ISTITUTO SPERIMENTALE PER
LA MECCANIZZAZIONE AGRICOLA
SEZIONE DI TREVIGLIO

CODE 1

OECD STANDARD CODE FOR THE OFFICIAL TESTING OF AGRICULTURAL AND FORESTRY TRACTOR PERFORMANCE





LAMBORGHINI L10N804WVT

trade name:
LAMBORGHINI AGILE 880 S

HÜRLIMANN H10N804WVT

trade name:
HÜRLIMANN XN 708

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.:	**1/1812**
Date of approval:	12 March 1999
Period of test:	October - November 1998

ISMA Via Milano 43 24047 Treviglio BG Italy
Tel/Fax: 0363 49603

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 30

3.7 Measurement of external noise level 31

3.8 Repairs 31

3.9 Remarks 31

The Lamborghini Agile 880 S (4WD) and Hürlimann XN 708 (4WD) tractors are technically identical in all main respects except with regard to model designation, colour and side bonnets design.

All tests were carried out on the Lamborghini Agile 880 S

All stated dimensions and tests refer to tyre size 240/70R16 at front and 380/70R20 at rear, as well as to track widths 1060 mm at front and 910 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:	L10N804WVT with 45 forward and 45 reverse speeds, 40 km/h version;
- Trade name:	AGILE 880 S;
- Type:	four-wheel drive, unit construction;
- Number of driving wheels:	4;
- Serial number:	1052;
- First serial number:	1001.

1.2 Engine

- Make:	SAME DEUTZ-FAHR Group;
- Model:	1000.4 W3;
- Type:	water cooled 4-stroke diesel, direct injection naturally aspirated;
- Serial number:	2379.

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:	17:1;
- Arrangement of valves:	overhead;
- Cylinder liners:	wet liners.

1.2.2 *Supercharging* none.

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 ± 2 mm^3/stroke at rated speed and full load corresponding 17.65 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 2500 rev/min;
- Rated engine speed:	2350 rev/min.

1.2.5 *Air cleaner*

- Pre-cleaner:	(optional, fitted on tested tractor)
. Make:	DONALDSON;
. Model:	PB 01-6330;
. 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 4803;
- 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 3557;
- 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 5115 14 V 85 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 3516;
- Type:	one reflection absorption chamber;
- Location:	on the left hand side of engine, horizontal position under side bonnet;
- Height of outlet above ground:	340 mm.

1.3 Transmission

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

- Make:	SAME DEUTZ-FAHR Group;
- Model:	706.23;
- Type:	single disk dry clutch;
- Number of plates:	1;
- Plates diameter:	305 mm;
- Control system:	hydraulic operated by pedal.

1.3.2 *Gear box*

- Make: SAME DEUTZ-FAHR Group;
- Model: 706.31;
- 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: 706.44;
- Type: bevel gear differential and epyciclic final drive.
- Differential lock
  . Make: SAME DEUTZ FAHR Group;
  . Model: 706.47;
  . Type: electrohydraulic;
  . Control system: engaged or disengaged by button.

1.3.4 *Front axle and final drives*

- Make: SAME DEUTZ FAHR Group;
- Model: 706.43;
- 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: 706.46;
  . 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	2952.67	2460.57	2004.41	0.15	0.18	0.23
2	Slow	2067.08	1722.62	1421.20	0.22	0.26	0.32
3	Slow	1442.63	1202.17	991.87	0.31	0.38	0.46
4	Slow	1032.36	860.27	709.79	0.44	0.53	0.64
5	Slow	679.20	566.00	466.96	0.67	0.80	0.97
1	Normal	467.54	389.60	321.43	0.97	1.16	1.41
2	Normal	327.30	272.79	225.00	1.38	1.66	2.01
3	Normal	228.41	190.39	157.02	1.98	2.37	2.88
4	Normal	163.46	136.25	112.36	2.76	3.32	4.02
5	Normal	107.54	89.62	73.94	4.20	5.04	6.11
1	Fast	84.96	70.83	58.41	5.32	6.38	7.74
2	Fast	59.45	49.59	40.87	7.60	9.11	11.06
3	Fast	41.53	34.61	28.54	10.88	13.06	15.83
4	Fast	29.68	24.75	20.39	15.22	18.26	22.16
5	Fast	19.54	16.28	13.44	23.12	27.75	33.63

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	3112.01	2593.36	2112.58	0.15	0.17	0.21
2	Slow	2593.36	1815.58	1497.90	0.21	0.25	0.30
3	Slow	1520.48	1267.05	1045.40	0.30	0.36	0.43
4	Slow	1088.07	906.69	748.10	0.42	0.50	0.60
5	Slow	715.85	596.55	492.16	0.63	0.76	0.92
1	Normal	492.77	410.62	338.77	0.92	1.10	1.33
2	Normal	344.97	287.51	237.14	1.31	1.57	1.91
3	Normal	240.74	200.67	165.49	1.88	2.25	2.73
4	Normal	172.28	143.60	118.42	2.62	3.15	3.82
5	Normal	113.34	94.46	77.93	3.99	4.78	5.80
1	Fast	89.54	74.65	61.56	5.05	6.05	7.34
2	Fast	62.66	52.26	43.07	7.21	8.64	10.49
3	Fast	43.77	36.48	30.08	10.32	12.39	15.02
4	Fast	31.28	26.08	21.49	14.45	17.32	21.03
5	Fast	20.60	17.16	14.16	21.94	26.33	31.91

(*) *Calculated with a tyre dynamic radius index of 510 mm. (ISO 4251/1-1992)*

- Number of revolutions of front wheels for one revolution of rear wheels: 1.4998.

1.4 Power take-off

1.4.1 *Main power take-off proportional to engine speed*

- Type: independent, at rear of tractor, engaged or disengaged by push button, driven by multiplate wet clutch independent of travel clutch;
- Number of shafts: 1;
- Method of changing and dimensions of power take-off shaft ends: not changeable, 35 mm diameter, 6 splines, ISO 500-1991, type 1;
- Method of changing speed: by internal or external hand lever;
- Height above ground: 500 mm;
- Distance from the median plane of the tractor: 0 mm;
- Distance behind rear axle: 440 mm;
- Direction of rotation (viewed facing driving end): clockwise.

1.4.1 *Main power take-off proportional to engine speed* (continued)

PTO type	PTO speed rev/min	Engine speed rev/min	Engine/PTO transmission ratio	Power restriction and maximum torque
540	540 611	2077 2350	3.8462	none
750	750 766	2300 2350	3.0667	none
1000	1000 1021	2300 2350	2.3000	none

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

- Type: independent, at front of tractor, engaged or disengaged by push button, driven by multiplate wet clutch independent of travel clutch;
- Number and type of shafts: 1, ISO 500-1991, type 1 (35 mm dia, 6 splines);
- Height above ground: 530 mm;
- Distance from the median plane of the tractor: 0 mm;
- Distance forward front axle: 630 mm;
- Direction of rotation (viewed facing driving end): anticlockwise.

PTO type	PTO speed rev/min	Engine speed rev/min	Engine/PTO transmission ratio	Power restriction and maximum torque
1000	1000 979	2400 2350	2.40	none

1.4.3 *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;
- Direction of rotation with forward gear engaged:	clockwise;
- Travelling distance for one revolution of power take-off shaft:	0.28 m;
- Number of power take-off shaft revolutions for one revolution of rear driving wheels:	14.74.

1.5 Hydraulic power lift

1.5.1 *Rear power lift*

- Make:	SAME DEUTZ-FAHR Group;
- Model:	706.39;
- 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 ;
- Site of oil reservoir:	gear box;
- Number, type and location of tapping points:	3, 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:	706.59;
- 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

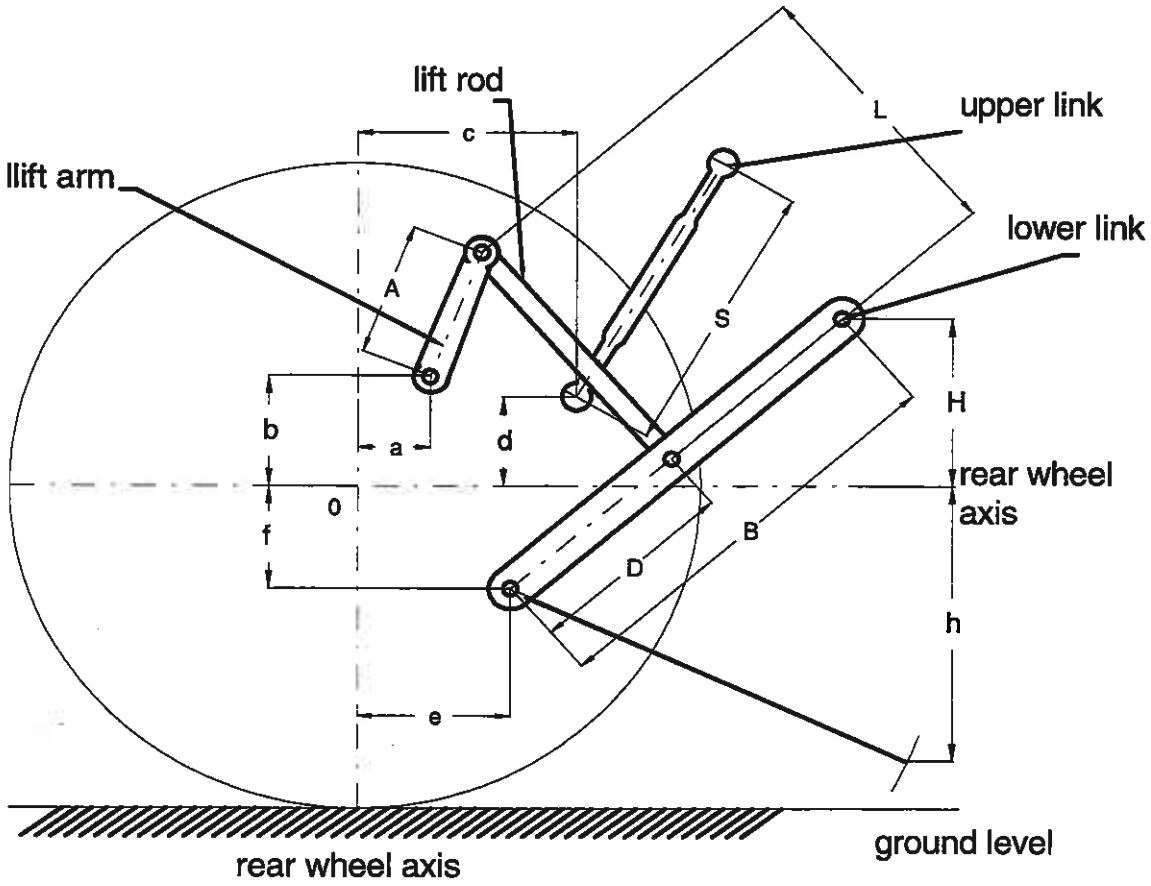
1.6.1 *Rear three point linkage*

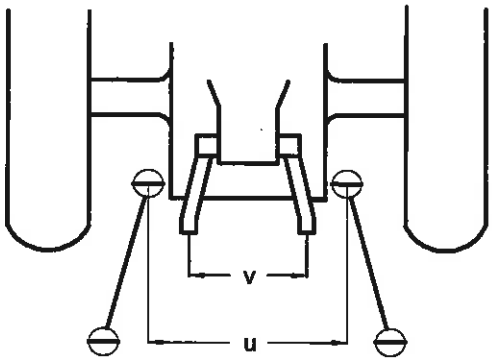
- Category (ISO 730/1-1994):	2;
- Category adapter:	none.

1.6.2 *Front three point linkage*

- Category (ISO 730/1-1994):	2
- Category adapter:	none

Rear linkage geometry



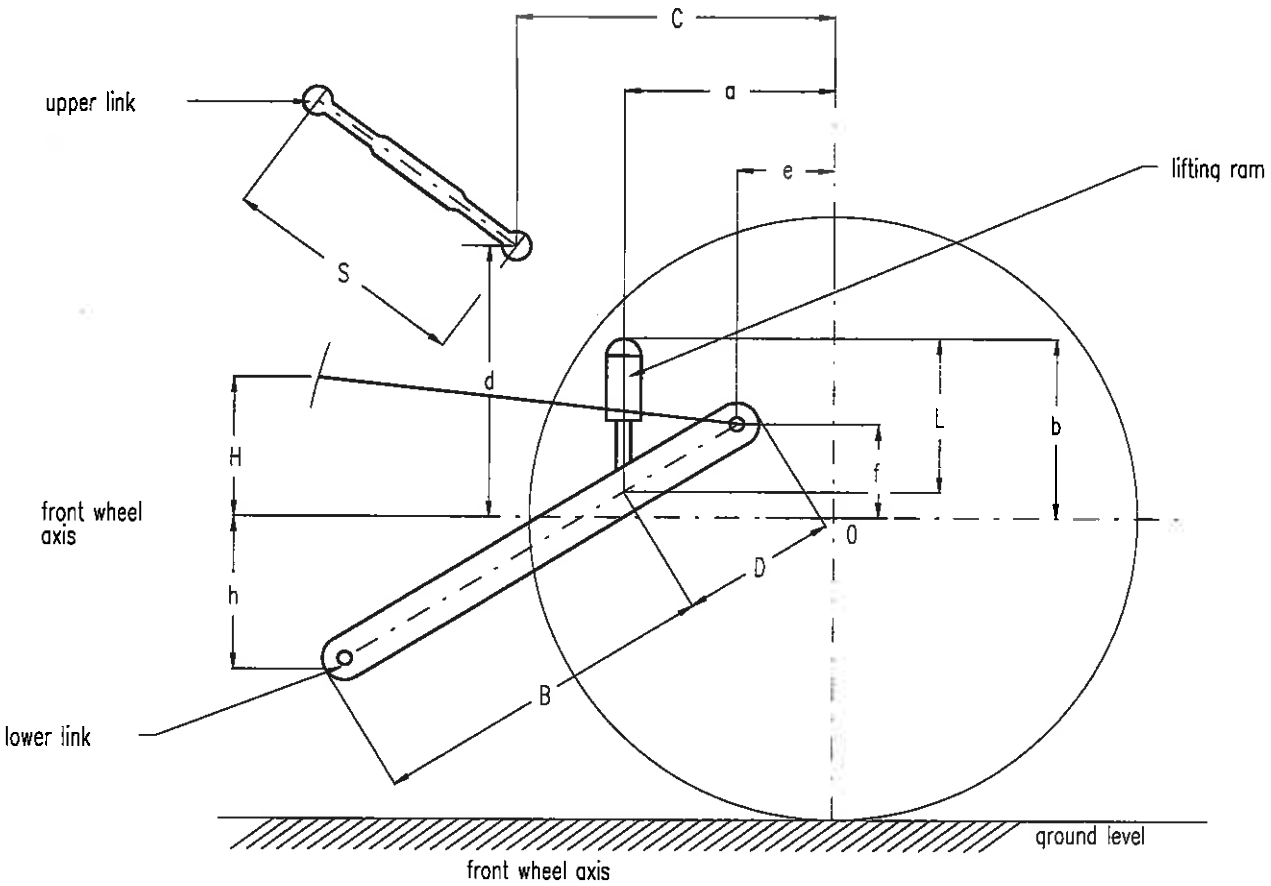


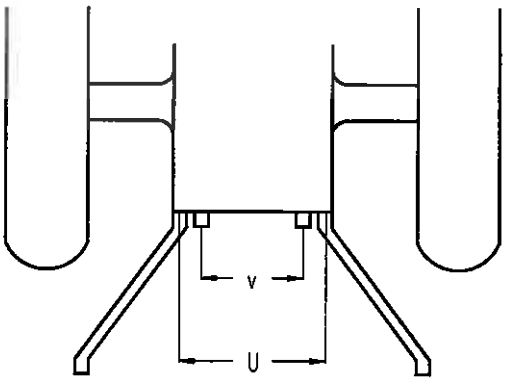
Dimensions of rear linkage geometry when connected to the standard frame

			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	535
Distance of upper link pivot point from rear wheel axis				
- horizontally		(c)	407-397-407	397
- vertically		(d)	260-295-335	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)	520	520
Length of lift rods		(L)	from 420 to 560	530
Height of lower hitch points relative to the rear wheel axis:				
Length of lift rods	(L)	420	560	530
Linkage distance of lift rods	(D)	520	520	520
Lowest position	(h)	273	493	320
Highest position	(H)	355	190	322
Height above ground of lower hitch points when locked in transport position (*)				832

(*) *Assuming the dynamic radius index = 510 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)	630	630
- 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 470 to 680	473
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)	433	433
- 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)		230
- in high position	(H)		323
Height above ground of lower hitch points (*)			673

(*) Assuming the dynamic radius index = 350 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.:	250 mm;
. Max.:	670 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

- 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.:	155 mm;
. Max.:	865 mm;
- Horizontal distance behind power take-off shaft end:	470 mm;
- Diameter of the pinhole:	28 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: 706.54;
- 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	1020	1265	changing the position of the rims with respect to the disc
Rear	890	1290	

1.13 Protective strutture

- Make:	SAME DEUTZ-FAHR GROUP;
- Model:	C 40;
- 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/0 125;
- Date of approval:	19 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	990	160 x 100	185
Front parking lights	1220	110 x 35	495
Front direction indicator	1220	110 x 35	535
Rear parking lights	1080	50 x 60	430
Rear direction indicator	1080	50 x 60	480
Brake lights	1080	50 x 60	380
Reflectors	650	⌀ 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: 230 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	1175	1195	1525	1540
Rear	1345	1400	1230	1290
Total	2520	2595	2755	2830

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	PIRELLI
model	DT 810 RADIAL	TM 700
dimensions	240/70R16	380/70R20
ply rating	-	-
load index/speed index	104 A8	122 A8
type	radial	radial
maximum load (tyre manufacturer's)	900 daN	1500 daN
inflation pressure (tyre manufact.'s)	240 kPa	160 kPa
dinamic radius index	350 mm	510 mm
Chosen track width	1060 mm	910 mm
Technically permissible axle load	1766 daN	2943 daN
Other tyres available	280/65R15.5	380/70R20

2.6 Fuel

- Type: AGIP DIESEL, DIN 51601; (in accordance with the national standard)
- Density at 15 °C: 0.833 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: 30 October 1998, ISMA, Treviglio BG, Italy;
- Type of dynamometer: eddy-current, ZÖLLNER B350.

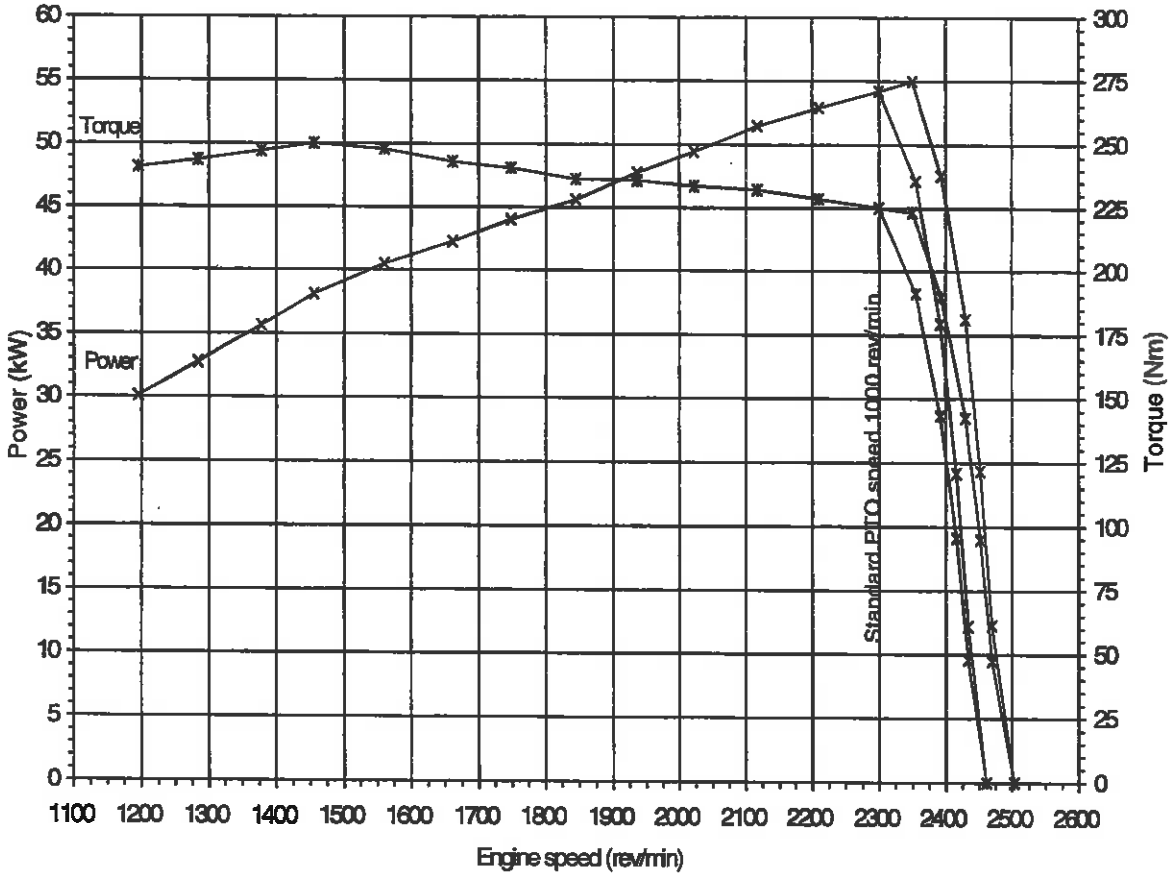
Power	Speed		Fuel consumption			Specific energy
	Engine	PTO	Hourly		Specific	
kW	rev/min	rev/min	l/h	kg/h	g/kWh	kWh/l
3.1.1 MAXIMUM POWER - TWO-HOUR TEST						
54.97	2350	1022	17.65	14.70	267	3.11
3.1.2 POWER AT RATED ENGINE SPEED						
54.97	2350	1022	17.65	14.70	267	3.11
3.1.3 STANDARD POWER TAKE-OFF SPEED (1000 rev/min)						
54.19	2300	1000	17.29	14.40	266	3.13
3.1.4 PART LOADS 3.1.4.1 The torque corresponding to maximum power at rated engine speed						
54.97	2350	1022	17.65	14.70	267	3.11
3.1.4.2 85% of torque obtained in 3.1.4.1						
47.58	2393	1040	14.71	12.25	257	3.24
3.1.4.3 75% of torque defined in 3.1.4.2						
36.25	2430	1057	11.96	9.96	275	3.03
3.1.4.4 50% of torque defined in 3.1.4.2						
24.36	2452	1066	9.27	7.72	317	2.63
3.1.4.5 25% of torque defined in 3.1.4.2						
12.28	2470	1074	7.13	5.94	484	1.72
3.1.4.6 unloaded						
0	2503	1088	4.87	4.06	-	-

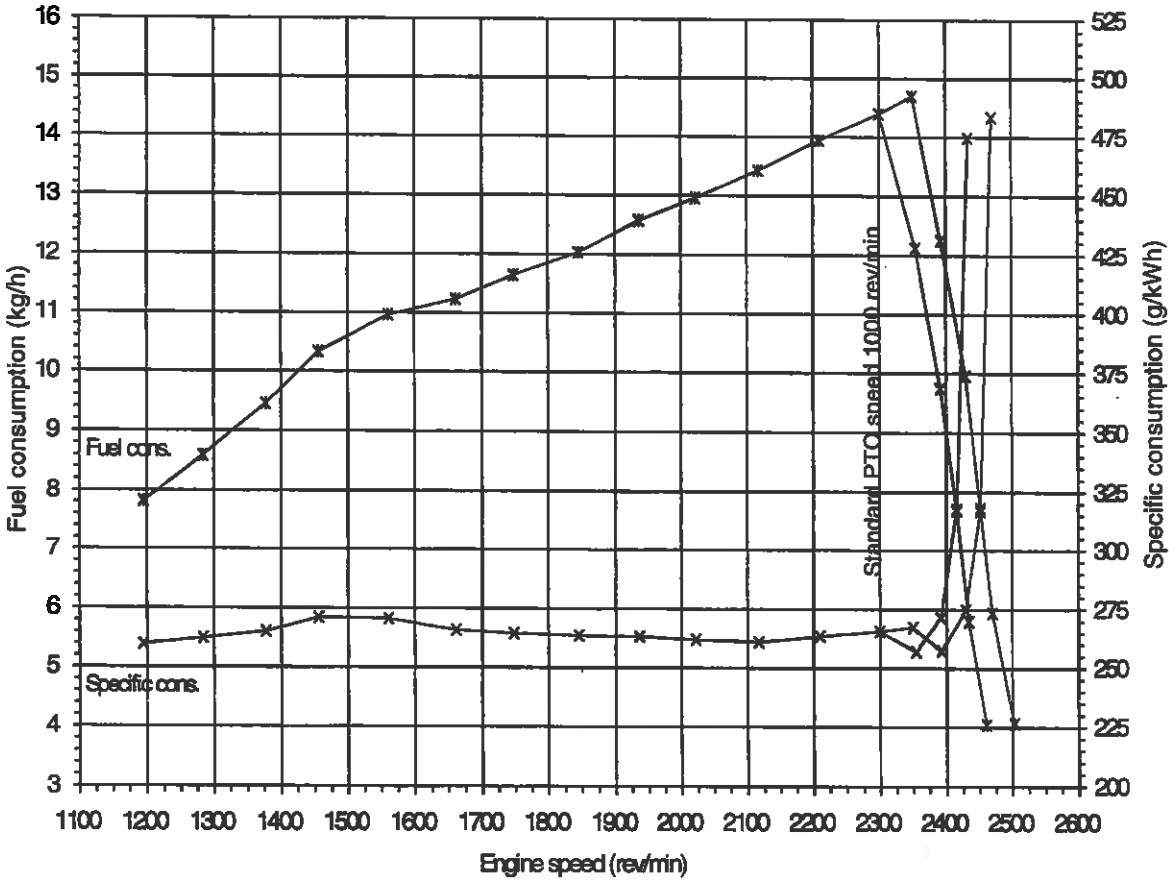
Power	Speed		Fuel consumption			Specific
	Engine	PTO	Hourly		Specific	energy
kW	rev/min	rev/min	l/h	kg/h	g/kWh	kWh/l
3.1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED (1000 rev/min)						
3.1.5.1 The torque corresponding to maximum power available						
54.19	2300	1000	17.29	14.40	266	3.13
3.1.5.2 85% of torque obtained in 3.1.5.1						
47.15	2355	1024	14.55	12.12	257	3.24
3.1.5.3 75% of torque defined in 3.1.5.2						
35.90	2392	1040	11.70	9.75	272	3.07
3.1.5.4 50% of torque defined in 3.1.5.2						
24.18	2416	1050	9.22	7.68	318	2.62
3.1.5.5 25% of torque defined in 3.1.5.2						
12.22	2434	1058	6.96	5.80	475	1.75
3.1.5.6 unloaded						
0	2461	1070	4.85	4.04	-	-

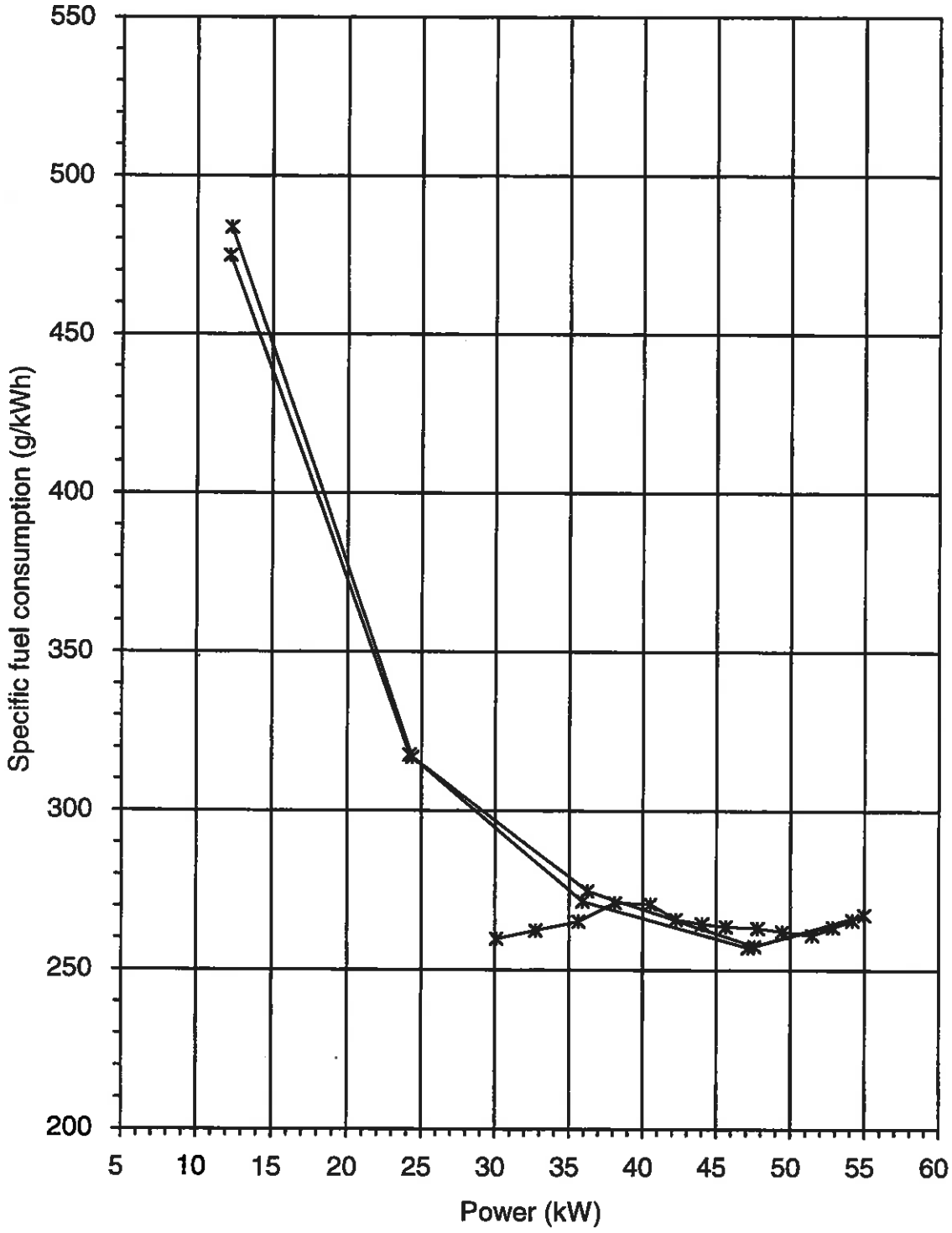
- No load maximum engine speed: 2503 rev/min;
- Equivalent flywheel torque at rated engine speed: 223.47 Nm;
- Equivalent flywheel torque at 2-hour test: 223.47 Nm;
- Maximum equivalent flywheel torque: 250.08 Nm at 1456 rev/min of the engine.

- Mean atmospheric conditions
  . Temperature: 20 °C
  . Pressure: 100 kPa
  . Relative humidity: 62 %

- Maximum temperatures
  . Coolant: 87 °C
  . Engine oil: 126 °C
  . Fuel: 28 °C
  . Engine air intake: 24 °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
5
10
15
20
25
30
35
40
45
50
55
60
Power (kW)

3.2 Hydraulic power and lifting force

- Date of tests: 2 November 1998.

3.2.1 *Hydraulic power test*

- Sustained pressure with relief valve open: 18.8 MPa;
- Pump delivery rate at minimum pressure: 34.6 l/min;

	Flow rate l/min	Pressure MPa	Power kW
At 90% of the actual relief valve setting	33.7	16.9	9.49
Maximum	33.7	17.3	9.72

- 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	190	190
Vertical movement			
without lifting forces	mm	642	872
with lifting forces	mm	617	816
Maximum corrected force exerted through full range	kN	18.67	10.86
Corresponding pressure of hydraulic fluid	MPa	16.9	16.9
Moment about rear axle	kNm	17.34	16.71
Maximum tilt angle of mast from vertical	degrees	-	18

Lifting heights relative to the horizontal lower links (mm)											
-177	-166	-100	0	+100	+200	+300	+400	+451	+500	+600	+639
Lifting forces at hitch points (kN), corrected to 16.9 MPa											
-	18.54	18.67	19.60	20.02	20.15	20.74	22.31	22.51	-	-	-
Lifting forces at test frame (kN), corrected to 16.9 MPa											
17.66	-	17.00	16.82	16.28	15.60	14.21	13.16	-	12.20	11.33	10.86

3.2.3 *Front power lift test*

		At hitch point	On the frame
Height of lower hitch point above ground in down position	mm	120	120
Vertical movement			
without lifting forces	mm	553	564
with lifting forces	mm	500	500
Maximum corrected force exerted through full range	kN	15.19	11.99
Corresponding pressure of hydraulic fluid	MPa	16.9	16.9
Moment about rear axle	kNm	16.75	20.56
Maximum tilt angle of mast from vertical	degrees	-	2

Lifting heights relative to the horizontal lower links											
mm	-270	-249	-200	-100	0	+100	+200	+230	+251	-	-
Lifting forces at hitch points, corrected to 16.9 MPa											
kN	15.33	-	15.19	15.34	15.69	16.11	16.34	16.33	-	-	-
Lifting forces at test frame, corrected to 16.9 MPa											
kN	-	16.55	16.17	15.03	14.36	13.60	12.46	-	11.99	-	-

3.3 Drawbar performance

- Date of tests: 9, 10, 11 and 12 November 1998;
- Type of track: concrete.

	Height of drawbar above ground mm	Tyre inflation pressure	
		Front kPa	Rear kPa
Unballasted	337	240	160
Ballasted	340	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)													
5SM	5.04	25.19	0.72	2475	15.1	1008	0.83	24	80	110	7	75	100.8
1NL	6.34	26.23	0.87	2477	15.0	855	0.97	23	80	110	7	75	100.9
5SH	5.95	24.93	0.86	2466	15.1	1042	0.80	24	80	107	7	74	100.9
1NM	7.06	24.43	1.04	2475	15.1	800	1.04	23	81	108	7	75	100.8
2NL	8.39	24.38	1.24	2470	14.9	698	1.19	23	81	109	7	74	100.9
1NH	8.87	25.36	1.26	2468	15.0	671	1.24	22	80	109	7	73	100.9
2NM	10.61	25.64	1.49	2466	14.9	587	1.42	23	81	110	8	73	100.9
3NL	12.39	25.21	1.77	2456	15.0	593	1.40	22	81	109	8	73	100.9
2NH	12.67	25.34	1.80	2454	15.0	592	1.41	23	82	110	8	72	100.8
3NM	14.46	24.44	2.13	2452	14.9	530	1.57	22	82	109	9	72	100.9
4NL	18.04	26.30	2.47	2445	14.9	462	1.80	22	81	110	9	72	100.9
3NH	18.18	25.57	2.56	2443	15.0	475	1.75	22	81	110	10	70	100.9
4NM	21.40	26.21	2.94	2436	15.2	437	1.90	22	82	110	10	70	100.8
4NH	25.05	25.27	3.57	2429	14.9	397	2.10	22	80	111	10	69	100.9
5NL	26.93	26.07	3.72	2426	14.9	377	2.21	23	82	111	10	69	100.9
5NM	30.31	24.63	4.43	2406	15.0	375	2.22	22	82	111	11	68	100.9
1FL	33.49	25.77	4.68	2410	15.0	337	2.47	21	82	112	12	68	100.9
5NH	36.90	24.98	5.32	2380	14.7	355	2.35	21	82	112	11	67	100.8
1FM	38.27	24.92	5.53	2385	15.0	329	2.53	21	83	114	12	68	100.9
2FL	45.19	24.88	6.54	2348	14.4	328	2.54	22	83	114	12	67	100.9
1FH	44.65	23.71	6.78	2353	13.3	325	2.56	22	84	115	13	65	100.9
2FM	46.61	20.12	8.34	2348	9.0	315	2.65	21	85	116	13	64	100.9
3FL	47.08	16.67	10.17	2346	7.1	311	2.68	22	84	116	12	64	100.9
2FH	46.70	16.23	10.36	2348	6.8	314	2.66	21	84	118	13	63	100.9
3FM	46.73	13.49	12.47	2353	5.4	310	2.68	21	84	119	14	63	100.9
4FL	47.32	11.63	14.65	2351	4.5	311	2.68	21	85	120	14	62	100.9
3FH	46.70	11.03	15.24	2346	4.0	314	2.65	21	84	122	14	62	100.9

Gear and range	Power	Drawbar pull	Speed	Engine speed	Slip of wheels	Specific fuel consumption	Specific energy	Temperatures			Atmospheric conditions		
								Fuel	Coolant	Engine oil	Temperature	Relative humidity	Pressure
	kW	kN	km/h	rev/min	%	g/kWh	kWh/l	°C	°C	°C	°C	%	kPa
3.3.2 MAXIMUM POWER IN TESTED GEARS (ballasted tractor)													
1SL	1.07	25.69	0.15	2493	12.9	4252	0.20	31	82	112	17	84	100.1
1SM	1.20	25.36	0.17	2491	15.0	3875	0.21	32	82	113	18	85	100.0
2SL	1.64	29.46	0.20	2491	14.2	2854	0.29	32	81	114	18	84	100.0
1SH	1.64	29.54	0.20	2486	14.9	3024	0.28	33	81	113	19	83	100.1
2SM	1.84	28.80	0.23	2489	14.8	2554	0.33	32	82	113	19	82	100.0
3SL	2.10	27.03	0.28	2486	14.8	2333	0.36	35	82	113	18	82	100.1
2SH	2.44	31.35	0.28	2484	14.6	2074	0.40	35	83	113	18	81	100.1
3SM	2.46	26.86	0.33	2486	14.8	2000	0.42	37	83	114	18	81	100.1
4SL	2.80	25.82	0.39	2482	15.3	1871	0.45	37	84	114	19	80	100.1
3SH	2.97	26.73	0.40	2477	14.7	1835	0.45	38	84	115	18	80	100.1
4SM	3.67	28.73	0.46	2479	15.0	1460	0.57	37	85	115	18	81	100.1
4SH	4.15	26.65	0.56	2470	15.1	1417	0.59	37	84	115	17	80	100.1
5SL	4.45	27.18	0.59	2475	14.7	1267	0.66	36	85	116	17	79	100.0
5SM	6.09	30.90	0.71	2468	15.2	985	0.85	35	85	116	17	78	100.1
1NL	7.07	29.59	0.86	2472	15.1	813	1.02	33	85	116	17	78	100.1
5SH	7.19	30.13	0.86	2459	14.4	974	0.86	33	84	117	16	79	100.1
1NM	7.76	27.13	1.03	2468	15.1	786	1.06	31	85	117	16	79	100.1
2NL	9.65	28.24	1.23	2463	15.1	690	1.21	30	85	117	16	80	100.1
1NH	9.88	28.23	1.26	2461	14.5	694	1.20	30	84	118	15	80	100.0
2NM	11.05	27.06	1.47	2456	15.1	665	1.25	29	85	117	15	80	100.0
3NL	14.40	29.47	1.76	2449	14.7	550	1.51	29	85	117	15	81	100.0
2NH	14.30	28.93	1.78	2447	15.1	573	1.45	30	85	119	16	81	100.0
3NM	17.27	29.47	2.11	2445	14.8	483	1.72	29	85	119	15	82	100.0
4NL	19.08	28.16	2.44	2438	15.1	478	1.74	28	84	120	15	82	100.0
3NH	19.42	27.53	2.54	2436	15.1	480	1.73	27	84	120	16	82	100.0
4NM	21.91	26.93	2.93	2433	14.8	441	1.89	27	85	121	15	83	100.1
4NH	28.02	28.59	3.53	2420	14.9	377	2.21	28	85	121	16	83	100.0
5NL	29.00	28.30	3.69	2420	15.0	363	2.29	27	85	121	15	83	100.0
5NM	33.77	27.70	4.39	2397	14.9	352	2.36	26	85	122	15	83	100.0
1FL	35.63	27.77	4.62	2397	14.7	335	2.49	25	86	123	14	83	100.1
5NH	37.67	25.60	5.30	2371	14.8	361	2.31	25	85	123	15	84	100.0
1FM	39.16	25.60	5.51	2376	14.8	342	2.43	25	85	123	15	84	100.0
2FL	44.80	23.83	6.77	2351	11.3	327	2.55	25	85	122	14	83	100.0
1FH	44.35	22.98	6.95	2351	10.5	331	2.52	24	85	123	14	84	100.0
2FM	46.54	19.81	8.46	2353	7.4	314	2.66	24	85	124	14	83	100.0
3FL	46.60	16.34	10.27	2348	5.7	316	2.64	23	85	124	14	83	100.0
2FH	47.60	16.43	10.43	2348	5.6	308	2.70	24	85	124	15	84	100.1
3FM	47.40	13.61	12.54	2348	3.9	311	2.68	24	85	124	14	84	100.1
4FL	47.60	11.64	14.73	2346	2.9	309	2.70	24	85	124	15	85	100.0
3FH	46.30	10.88	15.33	2344	2.8	314	2.66	24	85	124	15	85	100.0

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													
2FL	36.23	17.85	7.31	2413	6.8	310	2.69	23	86	117	12	73	101.0
3.3.3.2 FIVE HOUR TEST at pull corresponding to 15% wheel slip, without additional ballast													
1FM	39.01	25.50	5.51	2385	14.6	328	2.54	22	84	119	12	75	101.4

Oil consumption during ten hours duration of test 3.3.3.1 and 3.3.3.2: 67 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	4.17	4.13	4.40	4.36
Radius of turning circle	3.51	3.48	3.72	3.71

3.5 Location of centre of gravity

	mm
Height above ground	663
Distance forward from rear axle centre	947
Distance from tractor's median plane to the left	10

3.6 Braking

- Date of tests: 13 November 1998.

3.6.1 *Cold service braking device test*

	Speed before application of brakes km/h	Braking device control force kN	Mean deceleration m/s²
Ballasted tractor	35.6	1.0	3.59
		2.0	3.88
		3.0	4.03
		4.0	4.40
		5.0	4.65
		6.0	4.83
Unballasted tractor	35.6	1.0	4.00
		2.0	4.29
		3.0	4.58
		4.0	4.89
		5.0	5.13
		6.0	5.63

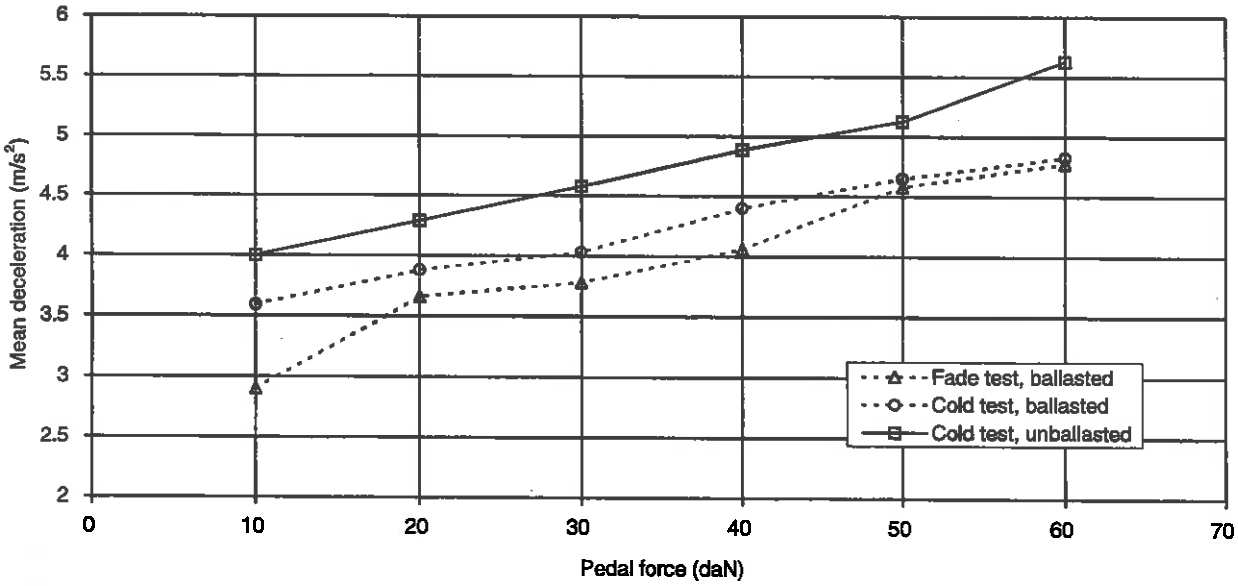
- Maximum deviation of tractor from its original course: none;
- Abnormal vibration: none;
- Brake heating method: heated by towing of the tractor for 1 km.

3.6.2 *Fade test*

	Speed before application of brakes km/h	Braking device control force kN	Mean deceleration m/s²
Ballasted tractor	35.6	1.0	2.90
		2.0	3.66
		3.0	3.78
		4.0	4.06
		5.0	4.58
		6.0	4.78

- 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	15.0	14.5

3.7 Measurement of external noise level

- Date of test: 13 November 1998;
- Type of track: concrete;
- Type of sound level meter: BRÜEL & KJÆR model 2231.

Gear	Travelling speed before acceleration km/h	Sound level dB(A)
5FH	26.8	85.4

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)