ISTITUTO SPERIMENTALE PER
LA MECCANIZZAZIONE AGRICOLA
SEZIONE DI TREVIGLIO

2.

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





LAMBORGHINI L10N874WVT

trade name:
LAMBORGHINI AGILE 990 S

HÜRLIMANN H10N874WVT

trade name:
HÜRLIMANN XN 709

45 forward and 45 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.:	**1/1828**
Date of approval:	18 June 1999
Period of test:	April - May 1999

ISMA Via Milano 43 24047 Treviglio BG Italy
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The Lamborghini Agile 990 S (4WD) and Hürlimann XN 709 (4WD) tractors are technically identical in all main respects except with regard to model, designation, colour and side bonnets design.

All test were carried out on the Lamborghini Agile 990 S (4WD)

All stated dimensions and tests refer to tyre size 280/70R18 at front and 420/70R28 at rear, as well as to track widths 1090 mm at front and 1080 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: LAMBORGHINI;
- Model: L10N874WVT with 45 forward and 45 reverse speeds 40 km/h version;
- Trade name: AGILE 990 S;
- Type: four-wheel drive, unit construction;
- Number of driving wheels: 4;
- Serial number: 1050;
- First serial number: 1001.

1.2 Engine

- Make: SAME DEUTZ-FAHR Group;
- Model: 1000.4 WT1;
- Type: water cooled 4-stroke diesel, direct injection turbo charged;
- Serial number: 2758.

1.2.1 *Cylinders*

- Number and disposition: 4 vertical in line;
- Bore x stroke: 105 x 115.5 mm;
- Capacity: 4000 cm^3;
- Compression ratio: 16:1;
- Arrangement of valves: overhead;
- Cylinder liners: dry.

1.2.2 *Supercharging*

- Make: SCHWITZER;
- Model: S1B;
- Type: exhaust driven supercharger, without intercooler;
- Pressure: 74.1 kPa.

1.2.3 *Fuel system*

- Fuel feed system:	AC corone fuel feed pump;
- Make, model and type of fuel filter:	FIAMM FNA 166/20;
- Total capacity of fuel tanks:	58 dm^3 (26+32 dm^3);
- Make, model and type of injection pump:	BOSCH PFR 1 K-90A 543, immersed, one per cylinder in line;
- Serial number:	without serial number;
- Manufacturer's production setting of injection pump:	
. Flow rate:	62.0 ± 2 mm^3/stroke at rated speed and full load corresponding 17.48 dm^3/h;
. Timing:	16° before TDC;
- Make, model and type of injectors:	BOSCH DLLA 150 S 1323 multihole injection nozzles;
- Injection pressure:	18 ± 1 MPa.

1.2.4 *Governor*

- Make:	SAME DEUTZ-FAHR Group;
- Model:	007.0992.4;
- Type:	electronic;
- Governed range of engine speed:	from 650 to 2530 rev/min;
- Rated engine speed:	2350 rev/min.

1.2.5 *Air cleaner*

- Pre-cleaner:	(optional, fitted on tested tractor)
. Make:	DONALDSON;
. Model:	PB01-6330;
. Type:	cyclone;
. Location:	above the bonnet;
- Main filter	
. Make:	DONALDSON;
. Model:	FLG 08-0553;
. Type:	dry paper element filter with replaceable cartridge;
. 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 4945 IN;
- Number of filters:	1.

1.2.7 *Cooling system*

- Type of coolant:	water cooling with axial blower;
- Specification of fan:	propeller fan driven by engine shaft;
- Number of fan blades:	6;
- Fan diameter:	400 mm;
- Type of temperature control:	electrical control.

1.2.8 *Starting system*

- Make:	ISKRA;
- Model:	AZJ 8149 12 V;
- Type:	electromagnetic engagement;
- Starter motor power rating:	2.7 kW;
- Cold starting aid:	thermostarter;
- Safety device:	electrical lockout on clutch and PTO controls;

1.2.9 *Electrical equipment*

- Voltage:	14 V;
- Generator	
. Make:	ISKRA;
. Model:	AAK 3563 14 V 65 A;
. Type:	alternator;
. Power:	65 A;
- Battery:	1 lead acid;
. capacity:	100 Ah at 20 hours rating.

1.2.10 *Exhaust system*

- Make:	SAME DEUTZ-FAHR Group;
- Model:	DGM SA 2301;
- Type:	one reflection absorption chamber;
- Location:	on the left hand side of engine, horizontal position under side bonnet;
- Height of outlet above ground:	430 mm.

1.3 Transmission

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

- Make:	SAME DEUTZ-FAHR Group;
- Model:	692.23;
- Type:	single disk dry clutch;
- Number of plates:	1;
- Plates diameter:	310 mm;
- Control system:	hydraulic operated by pedal.

1.3.2 *Gear box*

- Make: SAME DEUTZ-FAHR Group;
- Model: 692.31;
- Type: mechanical synchromesh speed change gear; 5 speeds with 3 ranges of speed (S/N/F), one electrohydraulic reduction gears (low/medium/high), and one reverse group.

	Forward	Reverse
Number of gears	5	5
Number of ranges	3	3
Number of reduction gears	3	3
Total of arrangements	45	45

- Available options: 5 speeds forward with 3 ranges (S/N/F) and 2 reduction gears (low/high), 5 speeds reverse with 3 ranges (S/N/F).

	Forward	Reverse
Number of gears	5	5
Number of ranges	3	3
Number of reduction gears	2	-
Total of arrangements	30	15

- Available options: 5 speeds forward with 2 ranges (N/F) and 2 reduction gears (low/high), 5 speeds reverse with 2 ranges (N/F).

	Forward	Reverse
Number of gears	5	5
Number of ranges	2	2
Number of reduction gears	2	-
Total of arrangements	20	10

1.3.3 *Rear axle and final drives*

- Make: SAME DEUTZ FAHR Group;
- Model: 692.44;
- Type: bevel gear differential and epyciclic final drive.
- Differential lock
  . Make: SAME DEUTZ FAHR Group;
  . Model: 692.47;
  . Type: electrohydraulic;
  . Control system: engaged or disengaged by button.

1.3.4 *Front axle and final drives*

- Make: SAME DEUTZ FAHR Group;
- Model: 692.43;
- 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: 692.46;
  . Type: electrohydraulic;
  . Control system: engaged or disengaged by button.

1.3.5 *Total ratios and travelling speeds*

Gear	Group	Number of engine revolutions for one revolution of the driving wheels			Nominal travelling speed at rated engine speed of 2350 rev/min (*) km/h		
		Low	Medium	High	Low	Medium	High
FORWARD							
1	Slow	3114.1	2595.1	2114.0	0.18	0.22	0.27
2	Slow	2180.1	1816.8	1498.9	0.26	0.31	0.38
3	Slow	1521.5	1267.9	1046.1	0.37	0.45	0.54
4	Slow	1088.8	907.3	748.6	0.52	0.62	0.76
5	Slow	716.33	596.95	492.49	0.79	0.95	1.15
1	Normal	493.1	410.9	339.0	1.15	1.38	1.67
2	Normal	345.2	287.7	237.3	1.64	1.97	2.39
3	Normal	240.9	200.8	165.6	2.35	2.82	3.42
4	Normal	172.4	143.7	118.5	3.29	3.95	4.78
5	Normal	113.42	94.52	77.98	5.00	6.00	7.27
1	Fast	89.6	74.7	61.6	6.33	7.59	9.20
2	Fast	62.7	52.3	43.1	9.04	10.84	13.16
3	Fast	43.8	36.5	30.1	12.95	15.53	18.84
4	Fast	31.3	26.1	21.5	18.12	21.72	26.37
5	Fast	20.61	17.17	14.17	27.51	33.02	40.01

(*) *Calculated with a tyre dynamic radius index of 640 mm. (ISO 4251-1:1992)*

- Number of revolutions of front wheels for one revolution of rear wheels: 1.5818

1.3.5 *Total ratios and travelling speeds* (continued)

Gear	Group	Number of engine revolutions for one revolution of the driving wheels			Nominal travelling speed at rated engine speed of 2350 rev/min (*) km/h		
		Low	Medium	High	Low	Medium	High
REVERSE							
1	Slow	3282.16	2735.15	2228.09	0.17	0.21	0.25
2	Slow	2297.76	1914.85	1579.79	0.25	0.30	0.36
3	Slow	1603.61	1336.33	1102.56	0.35	0.42	0.51
4	Slow	1147.56	956.27	789.00	0.49	0.59	0.72
5	Slow	754.99	629.17	519.07	0.75	0.90	1.09
1	Normal	519.71	433.08	357.30	1.09	1.31	1.59
2	Normal	363.83	303.23	250.11	1.56	1.87	2.27
3	Normal	253.90	211.64	174.54	2.23	2.68	3.25
4	Normal	181.70	151.46	124.90	3.12	3.74	4.54
5	Normal	119.54	99.62	82.19	4.74	5.69	6.90
1	Fast	94.44	78.73	64.92	6.00	7.20	8.73
2	Fast	66.08	55.12	45.43	8.58	10.29	12.48
3	Fast	46.16	38.47	31.72	12.28	14.74	17.87
4	Fast	32.99	27.51	22.66	17.19	25.02	20.61
5	Fast	21.72	18.10	14.93	26.10	31.33	37.97

(*) *Calculated with a tyre dynamic radius index of 640 mm. (ISO 4251-1:1992)*

- Number of revolutions of front wheels for one revolution of rear wheels: 1.5818

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: not changeable;
- 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: 680 mm;
- Distance from the median plane of the tractor: 0 mm;
- Distance behind rear axle: 440 mm;
- PTO speed at rated engine speed: 611 rev/min;
- Engine speed at standard power take-off speed: 2077 rev/min;
- Ratio of rotation speeds (engine speed/p.t.o. speed): 3.8462;
- Power restriction: none;
- Maximum torque transmissible: none;
- Direction of rotation (viewed from behind tractor): clockwise.

Power take-off at 750 (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: 680 mm;
- Distance from the median plane of the tractor: 0 mm;
- Distance behind rear axle: 440 mm;
- PTO speed at rated engine speed: 766 rev/min;
- Engine speed at standard power take-off speed: 2300 rev/min;
- Ratio of rotation speeds (engine speed/p.t.o. speed): 3.0667;
- 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:	680 mm;
- Distance from the median plane of the tractor:	0 mm;
- Distance behind rear axle:	440 mm;
- PTO speed at rated engine speed:	1022 rev/min;
- Engine speed at standard power take-off speed:	2300 rev/min;
- Ratio of rotation speeds (engine speed/p.t.o. speed):	2.3;
- 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*
(optional, not fitted on tested tractor)

- Type:	independent, not adjustable to 540-1000 rev/min location at rear of tractor, in tractor's median plane, below the main PTO, engaged or disengaged by hand lever at the left hand side of the seat;
- Number and type of shafts:	1, ISO 500:1991, type 1 (35 mm dia, 6 splines),
- Method of changing power take-off shaft ends:	none;
- Travelling distance for one revolution of power take-off shaft:	0.24 m;
- Number of power take-off shaft revolutions for one revolution of rear driving wheels:	16.31.
- Direction of rotation with forward gear engaged (viewed from behind tractor):	clockwise;

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;
- 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: 692.39;
- Type: load sensing;
- Type of hydraulic system: open centre system;
- Number and type of cylinders: 1 internal 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: 41 dm^3;

1.5.1 *Rear power lift* (continued)

- Site of oil reservoir: gear box;
- Number, type and location of tapping points: 7, double acting, at rear of tractor;
- Maximum volume of oil available to external cylinders: 15 dm^3 ;

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

- Make: SAME DEUTZ-FAHR Group;
- Model: 692.59;
- 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: 41 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

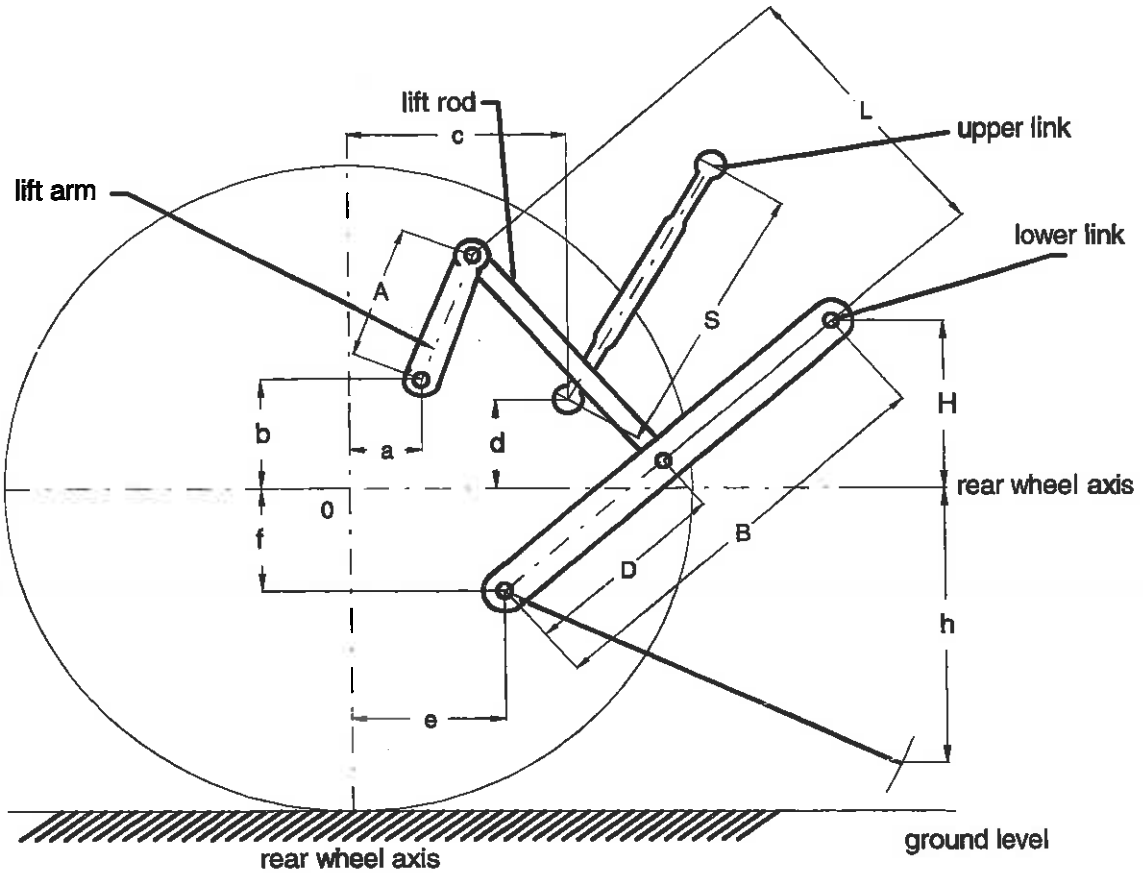
1.6.1 *Rear three point linkage*

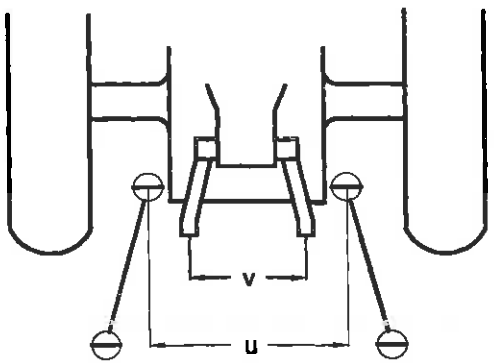
- Category (ISO 730-1:1994 + technical corrigendum): 2;
- Category adapter: none.

1.6.2 *Front three point linkage*

- Category (ISO 730-1:1994 + technical corrigendum): 2
- Category adapter: none

Rear linkage geometry



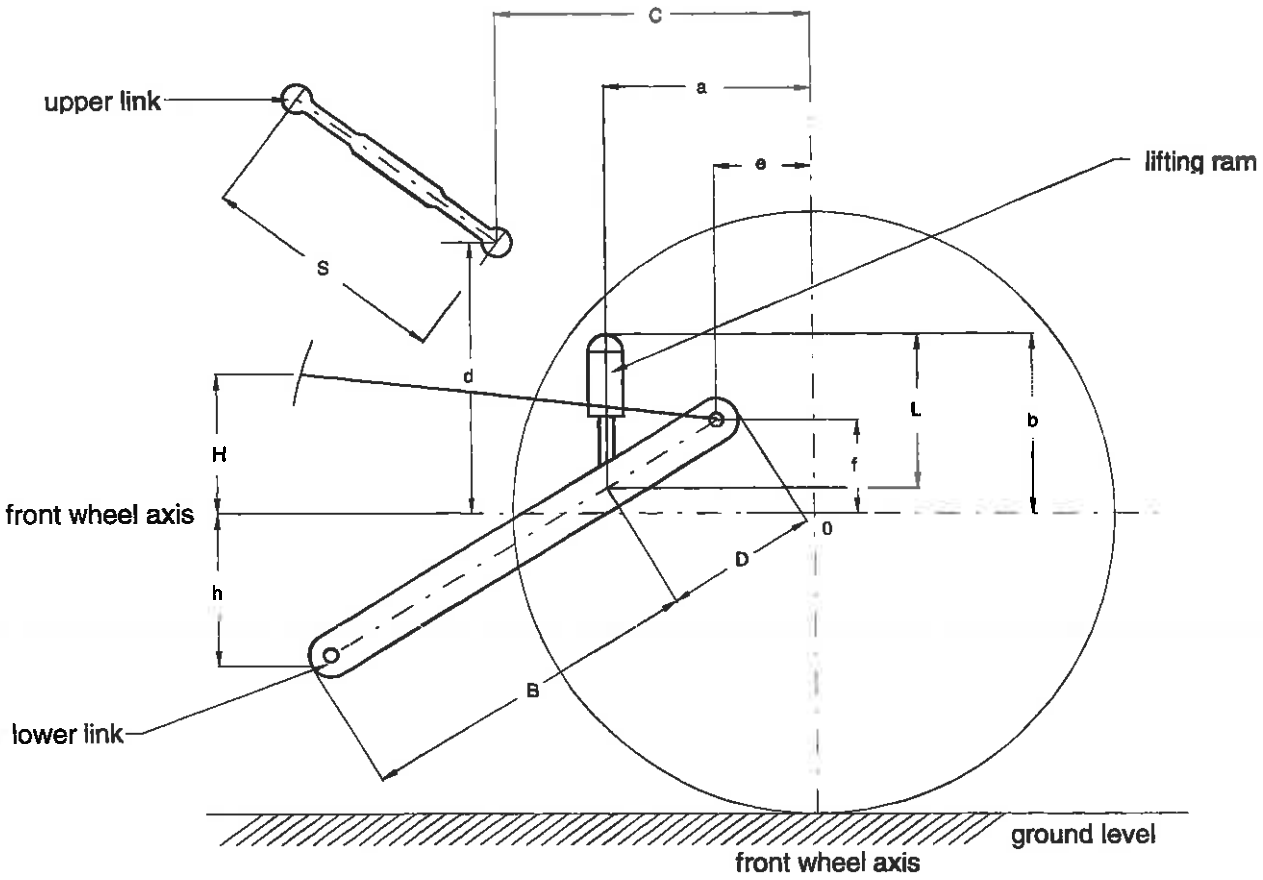


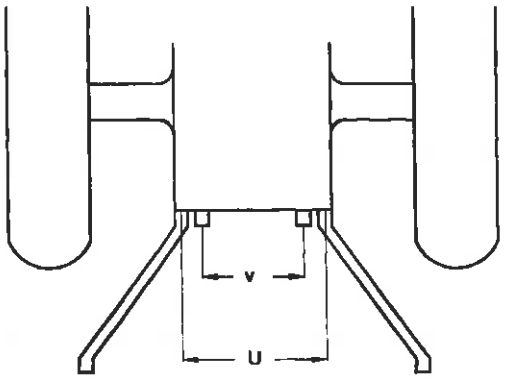
Dimensions of rear linkage geometry when connected to the standard frame

		Dimension or range mm		Settings used in test mm
Length of lift arms	(A)	380		380
Length of lower links	(B)	746		746
Distance of lift arm pivot point from rear wheel axis (behind)				
- horizontally	(a)	177		177
- vertically	(b)	315		315
Horizontal distance between the 2 lower link points	(u)	435		435
Horizontal distance between the 2 lift arm end points	(v)	330		330
Length of upper link	(S)	from 475 to 680		544
Distance of upper link pivot point from rear wheel axis				
- horizontally	(c)	398-388-408		388
- vertically	(d)	335-295-260		295
Distance of lower link pivot point from rear wheel axis				
- horizontally	(e)	183		183
- vertically	(f)	154		154
Distance of lower link pivot points to lift rod pivot points on lower links	(D)	600		600
Length of lift rods	(L)	from 505 to 645		637
Height of lower hitch points relative to the rear wheel axis:				
Length of lift rods	(L)	505	645	637
Linkage distance of lift rods	(D)	600	600	600
Lowest position	(h)	242	452	440
Highest position	(H)	382	247	255
Height above ground of lower hitch points when locked in transport position (*)				890

(*) *Assuming the dynamic radius index = 640 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)	670	670
Distance of cilinders pivot point from front wheel axis (forward)			
- horizontally	(a)	650	650
- vertically	(b)	485	485
Horizontal distance between the 2 lower link points	(u)	280	280
Horizontal distance between the 2 lift arm end points	(v)	310	310
Length of upper link	(S)	from 450 to 680	458
Distance of upper link pivot point from front wheel axis			
- horizontally	(c)	630 - 675	630
- vertically	(d)	540 - 480	540
Distance of upper link pivot point from front wheel axis			
- horizontally	(e)	438	438
- vertically	(f)	40	40
Distance of lower link pivot points to cylinders pivot points on lower links	(D)	235	235
Length of cylinders			
- in low position	(L)	360	360
- in high position	(L)	560	560
Height of lower hitch points relative to the front wheel axis			
- in low position	(h)	247	247
- in high position	(H)	315	315
Height above ground of lower hitch points (*)			700

(*) Assuming the dynamic radius index = 400 mm (ISO 4251-1:1992)

1.7 Swinging drawbar

(not available)

1.8 Trailer hitch

- Type:	DGM-GA 4200 C 6t V1,5;
- Hole diameter:	28 mm;
- Height above ground	
. Min.:	380 mm;
. Max.:	800 mm;
- Distance of hitch point from rear wheel axis	
. Horizontally:	600 mm;
- Distance of hitch point from power take-off shaft end	
. Vertically:	270 mm below, 140 mm above;
. Horizontally:	160 mm;
- Maximum vertical permissible load:	14.7 kN.

1.9 Holed drawbar

(optional, not fitted on tested tractor)

- Number of holes:	7;
- Distance between holes:	100 mm;
- Hole diameter:	28.5 mm;
- Thickness x width of the drawbar:	30 x 80 mm;
- Height above ground,	
. Min.:	188 mm;
. Max.:	1022 mm;
- Horizontal distance behind power take-off shaft end:	470 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 80 R;
- Type:	hydrostatic;
- Working pressure:	15 MPa;

1.11 Brakes

1.11.1 *Service brake*

- Make: SAME DEUTZ-FAHR Group;
- Model: 692.54;
- Type: oil bath disc, total 4 discs, 2 at front (1 per wheel) and 2 at rear (1 per wheel), all mounted before the final drive;
  - . Front disc diameter: 178 mm;
  - . Rear disc diameter: 224 mm;
  - . Material: FRENDO HDT 303 SINTERIX 2 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, 2 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: 2056 mm.

-Track width adjustment:

	Minimum mm	Maximum mm	Adjustment method
Front	1080	1200	changing the position of the rims with respect to the disc
Rear	1080	1250	

1.13 Protective strutture

- Make:	SAME DEUTZ-FAHR GROUP;
- Model:	C 39;
- 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:	7/S/0 126;
- Date of approval:	20 March 1998;
- Modification certificate:	none.

1.14 Seat

1.14.1 *Driver's seat*

- Make:	GRAMMER;
- Model:	MSG 83/8;
- 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:	KAB;
- Models:	P1/XH 2;
- 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* (continued)

- Make: GRAMMER;
- Models: MSG 93/8;
- 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.

- Make: GRAMMER;
- Models: DS 83H/8;
- 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.

1.14.3 *Passenger's seat* none.

1.15 Lighting

Lighting system in accordance with EEC 78/933

	Height above ground of centre mm	Size mm	Distance from out side edge of lights to median plane of tractor mm
Headlights	1025	160 x 100	185
Front parking lights	1280	110 x 35	495
Front direction indicator	1280	110 x 35	535
Rear parking lights	1345	50 x 60	430
Rear direction indicator	1345	50 x 60	480
Brake lights	1345	50 x 60	380
Reflectors	970	⌀ 80	490

2. TEST CONDITIONS

2.1 Overall dimensions

	Length		Width		Height at top of protective structure
	with front power lift	without front power lift	minimum	maximum	
	mm	mm	mm	mm	mm
Unballasted	4166	3561	1290	1640	2110
Ballasted	4266	3801	1290	1640	2110

2.2 Ground clearance:

270 mm below front axle (unballasted tractor).

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

	Unballasted		Ballasted	
	Without driver	With driver	Without driver	With driver
	kg	kg	kg	kg
Front	1250	1270	1595	1615
Rear	1490	1545	1380	1435
Total	2740	2815	2975	3050

2.4 Ballast

	Weights		Water
	Number	Total mass	
		kg	kg
Front	1	235	-
Rear wheels	-	-	-

2.5 Tyres and track width specifications

	Front	Rear
Tyres		
make	GOOD YEAR	TAURUS
model	DT 810 RADIAL	POINT 7
dimensions	280/70R18	420/70R28
ply rating	-	-
load index/speed index	114 A8	133 A8
type	radial	radial
maximum load (tyre manufacturer's)	1180 daN	2060 daN
inflation pressure (tyre manufact.'s)	240 kPa	160 kPa
dynamic radius index	400 mm	640 mm
Chosen track width	1090 mm	1080 mm
Technically permissible axle load	1766 daN	2943 daN
Other tyres available	280/70R16	380/70R28
	280/70R16	420/70R24
	260/70R16	380/70R24

2.6 Fuel

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

2.7 Oils and lubricants

2.7.1 *Capacity and change interval*

	Capacity dm^3	Oil change h	Filter change h
Engine	11	150	300
Gear box with rear axle and final drives, hydraulic system, steering	41	1200	2400(*)
Front PTO transmission	2.5	1200	-
Front axle/final drives	6/3	1200	-
Brakes	2.5	-	-

(*) 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 SE - CD	API SE - CD
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: 15.

3. COMPULSORY TESTS RESULTS

3.1 Main power take-off

- Date and location of test: 8 April 1999, ISMA, Treviglio BG, Italy;
- Type of dynamometer: eddy-current, ZÖLLNER B350.

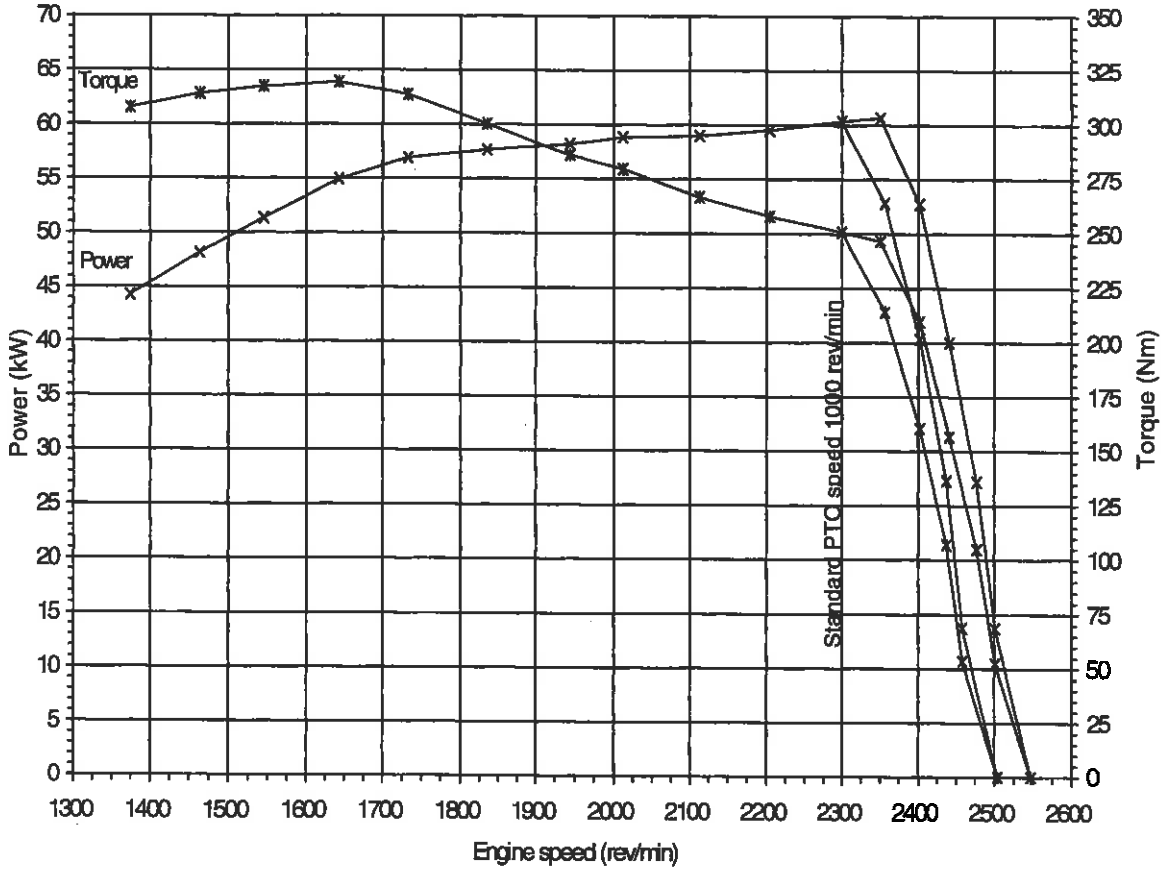
Power	Speed		Fuel consumption			Specific energy
	Engine	PTO	Hourly		Specific	
kW	rev/min	rev/min	l/h	kg/h	g/kWh	kWh/l
3.1.1 MAXIMUM POWER - TWO-HOUR TEST						
60.69	2351	1022	17.48	14.63	241	3.47
3.1.2 POWER AT RATED ENGINE SPEED						
60.69	2351	1022	17.48	14.63	241	3.47
3.1.3 STANDARD POWER TAKE-OFF SPEED (1000 rev/min)						
60.37	2300	1000	17.25	14.44	239	3.50
3.1.4 PART LOADS 3.1.4.1 The torque corresponding to maximum power at rated engine speed						
60.69	2351	1022	17.48	14.63	241	3.47
3.1.4.2 85% of torque obtained in 3.1.4.1						
52.74	2402	1044	15.91	13.32	253	3.31
3.1.4.3 75% of torque defined in 3.1.4.2						
40.01	2441	1061	12.92	10.81	270	3.10
3.1.4.4 50% of torque defined in 3.1.4.2						
27.20	2477	1077	10.38	8.69	319	2.62
3.1.4.5 25% of torque defined in 3.1.4.2						
13.72	2501	1087	7.63	6.39	466	1.80
3.1.4.6 unloaded						
0	2547	1107	5.21	4.36	-	-

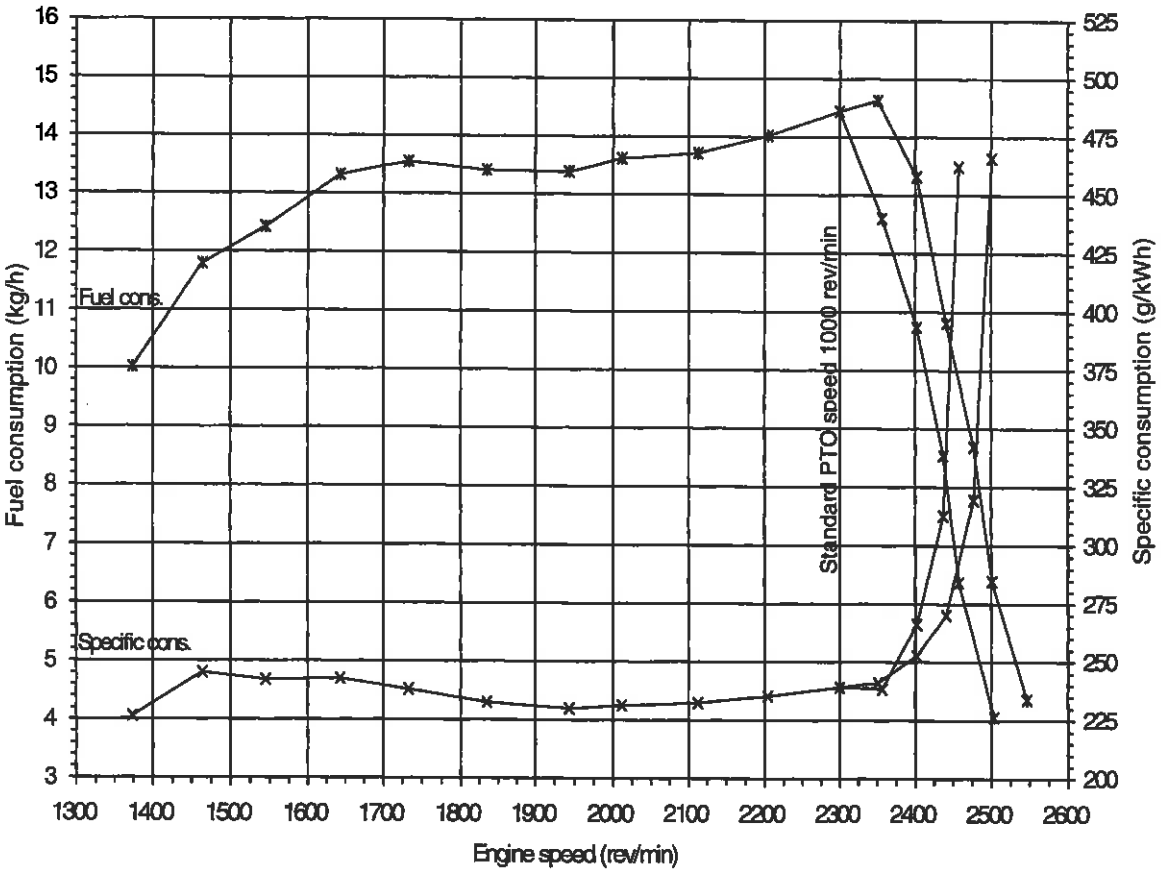
Power	Speed		Fuel consumption			Specific
	Engine	PTO	Hourly		Specific	energy
kW	rev/min	rev/min	l/h	kg/h	g/kWh	kWh/l
3.1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED (1000 rev/min)						
3.1.5.1 The torque corresponding to maximum power available						
60.37	2300	1000	17.25	14.44	239	3.50
3.1.5.2 85% of torque obtained in 3.1.5.1						
52.83	2357	1025	15.05	12.60	238	3.51
3.1.5.3 75% of torque defined in 3.1.5.2						
40.35	2402	1044	12.83	10.74	266	3.14
3.1.5.4 50% of torque defined in 3.1.5.2						
27.32	2437	1060	10.20	8.54	313	2.68
3.1.5.5 25% of torque defined in 3.1.5.2						
13.78	2458	1069	7.61	6.37	462	1.81
3.1.5.6 unloaded						
0	2504	1089	4.85	4.06	-	-

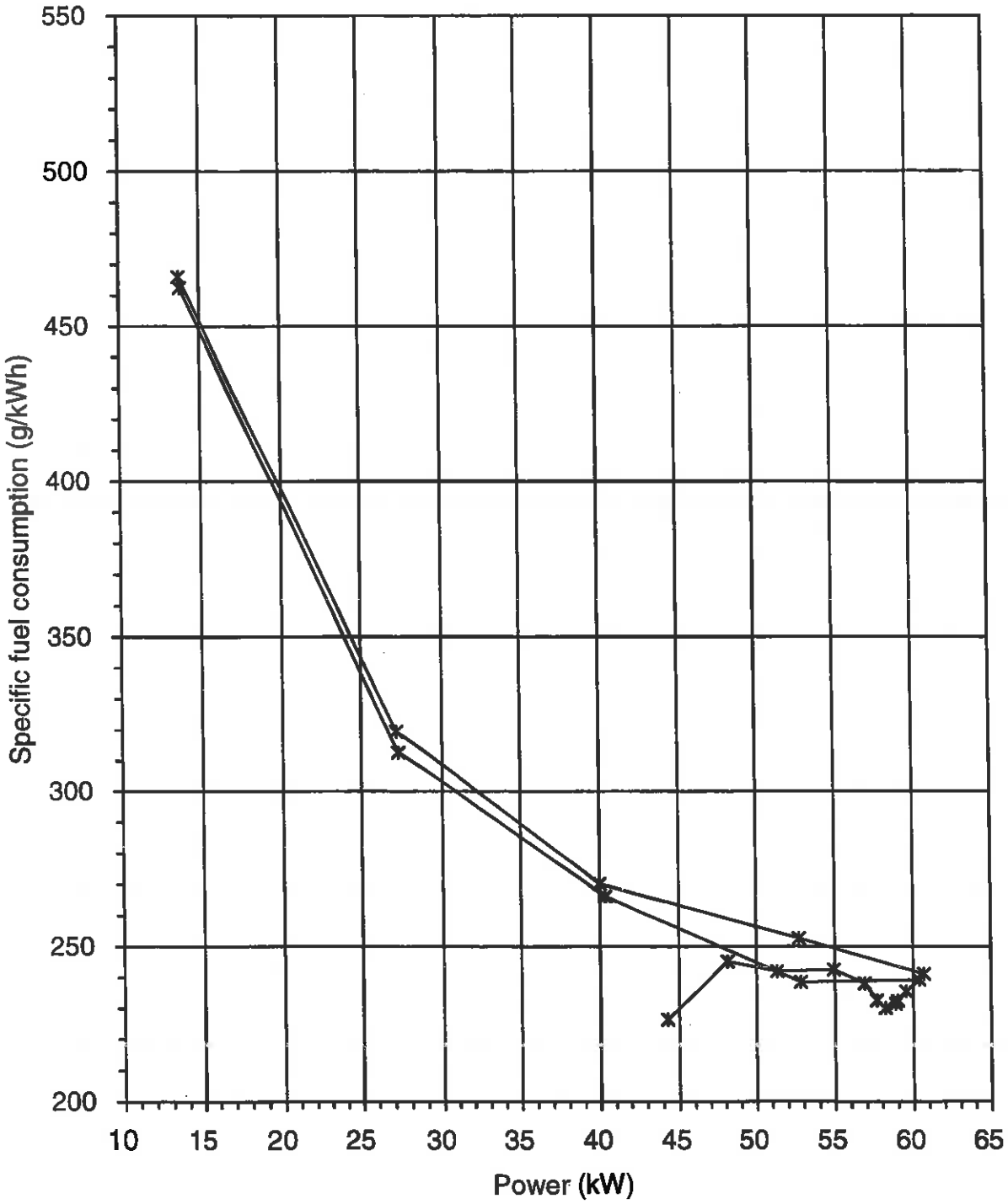
- No load maximum engine speed: 2547 rev/min;
- Equivalent flywheel torque at rated engine speed: 246.60 Nm;
- Equivalent flywheel torque at 2-hour test: 246.60 Nm;
- Maximum equivalent flywheel torque: 319.44 Nm at 1643 rev/min of the engine.

- Mean atmospheric conditions
  . Temperature: 19 °C
  . Pressure: 99.0 kPa
  . Relative humidity: 63 %

- Maximum temperatures
  . Coolant: 110 °C
  . Engine oil: 130 °C
  . Fuel: 30 °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)
550
500
450
400
350
300
250
200
10
15
20
25
30
35
40
45
50
55
60
65
Power (kW)

3.2 Hydraulic power and lifting force

- Date of tests: 30 April 1999.

3.2.1 *Hydraulic power test*

- Sustained pressure with relief valve open: 17.5 MPa;
- Pump delivery rate at minimum pressure: 36.1 l/min;

	Flow rate l/min	Pressure MPa	Power kW
At 90% of the actual relief valve setting	34.9	15.8	9.19
Maximum	34.9	15.8	9.19

- 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*

		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	695	854
with lifting forces	mm	681	779
Maximum corrected force exerted through full range	kN	15.50	11.89
Corresponding pressure of hydraulic fluid	MPa	15.8	15.8
Moment about rear axle	kNm	14.40	18.30
Maximum tilt angle of mast from vertical	degrees	-	11

Lifting heights relative to the horizontal lower links (mm)											
-297	-286	-200	-100	0	+100	+200	+300	+395	+400	+482	-
Lifting forces at hitch points (kN), corrected to 15.8 MPa											
-	15.50	16.18	17.00	17.44	17.46	17.99	19.06	19.38	-	-	-
Lifting forces at test frame (kN), corrected to 15.8 MPa											
15.69	-	15.63	15.56	15.16	14.26	13.66	13.29	-	12.65	11.89	-

3.2.3 *Front power lift test*

		At hitch point	On the frame
Height of lower hitch point above ground in down position	mm	138	138
Vertical movement			
without lifting forces	mm	562	573
with lifting forces	mm	550	561
Maximum corrected force exerted through full range	kN	13.95	10.65
Corresponding pressure of hydraulic fluid	MPa	15.8	15.8
Moment about rear axle	kNm	15.46	18.30
Maximum tilt angle of mast from vertical	degrees	-	4

Lifting heights relative to the horizontal lower links											
mm	-287	-255	-200	-100	0	+100	+200	+263	+300	+306	-
Lifting forces at hitch points, corrected to 15.8 MPa											
kN	14.48	-	13.95	14.13	14.39	14.77	15.03	15.01	-	-	-
Lifting forces at test frame, corrected to 15.8 MPa											
kN	-	16.31	14.48	13.60	12.91	12.17	11.11	-	10.81	10.65	-

3.3 Drawbar performance

- Date of tests: 13, 14, 19 and 20 April 1999;
- Type of track: concrete.

	Height of drawbar above ground mm	Tyre inflation pressure	
		Front kPa	Rear kPa
Unballasted	525	240	160
Ballasted	536	240	160

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)													
3SH	3.39	25.43	0.48	2523	15.3	1593	0.53	27	83	118	21	80	100.3
4SM	3.74	24.07	0.56	2523	15.1	1449	0.58	27	83	118	22	80	100.3
4SH	4.54	24.07	0.68	2516	15.0	1258	0.67	28	83	121	21	79	100.3
5SL	4.96	25.15	0.71	2518	14.8	1135	0.74	27	83	121	22	80	100.3
5SM	5.78	24.47	0.85	2509	15.0	1062	0.79	29	84	124	21	79	100.4
1NL	7.10	24.81	1.03	2516	15.0	807	1.04	29	83	124	22	79	100.3
5SH	7.14	24.96	1.03	2502	15.0	880	0.95	29	83	124	22	78	100.3
1NM	8.16	23.70	1.24	2512	15.0	723	1.16	27	83	124	21	78	100.4
2NL	9.38	22.98	1.47	2502	15.0	672	1.25	25	83	125	21	79	100.3
1NH	9.65	23.17	1.50	2500	15.0	673	1.24	26	83	125	21	78	100.3
2NM	12.22	25.01	1.76	2493	15.0	587	1.43	25	82	124	22	79	100.3
3NL	13.94	23.68	2.12	2489	15.0	547	1.53	27	83	124	21	78	100.4
2NH	14.14	23.90	2.13	2486	15.0	552	1.52	27	83	125	21	78	100.4
3NM	15.94	22.78	2.52	2482	15.0	513	1.63	26	83	125	22	78	100.3
4NL	19.84	23.81	3.00	2477	13.5	441	1.90	26	81	126	22	77	100.3
3NH	21.10	24.19	3.14	2472	12.3	427	1.96	24	82	126	22	77	100.4
4NM	24.23	24.37	3.58	2468	13.2	383	2.19	24	82	126	22	75	100.3
4NH	27.12	22.14	4.41	2452	11.3	377	2.22	23	83	127	21	75	100.3
5NL	30.38	24.09	4.54	2447	12.4	347	2.41	25	83	128	22	75	100.4
5NM	33.92	22.50	5.43	2422	11.7	357	2.34	25	84	128	22	75	100.3
1FL	36.06	22.51	5.77	2429	11.5	321	2.61	25	84	127	22	75	100.4
5NH	40.70	22.07	6.64	2403	10.4	328	2.56	26	83	128	21	76	100.4
1FM	41.72	21.61	6.95	2413	10.4	302	2.77	25	83	128	21	75	100.4
2FL	48.18	21.26	8.16	2380	10.6	289	2.90	23	84	128	21	74	100.4
1FH	48.56	21.30	8.21	2364	11.0	294	2.84	23	84	128	20	74	100.4
2FM	53.68	19.41	9.96	2346	7.6	270	3.10	23	84	128	21	74	100.3
3FL	53.16	15.69	12.20	2351	5.5	275	3.04	24	83	129	21	72	100.4
2FH	52.85	15.35	12.40	2351	5.3	276	3.03	24	84	129	21	72	100.3
3FM	53.69	13.07	14.79	2344	4.2	270	3.10	23	84	128	20	72	100.3

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)													
1SL	1.18	26.50	0.16	2537	14.4	4085	0.20	23	84	121	13	87	99.8
1SM	1.45	27.44	0.19	2537	15.0	3297	0.25	24	83	121	13	87	99.7
2SL	1.76	28.77	0.22	2535	15.0	2773	0.30	24	84	121	13	86	99.8
1SH	1.87	29.28	0.23	2532	14.8	2668	0.31	24	83	122	14	86	99.7
2SM	2.08	27.67	0.27	2537	15.3	2308	0.36	25	83	122	14	87	99.7
3SL	2.63	28.69	0.33	2535	15.1	1852	0.45	24	82	122	13	87	99.7
2SH	2.61	28.50	0.33	2525	14.8	2023	0.41	24	84	123	13	86	99.8
3SM	3.01	27.76	0.39	2528	15.1	1718	0.49	25	82	123	14	86	99.7
4SL	3.60	27.57	0.47	2525	15.0	1472	0.57	25	82	124	14	86	99.7
3SH	3.64	27.29	0.48	2523	15.1	1489	0.56	24	82	124	13	85	99.7
4SM	4.25	27.85	0.55	2523	15.0	1271	0.66	24	82	124	14	85	99.7
4SH	5.00	26.90	0.67	2514	15.0	1166	0.72	24	82	125	13	84	99.8
5SL	5.31	27.34	0.70	2516	15.0	1079	0.78	23	81	125	14	84	99.8
5SM	6.52	27.96	0.84	2502	15.0	966	0.87	24	81	124	13	82	99.8
1NL	7.75	27.35	1.02	2512	15.0	759	1.10	24	82	125	14	82	99.8
5SH	7.78	27.48	1.02	2493	15.1	928	0.90	24	83	125	14	81	99.7
1NM	9.78	28.65	1.23	2502	15.2	646	1.30	25	81	125	13	81	99.8
2NL	11.10	27.38	1.46	2495	14.9	631	1.33	25	81	126	13	82	99.7
1NH	11.33	27.57	1.48	2493	15.2	635	1.32	24	82	126	14	81	99.7
2NM	12.99	26.73	1.75	2489	15.2	584	1.43	24	82	126	14	81	99.8
3NL	15.72	27.22	2.08	2482	15.0	523	1.60	24	81	125	13	80	99.7
2NH	16.08	27.45	2.11	2479	15.2	529	1.58	24	82	126	14	80	99.7
3NM	19.78	28.50	2.50	2477	15.0	438	1.91	25	82	127	13	80	99.7
4NL	21.60	26.82	2.90	2466	14.9	433	1.93	25	81	127	14	80	99.7
3NH	23.88	28.47	3.02	2463	15.0	398	2.10	25	82	126	13	79	99.8
4NM	26.42	27.42	3.47	2454	14.7	379	2.21	25	82	127	13	79	99.7
4NH	32.39	27.97	4.17	2431	14.8	355	2.36	25	81	127	14	79	99.7
5NL	34.56	28.41	4.38	2426	14.2	341	2.46	24	81	127	14	79	99.8
5NM	39.73	27.41	5.22	2403	13.9	335	2.50	25	81	128	14	78	99.8
1FL	41.94	27.31	5.53	2408	13.7	311	2.69	25	82	128	14	79	99.8
5NH	47.29	27.73	6.14	2341	13.8	306	2.73	24	82	128	13	79	99.8
1FM	48.64	26.50	6.61	2378	12.8	286	2.92	25	81	128	13	78	99.8
2FL	51.10	22.80	8.07	2346	9.4	284	2.94	25	81	128	14	78	99.7
1FH	50.98	22.25	8.25	2348	9.1	285	2.93	25	81	128	14	78	99.8
2FM	54.08	19.46	10.01	2348	6.1	269	3.11	26	82	127	13	77	99.9
3FL	55.53	16.42	12.18	2348	4.5	262	3.19	25	82	127	14	77	99.8
2FH	53.73	15.64	12.37	2346	4.5	270	3.10	25	83	128	14	78	99.8
3FM	53.77	13.10	14.78	2346	3.5	270	3.10	24	82	128	14	77	99.7

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													
1FM	39.88	19.81	7.25	2422	7.0	303	2.76	22	82	128	17	61	99.9
3.3.3.2 FIVE HOUR TEST at pull corresponding to 15% wheel slip, without additional ballast													
5NL	34.59	28.24	4.41	2424	14.0	344	2.43	26	81	129	18	63	100.0

Oil consumption during ten hours duration of test 3.3.3.1 and 3.3.3.2: 30 g/h.

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

	With brakes		Without brakes	
	left-hand m	right-hand m	left-hand m	right-hand m
Radius of turning area	4.23	4.37	4.40	4.50
Radius of turning circle	3.60	3.75	3.78	3.87

3.5 Location of centre of gravity

	mm
Height above ground	762
Distance forward from rear axle centre	928
Distance from tractor's median plane to the left	7

3.6 Braking

- Date of tests: 7 May 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	43.3	1.0	2.98
		2.0	3.65
		3.0	3.90
		4.0	4.29
		5.0	4.36
		6.0	4.48
Unballasted tractor	43.3	1.0	3.34
		2.0	3.87
		3.0	4.30
		4.0	4.57
		5.0	5.16
		6.0	5.31

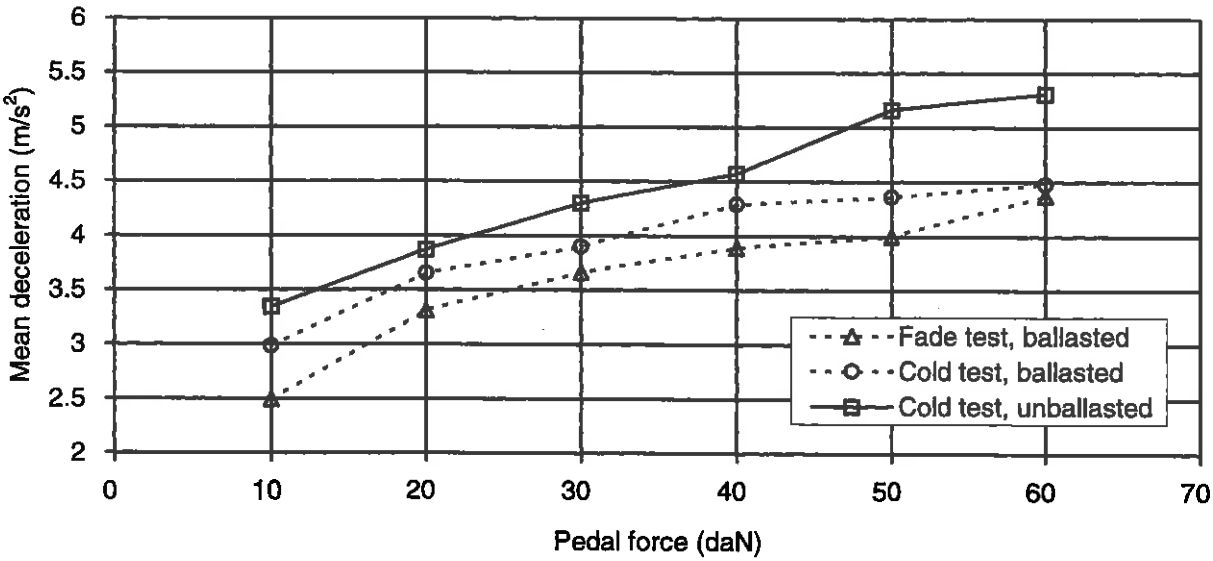
- Maximum deviation of tractor from its original course: none;
- Abnormal vibration: none;
- Brake heating method: heated by towing of the tractor for 1 km.

3.6.2 *Fade test*

	Speed before application of brakes km/h	Braking device control force kN	Mean deceleration m/s^2
Ballasted tractor	43.3	1.0	2.49
		2.0	3.31
		3.0	3.66
		4.0	3.89
		5.0	4.00
		6.0	4.37

- 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	down
	daN	daN
Braking device control force	18.6	18.6

3.7 Measurement of external noise level

- Date of test: 3 May 1999;
- Type of track: concrete;
- Type of sound level meter: BRÜEL & KJÆR model 2231.

Gear	Travelling speed before acceleration	Sound level
	km/h	dB(A)
5FH	32.5	82.8

3.8 Repairs: none.
3.9 Remarks: none.

TEST ENGINEER
(Dr. Carlo BISAGLIA)

DIRECTOR OF TESTING STATION
(Prof. Giuseppe COLZANI)

HEAD OF ISMA
(Ing. Giovanni SANTORO)