1.10 Steering

- Specification:	hydrostatic steering with BOSCH hydraulic gear pump, 2 simple acting ram directly on front axle.
- Make:	DANFOSS;
- Model:	ORBITROLL OSPC 200 OR;
- Type:	hydrostatic;
- Working pressure:	15 MPa.

ISTITUTO SPERIMENTALE PER
LA MECCANIZZAZIONE AGRICOLA
SEZIONE DI TREVIGLIO

1.11 Brakes

1.11.1 *Service brake*

- Make: SAME DEUTZ-FAHR Group;
- Model: 116.54;
- Type: oil bath disc, total 8 discs, 4 at front (2 per wheel) and 4 at rear (2 per wheel), all mounted before the final drive;
  - . Front disc diameter: 224 mm;
  - . Rear disc diameter: 302 mm;
  - . Material: FRENDO HDT 303 lining material;
- Method of operation: hydraulically actuated with 2 pedals;
- Trailer braking take-off: none.

1.11.2 *Parking brake*

- Type: fully independent of service brake, 4 oil bath disc mounted on the pinion shaft in the gear box;
- Method of operation: mechanical by hand lever.

1.11.3 *Steering brake*

- Method of operation: divided pedal of service brake, for normal use locked together.

1.12 Wheels

- Number
  - . Front: 2, steering and driving;
  - . Rear: 2, driving;
- Wheelbase: 2750 mm.

-Track width adjustment:

	Minimum mm	Maximum mm	Adjustment method
Front	1810	1940	changing the position of the rims with respect to the disc
Rear	1800	1900	

1.13 Protective strutture

- Make:	SAME DEUTZ-FAHR GROUP;
- Model:	C 42;
- Type:	cab, not tiltable;
- Manufacturer's name and address:	SAME DEUTZ-FAHR GROUP S.p.A., Viale F. Cassani 15, 24047 Treviglio BG, Italy.
- OECD approval number:	4/0 570;
- Date of approval:	24 March 1999;
- Modification certificate:	none.

1.14 Seat

1.14.1 *Driver's seat*

- Make:	GRAMMER;
- Model:	MSG 95A/20;
- Type:	upholstered seat with back rest;
- Seat and steering wheel reversible:	no;
- Type of suspension:	adjustable spring;
- Type of damping:	shock absorber;
- Range of adjustment:	150 mm longitudinally and 60 mm vertically;
- Safety belt:	no.

1.14.2 *Optional driver's seats*

- Make:	GRAMMER;
- Models:	MSG 95G/20;
- Type:	upholstered seat with back rest
- Seat and steering wheel reversible:	no;
- Type of suspension:	pneumatic, with automatic weight adjustment;
- Type of damping:	shock absorber;
- Range of adjustment:	150 mm longitudinally and 60 mm vertically;
- Safety belt:	no.

1.14.3 *Passenger's seat*

- Location:	on left side of driver's seat;
- 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
Headlights	1500	165 x 100	165
Front parking lights	1870	115 x 40	900
Front direction indicator	1910	115 x 40	900
Rear parking lights	1870	115 x 75	960
Rear direction indicator	1920	105 x 40	960
Brake lights	1890	⌀ 115	810
Reflectors	1720	105 x 30	860

2. TEST CONDITIONS

2.1 Overall dimensions

	Length		Width		Height at top of	
	with front power lift mm	without front power lift mm	minimum mm	maximum mm	protective structure mm	exhaust pipe mm
Unballasted	5270	4680	2500	2550	2900	2900
Ballasted	5465	5010	2500	2550	2900	2900

2.2 Ground clearance: 520 mm bracket of trailer hitch (unballasted tractor).

2.3 Tractor mass (with full fuel tanks, cab and front power lift)

	Unballasted		Ballasted	
	Without driver kg	With driver kg	Without driver kg	With driver kg
Front	2950	2975	3745	3770
Rear	3895	3945	3915	3965
Total	6845	6920	7660	7735

2.4 Ballast

	Weights		Water
	Number	Total mass kg	kg
Front	1	545	-
Rear wheels	3 + 3	270	-

2.5 Tyres and track width specifications

	Front	Rear
Tyres		
make	GOOD YEAR	GOOD YEAR
model	DT 820	DT 820
dimensions	540/65R30	650/65R38
ply rating	-	-
load index/speed index	143 A8	154 A8
type	radial	radial
maximum load (tyre manufacturer's)	2406 daN	3824 daN
inflation pressure (tyre manufact.'s)	160 kPa	120 kPa
dynamic radius index	695 mm	855 mm
Chosen track width	1940 mm	1830 mm
Technically permissible axle load	4415 daN	7260 daN
Other tyres available	420/70R30 16.9R30	520/70R38 20.8R38

2.6 Fuel

- Type: AGIP DIESEL, DIN 51601;
  (in accordance with the national standard)
- Density at 15 °C: 0.837 g/cm^3.

2.7 Oils and lubricants

2.7.1 *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 PTO transmission	2.5	1200	-
Front axle/final drives	13/2.5 x 2	1200	2400
Brakes	max level	1200	2400

(*) Or when the warning lamp is lighted

2.7.2 *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 PTO transmission, front/rear axle and final drives		
Type	AKROS MULTI	AKROS MULTI
Viscosity	11.5 cSt	11.5 cSt
Classification	API GL 4	API GL 4
Steering oil		
Type	AKROS MULTI	AKROS MULTI
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

2.7.3 *Grease*

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

3. COMPULSORY TESTS RESULTS

3.1 Main power take-off

- Date and location of test: 7 October 1999, ISMA, Treviglio BG, Italy;
- Type of dynamometer: eddy-current, ZÖLLNER B350.

Power	Speed		Fuel consumption			Specific
	Engine	PTO	Hourly		Specific	energy
kW	rev/min	rev/min	l/h	kg/h	g/kWh	kWh/l
3.1.1 MAXIMUM POWER - TWO-HOUR TEST						
104.4	2350	1028	31.06	26.03	249	3.36
3.1.2 POWER AT RATED ENGINE SPEED						
104.4	2350	1028	31.06	26.03	249	3.36
3.1.3 STANDARD POWER TAKE-OFF SPEED (1000 ± 25 rev/min)						
102.5	2287	1001	30.47	25.53	249	3.36
3.1.4 PART LOADS 3.1.4.1 The torque corresponding to maximum power at rated engine speed						
104.4	2350	1028	31.06	26.03	249	3.36
3.1.4.2 85% of torque obtained in 3.1.4.1						
90.84	2403	1051	28.72	24.07	265	3.16
3.1.4.3 75% of torque defined in 3.1.4.2						
68.79	2429	1063	24.02	20.13	293	2.86
3.1.4.4 50% of torque defined in 3.1.4.2						
46.45	2458	1075	19.43	16.28	350	2.39
3.1.4.5 25% of torque defined in 3.1.4.2						
23.34	2472	1082	14.76	12.37	530	1.58
3.1.4.6 unloaded						
0	2503	1095	10.07	8.44	-	-

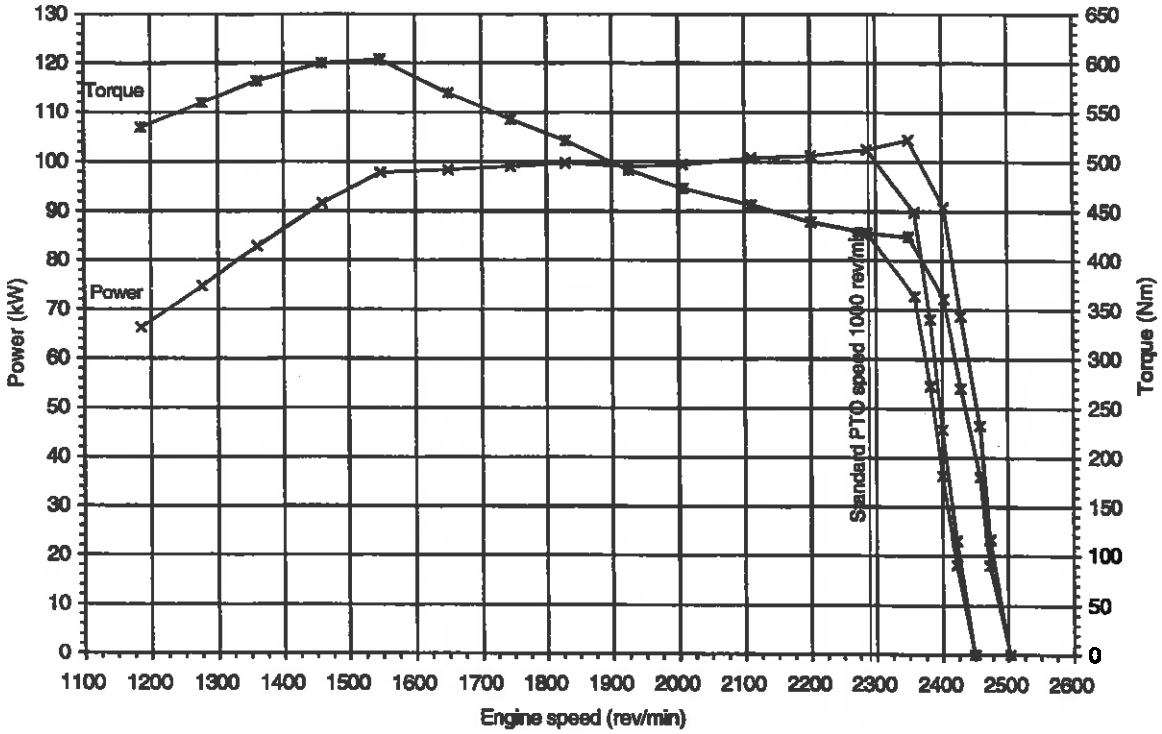
ISTITUTO SPERIMENTALE PER
LA MECCANIZZAZIONE AGRICOLA
SEZIONE DI TREVIGLIO

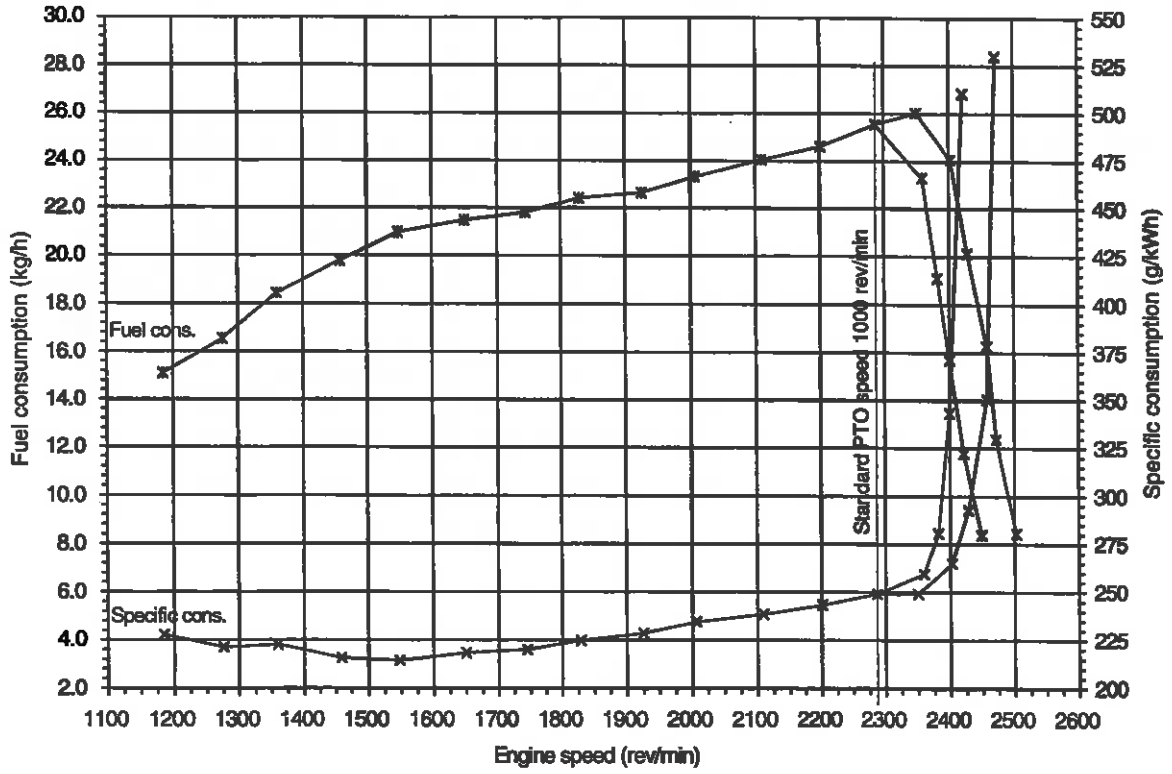
Power	Speed		Fuel consumption			Specific energy
	Engine	PTO	Hourly		Specific	
kW	rev/min	rev/min	l/h	kg/h	g/kWh	kWh/l
3.1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED (1000 ± 25 rev/min)						
3.1.5.1 The torque corresponding to maximum power available						
102.5	2287	1001	30.47	25.53	249	3.36
3.1.5.2 85% of torque obtained in 3.1.5.1						
89.85	2359	1032	27.82	23.31	259	3.23
3.1.5.3 75% of torque defined in 3.1.5.2						
68.08	2382	1042	22.79	19.10	281	2.99
3.1.5.4 50% of torque defined in 3.1.5.2						
45.72	2400	1050	18.72	15.69	343	2.44
3.1.5.5 25% of torque defined in 3.1.5.2						
23.07	2422	1060	14.06	11.78	511	1.64
3.1.5.6 unloaded						
0	2449	1071	10.00	8.38	-	-

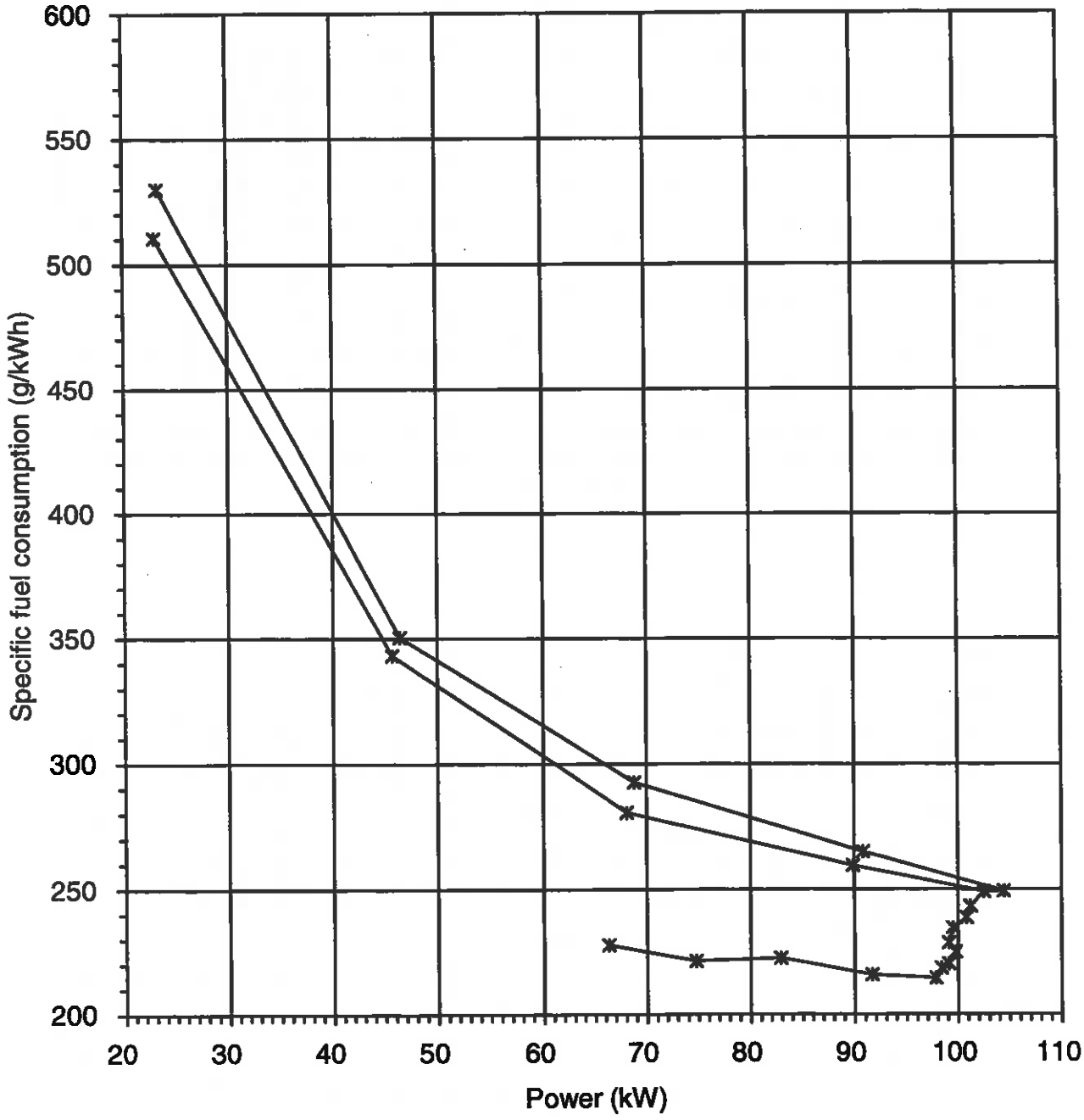
- No load maximum engine speed: 2503 rev/min;
- Equivalent flywheel torque at rated engine speed: 424.57 Nm;
- Equivalent flywheel torque at 2-hour test: 424.57 Nm;
- Maximum equivalent flywheel torque: 603.89 Nm at 1548 rev/min of the engine.

- Mean atmospheric conditions
  . Temperature: 28 °C
  . Pressure: 98.1 kPa
  . Relative humidity: 61 %

- Maximum temperatures
  . Coolant: 86 °C
  . Engine oil: 118 °C
  . Fuel: 23 °C
  . Engine air intake: 28 °C


Torque
Power
Power (kW)
Torque (Nm)
Standard PTO speed 1000 rev/min
Engine speed (rev/min)


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


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: 26 November 1999.

3.2.1 *Hydraulic power test*

- Sustained pressure with relief valve open: 18.5 MPa;
- Pump delivery rate at minimum pressure: 70.5 l/min;

	Flow rate l/min	Pressure MPa	Power kW
At 90% of the actual relief valve setting	68.9	16.7	19.18
Maximum	68.9	16.7	19.18

- Tapping point used for test: at rear of tractor;
- Temperature of hydraulic fluid if different from 65 ± 5°C: - ;
- Opening pressure of the unloading valve: - ;(*)
- Closing pressure of the unloading valve: - .(*)

(*) Opening and closing pressures of the unloading valve could not be measured

3.2.2 *Rear power lift test*

Linkage setting for test - see paragraph 1.6

		At hitch point	On the frame
Height of lower hitch point above ground in down position	mm	200	200
Vertical movement			
without lifting forces	mm	795	1025
with lifting forces	mm	761	960
Maximum corrected force exerted through full range	kN	57.29	65.42
Corresponding pressure of hydraulic fluid	MPa	16.7	16.7
Moment about rear-wheel axis	kNm	61.87	110.56
Maximum tilt angle of mast from vertical	degrees	-	20

Lifting heights relative to the horizontal plane including the lower link pivot points (mm)											
-436	415-	-300	-200	-100	0	+100	+200	+300	+346	+400	+524
Lifting forces at hitch points (kN), corrected to 16.7 MPa											
-	57.29	58.95	61.97	64.73	67.20	68.95	71.70	75.96	79.72	-	-
Lifting forces at test frame (kN), corrected to 16.7 MPa											
66.81	-	65.77	65.42	65.81	65.88	65.63	65.47	65.54	-	65.65	66.79

3.2.3 *Front power lift test*

Linkage settings for test - see paragraph 1.6

		At hitch point	On the frame
Height of lower hitch point above ground in down position	mm	195	195
Vertical movement			
without lifting forces	mm	775	948
with lifting forces	mm	759	913
Maximum corrected force exerted through full range	kN	22.43	20.04
Corresponding pressure of hydraulic fluid	MPa	16.7	16.7
Moment about rear-wheel axis	kNm	27.93	37.17
Maximum tilt angle of mast from vertical	degrees	-	23

Lifting heights relative to the horizontal plane including the lower link pivot points (mm).											
-511	-500	-405	-300	-200	-100	0	+100	+200	+300	+354	+402
Lifting forces at hitch points (kN), corrected to 16.7 MPa											
-	-	22.43	22.80	23.91	25.39	27.18	30.44	32.93	35.60	35.63	-
Lifting forces at test frame (kN), corrected to 16.7 MPa											
27.72	26.15	-	23.36	22.96	22.76	22.57	22.20	21.54	20.75	-	20.04

3.3 Drawbar performance

- Date of tests: 28 October, 2, 5 and 8 November 1999;
- Type of track: concrete.

	Height of drawbar above ground mm	Tyre inflation pressure	
		Front kPa	Rear kPa
Unballasted	585	160	120
Ballasted	587	160	120

Gear and range	Power kW	Drawbar pull kN	Speed km/h	Engine speed rev/min	Slip of wheels %	Specific fuel consumption g/kWh	Specific energy kWh/l	Temperatures Fuel °C	Coolant °C	Engine oil °C	Atmospheric conditions Temperature °C	Relative humidity %	Pressure kPa
3.3.1 MAXIMUM POWER IN TESTED GEARS (unballasted tractor)													
1S	8.71	61.51	0.51	2459	14.4	1846	0.45	27	80	139	14	71	100.6
2S	9.85	58.14	0.61	2457	15.2	1670	0.50	27	80	139	14	71	100.6
3S	12.87	62.62	0.74	2455	15.2	1299	0.65	27	80	139	15	71	100.6
4S	14.92	61.04	0.88	2453	15.0	1138	0.74	27	80	142	14	71	100.5
5S	17.47	59.34	1.06	2450	14.9	996	0.84	26	80	142	15	70	100.6
6S	21.13	59.44	1.28	2446	14.8	848	0.99	27	80	143	14	71	100.6
7S	25.35	60.06	1.52	2441	15.0	734	1.14	27	81	143	14	71	100.6
8S	30.50	60.01	1.83	2437	14.7	627	1.34	27	80	144	15	70	100.6
9S	36.76	59.90	2.21	2427	14.3	557	1.50	27	80	144	15	71	100.5
1N	37.23	60.12	2.23	2432	14.3	531	1.58	28	80	145	15	70	100.6
2N	44.79	59.30	2.72	2423	13.0	471	1.78	28	80	145	15	70	100.5
3N	56.71	60.42	3.38	2411	9.7	404	2.08	28	80	145	15	70	100.5
4N	67.76	61.46	3.97	2400	9.0	358	2.34	28	80	145	15	70	100.5
5N	78.26	58.35	4.83	2386	8.9	317	2.65	28	81	146	14	69	100.5
6N	87.80	53.50	5.91	2350	5.9	297	2.82	28	80	145	15	69	100.5
7N	89.45	44.74	7.20	2350	3.9	292	2.87	27	80	145	15	69	100.5
8N	86.83	35.74	8.75	2350	3.0	301	2.79	28	80	146	15	69	100.5
1F	90.00	35.19	9.21	2350	2.9	290	2.89	28	80	147	15	68	100.5
9N	85.06	28.84	10.62	2350	2.4	306	2.73	28	81	147	15	65	100.5
2F	87.39	28.00	11.24	2347	2.0	299	2.81	28	80	147	14	68	100.6
3F	84.98	22.42	13.65	2350	0.7	307	2.73	28	80	147	15	68	100.6
4F	82.57	18.24	16.30	2352	0.4	316	2.65	28	81	146	15	67	100.5
5F	82.54	15.07	19.72	2350	0.0	323	2.59	27	80	147	15	67	100.5

Gear and range	Power kW	Drawbar pull kN	Speed km/h	Engine speed rev/min	Slip of wheels %	Specific fuel consumption g/kWh	Specific energy kWh/l	Temperatures Fuel °C	Coolant °C	Engine oil °C	Atmospheric conditions Temperature °C	Relative humidity %	Pressure kPa
3.3.2 MAXIMUM POWER IN TESTED GEARS (ballasted tractor)													
1S	9.85	68.21	0.52	2441	14.5	1888	0.44	28	80	135	14	79	100.0
2S	11.66	67.71	0.62	2441	14.6	1594	0.53	28	81	135	14	79	100.0
3S	14.16	68.01	0.75	2441	15.0	1312	0.64	27	80	135	14	78	100.1
4S	16.68	67.49	0.89	2441	15.2	1115	0.75	28	81	136	14	79	100.0
5S	21.07	70.90	1.07	2446	15.0	850	0.99	28	81	135	14	79	100.1
6S	24.66	69.36	1.28	2439	15.2	765	1.10	27	81	134	14	78	100.0
7S	29.43	68.81	1.54	2437	14.5	649	1.29	28	81	135	14	78	100.2
8S	35.86	68.32	1.89	2430	12.8	560	1.50	28	81	136	14	78	100.0
9S	43.65	69.85	2.25	2418	13.4	501	1.67	28	81	136	15	75	100..
1N	43.99	69.78	2.27	2425	13.4	472	1.77	27	81	136	14	77	100.1
2N	53.08	70.27	2.72	2414	13.2	423	1.98	28	81	136	14	77	100.0
3N	63.36	69.14	3.30	2400	11.9	382	2.19	28	81	136	14	76	100.0
4N	77.13	70.85	3.92	2389	10.9	319	2.62	28	81	137	14	76	100.1
5N	87.15	65.75	4.77	2350	8.5	299	2.80	27	81	136	14	76	100.1
6N	87.70	53.52	5.90	2352	5.7	296	2.83	27	80	136	15	75	100.0
7N	87.09	43.74	7.17	2352	4.3	299	2.81	27	81	136	13	75	100.0
8N	85.82	35.52	8.70	2350	3.3	304	2.76	27	80	136	15	75	100.1
1F	87.49	34.43	9.15	2352	3.4	297	2.82	27	80	135	15	75	100.1
9N	83.16	28.55	10.49	2347	3.1	313	2.68	27	80	136	15	74	100.1
2F	87.74	28.44	11.11	2345	2.6	296	2.83	27	81	136	15	74	100.1
3F	83.96	22.43	13.48	2347	2.0	310	2.70	27	81	135	15	74	100.1
4F	81.79	18.41	16.00	2350	1.6	319	2.63	27	81	136	15	73	100.1
5F	81.15	15.06	19.40	2352	1.2	321	2.61	27	81	136	14	73	100.1

Gear and range	Power kW	Drawbar pull kN	Speed km/h	Engine speed rev/min	Slip of wheels %	Specific fuel consumption g/kWh	Specific energy kWh/l	Temperatures Fuel °C	Coolant °C	Engine oil °C	Atmospheric conditions Temperature °C	Relative humidity %	Pressure kPa
3.3.3 FIVE HOUR TESTS													
3.3.3.1 FIVE HOUR TEST at 75% of pull at maximum power													
7N	67.49	32.75	7.42	2402	2.8	358	2.34	25	81	141	15	68	100.0
3.3.3.2 FIVE HOUR TEST at pull corresponding to 15% wheel slip, without additional ballast.													
4N	77.54	70.87	3.94	2389	10.5	318	2.64	25	81	138	14	66	99.7

Oil consumption during ten hours duration of test 3.3.3.1 and 3.3.3.2: 62 g/h.

3.4 Turning area and turning circle (front wheel drive disengaged)

	With brakes		Without brakes	
	left-hand	right-hand	left-hand	right-hand
	m	m	m	m
Radius of turning area	4.31	4.5	6.29	6.34
Radius of turning circle	3.99	4.17	5.95	6.00

3.5 Location of centre of gravity

	mm
Height above ground	954
Distance forward from rear axle centre	1180
Distance from tractor's median plane to the left	16

3.6 Braking

- Date of tests: 12 November 1999.

3.6.1 *Cold service braking device test*

	Speed before application of brakes km/h	Braking device control force kN	Mean deceleration m/s^2
Ballasted tractor	43.4	1.0	2.72
		2.0	3.4
		3.0	3.61
		4.0	3.95
		5.0	4.22
		6.0	4.80
Unballasted tractor	43.4	1.0	2.95
		2.0	3.57
		3.0	3.80
		4.0	4.10
		5.0	4.20
		6.0	4.68

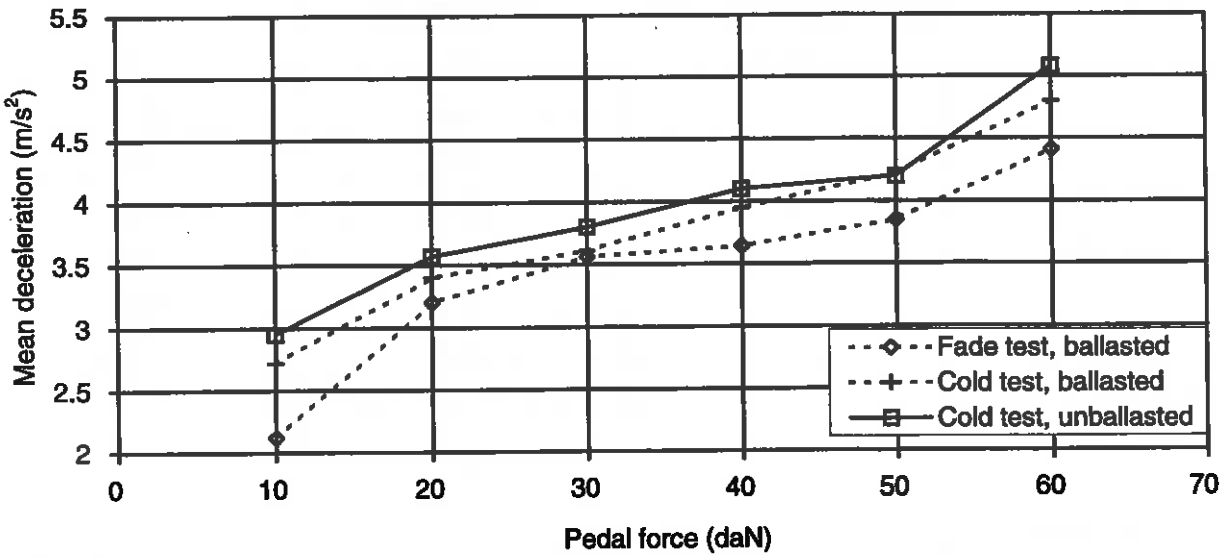
- Maximum deviation of tractor from its original course: none;
- Abnormal vibration: none;
- Brake heating method: heated by towing of the tractor for 1 km.

3.6.2 *Fade test*

	Speed before application of brakes km/h	Braking device control force kN	Mean deceleration m/s²
Ballasted tractor	43.4	1.0	2.12
		2.0	3.20
		3.0	3.56
		4.0	3.64
		5.0	3.85
		6.0	4.41

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

3.6.1 *Cold service braking device test* (continued)
3.6.2 *Fade test* (continued)



3.6.3 *Parking brake*

	Ballasted tractor on 18% slope	
	up daN	down daN
Braking device control force	12.7	11.8

3.7 Measurement of external noise level

- Date of test: 18 November 1999;
- Type of track: concrete;
- Type of sound level meter: BRÜEL & KJÆR model 2231.

Gear	Travelling speed before acceleration km/h	Sound level dB(A)
9F	32.5	83.3

4. OPTIONAL TEST RESULTS: none.

5. REPAIRS: none.

6. REMARKS: none.

TEST ENGINEER
(Dr. Carlo BISAGLIA)

DIRECTOR OF TESTING STATION
(Prof. Giuseppe COLZANI)

HEAD OF ISMA
(Ing. Giovanni SANTORO)