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 L10S603WVT

trade name:
LAMBORGHINI 664-60 SPRINT VDT

HÜRLIMANN H10S603WVT

trade name:
HÜRLIMANN XA 606 VDT

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.: 1/1784
Date of approval: 30 September 1998
Period of test: June - July 1998

ISMA Via Milano 43 24047 Treviglio BG Italy
Tel: (0363) 49603 Fax: (0363) 302007

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The Lamborghini 664-60 Sprint VDT (4WD) and Hürlimann XA 606 VDT (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 664-60 Sprint VDT (4WD).

All stated dimensions and tests refer to tyre size 360/70R20 at front and 420/70R30 at rear, as well as to track widths 1450 mm at front and 1500 mm at rear.

- Tractor manufacturer's name and address:	SAME DEUTZ-FAHR Group S.p.A. Viale 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:	L10S603WVT with 45 forward and 45 reverse speeds 40 km/h version;
- Trade name:	664-60 Sprint VDT;
- Type:	four-wheel drive, unit construction;
- Number of driving wheels:	4;
- Serial number:	1320;
- First serial number:	1001.

1.2 Engine

- Make:	SAME DEUTZ-FAHR Group;
- Model:	1000.3W1;
- Type:	water cooled 4-stroke diesel, direct injection naturally aspirated;
- Serial number:	2568.

1.2.1 *Cylinders*

- Number and disposition:	3 vertical in line;
- Bore x stroke:	105 x 115.5 mm;
- Capacity:	3000 cm^3;
- Compression ratio:	17:1;
- Arrangement of valves:	overhead;
- Cylinder liners:	wet liners.

1.2.3 *Fuel system*

- Fuel feed system:	AC corone fuel feed pump;
- Make, model and type of fuel filter:	FIAMM FNA 166/20;
- Capacity of fuel tank:	90 dm^3;
- Make, model and type of injection pump:	BOSCH PFR 1K 90A 542;
- Serial number:	without serial number;
- Manufacturer's production setting of injection pump:	
. Flow rate:	62 $\pm$2 mm^3/stroke at rated speed and full load corresponding 13.15 dm^3/h;
. Timing:	16° before TDC;
- Make, model and type of injectors:	BOSCH DLLA 150S 1323 multihole injecton nozzles;
- Injection pressure:	18 $\pm$ 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 2540 rev/min;
- Rated engine speed:	2350 rev/min.

1.2.5 *Air cleaner*

- Pre-cleaner	
. Make:	DONALDSON;
. Model:	P01-6330;
. Type:	cyclone;
. Location:	above the bonnet;
- Main filter	
. Make:	DONALDSON;
. Model:	FLG 08-0553 or FLG 08-0524;
. 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 impeller pump;
- Specification of fan:	propeller fan driven by engine shaft;
- Number of fan blades:	6;
- Fan diameter:	398 mm;
- Coolant capacity:	11 dm^3;
- Type of temperature control:	electrical control.
- Superpressure system;	60 kPa.

1.2.8 *Starting system*

- Make:	ISKRA;
- Model:	AZ 1349 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 5114
. Type:	alternator;
. Power:	85 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 3525;
- Type:	one reflection absorption chamber;
- Location:	on the left hand side of engine, horizontal position under side bonnet;
- Height of outlet above ground:	2310 mm.

1.3 Transmission

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

- Make: SAME DEUTZ-FAHR Group;
- Model: 649.23;
- Type: single disk dry clutch;
- Number of plates: 1;
- Plates diameter: 280 mm;
- Control system: hydraulic operated by pedal.

1.3.2 *Gear box*

- Make: SAME DEUTZ-FAHR Group;
- Model: 649.31;
- Type: mechanical synchromesh speed change gear; 5 speed with 3 ranges of speeds (S/N/F), one electrohydraulic reduction gear (low/medium/high), and one reverse group.
  . Number of gears: 45 forward and 45 reverse.
- Available options: 5 speed with 3 ranges of speeds (S/N/F), one electrohydraulic reduction gear (low/high), and one reverse group.
  . Number of gears: 30 forward and 15 reverse.

1.3.3 *Rear axle and final drives*

- Make: SAME DEUTZ FAHR Group;
- Model: 649.44;
- Type: bevel gear differential and epyciclic final drive.
- Differential lock
  . Make: SAME DEUTZ FAHR Group;
  . Model: 649.47;
  . Type: electrohydraulic;
  . Control system: engaged or disengaged by button.

1.3.4 *Front axle and final drives*

- Make: SAME DEUTZ FAHR Group;
- Model: 649.43;
- 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: 649.46;
  . 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	3046.50	2537.39	2093.62	0.19	0.23	0.28
2	Slow	2131.73	1776.32	1464.72	0.28	0.33	0.40
3	Slow	1487.73	1239.74	1022.68	0.40	0.48	0.58
4	Slow	1064.51	887.29	731.86	0.55	0.66	0.80
5	Slow	765.28	637.81	525.94	0.77	0.92	1.12
1	Normal	482.13	401.70	331.41	1.22	1.47	1.78
2	Normal	337.59	281.41	231.91	1.75	2.09	2.54
3	Normal	235.62	196.27	161.87	2.50	3.00	3.64
4	Normal	168.55	140.58	115.83	3.50	4.19	5.09
5	Normal	121.28	100.98	83.41	4.86	5.83	7.06
1	Fast	87.62	73.01	60.14	6.72	8.07	9.80
2	Fast	61.38	50.99	42.32	9.60	11.56	13.92
3	Fast	42.82	35.64	29.45	13.76	16.53	20.00
4	Fast	30.69	25.49	21.04	19.20	23.11	28.00
5	Fast	22.03	18.32	15.10	26.75	32.17	39.02
REVERSE							
1	Slow	3210.92	2674.33	2206.61	0.18	0.22	0.27
2	Slow	2246.78	1872.19	1543.76	0.26	0.31	0.38
3	Slow	1568.02	1306.64	1077.87	0.38	0.45	0.55
4	Slow	1121.96	935.18	771.36	053	0.63	0.76
5	Slow	806.58	672.23	554.33	0.73	0.88	1.06
1	Normal	508.15	423.37	349.29	1.16	1.39	1.69
2	Normal	355.81	296.60	244.43	1.66	1.99	2.41
3	Normal	248.34	206.86	170.60	2.37	2.85	3.45
4	Normal	177.65	148.17	122.08	3.32	3.98	4.83
5	Normal	127.82	106.43	87.91	4.61	5.54	6.70
1	Fast	92.34	76.95	63.39	6.38	7.66	9.29
2	Fast	64.69	53.74	44.61	9.11	10.96	13.21
3	Fast	45.13	37.56	31.04	13.05	15.68	18.98
4	Fast	32.35	26.87	22.17	18.21	21.93	26.57
5	Fast	23.22	19.30	15.91	25.38	30.52	37.02

(*) *Calculated with a tyre dynamic radius index of 665 mm. (ISO 4251/1-1992)*

- Number of revolutions of front wheels for one revolution of rear wheels: 1.383.

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: 700 mm;
- Distance from the median plane of the tractor: 0 mm;
- Distance behind rear axle: 400 mm;
- Direction of rotation (viewed facing driving end): clockwise.

PTO type	PTO speed rev/min	Engine speed rev/min	Engine/PTO transmission ratio	Power restriction kW
540	540 611	2077 2350	3.8462	none
750	750 752	2344 2350	3.1250	none
1000 (*)	1000 1021	2300 2350	2.3000	none

(*) *not fitted on tested tractor*

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: 605 mm;
- Distance from the median plane of the tractor: 0 mm;
- Distance forward front axle: 645 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 kW
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:	649.39;
- 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:	4 ways distributor 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:	ORIGINAL SAME SYSTEM 649-59 FRONT;
- 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, repeceable 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.

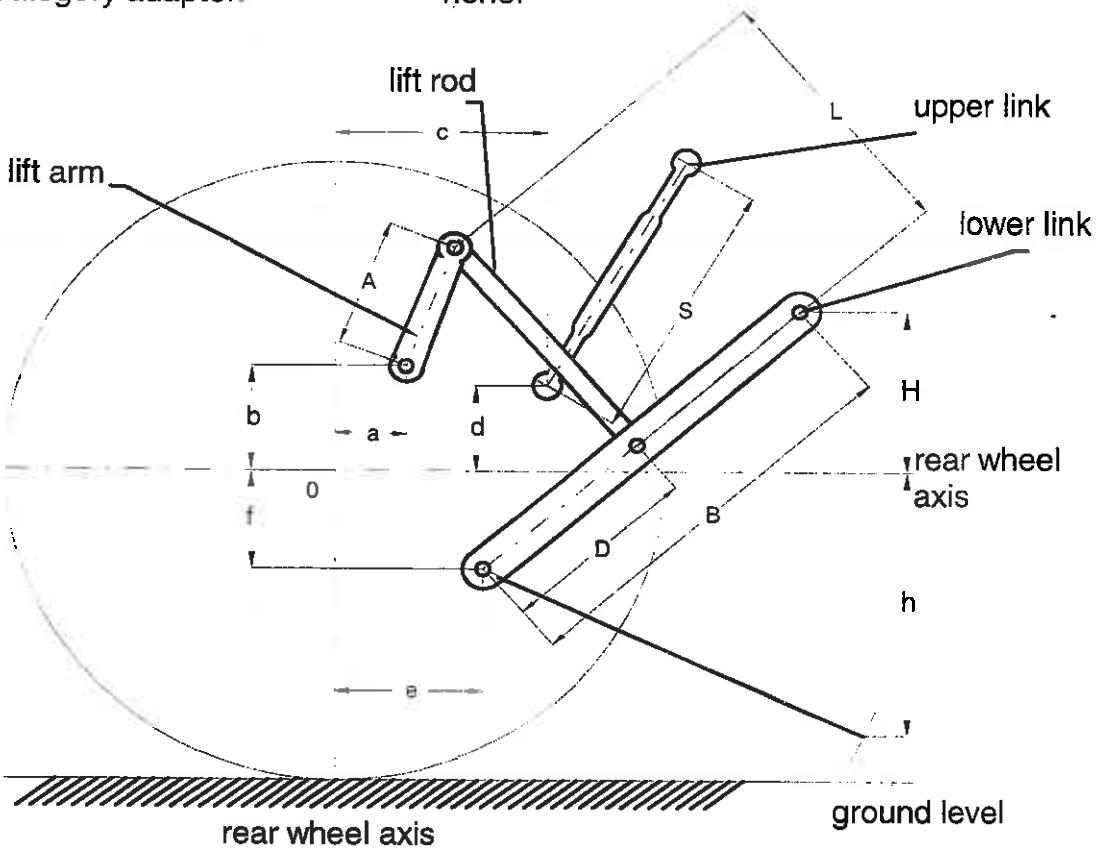
1.6 Three-point linkage

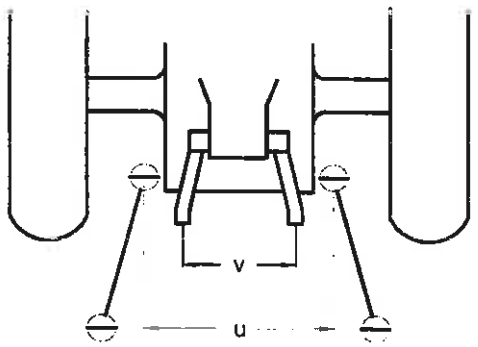
1.6.1 *Rear three point linkage*

- Category (ISO 730/1-1994): 2, lower links with WALTERSCHEID quick couplers;
- Category adapter: none.

1.6.2 *Front three point linkage*

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



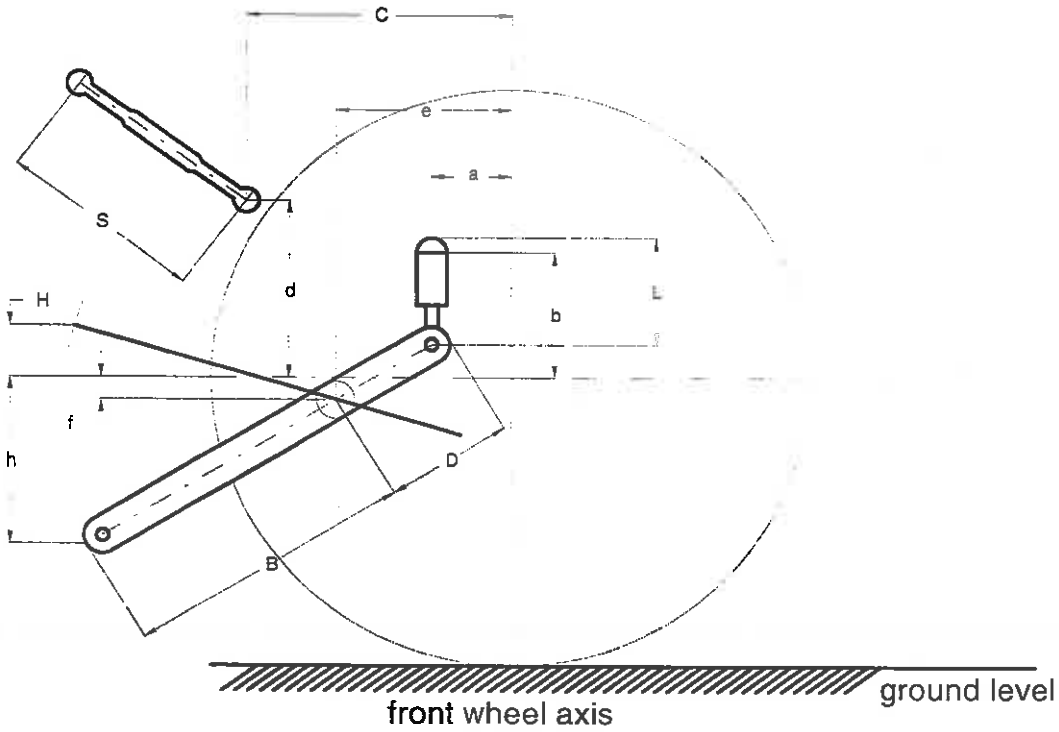


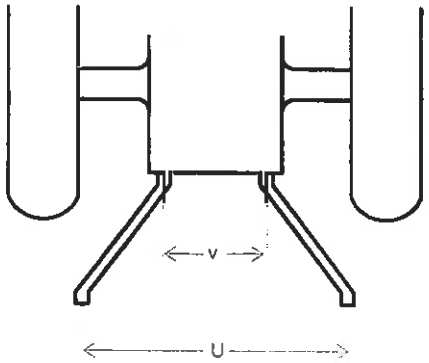
REAR LINKAGE GEOMETRY

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)	250	250
Length of lower links		(B)	860	860
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)	360	360
Horizontal distance between the 2 lift arm end points		(v)	450	450
Length of upper link		(S)	from 530 to 760	646
Distance of upper link pivot point from rear wheel axis				
- horizontally		(c)	397	397
- vertically		(d)	260-295-335	335
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)	400	400
Length of lift rods		(L)	from 535 to 689	590
Height of lower hitch points relative to the rear wheel axis:				
Length of lift rods	(L)	535	689	590
Linkage distance of lift rods	(D)	400	400	400
Lowest position	(h)	333	585	464
Highest position	(H)	357	57	256
Height above ground of lower hitch points when locked in transport position (*)				920

(*) *Assuming the dynamic radius index = 665 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)	647	647
Distance of cilinders pivot point from front wheel axis (forward)			
- horizontally	(a)	245	245
- vertically	(b)	474	474
Horizontal distance between the 2 lower link points	(u)	855	855
Horizontal distance between the 2 lift arm end points	(v)	340	340
Length of upper link	(S)	from 450 to 680	451
Distance of upper link pivot point from front wheel axis			
- horizontally	(c)	592-617-634	634
- vertically	(d)	319-373-431	431
Distance of upper link pivot point from front wheel axis			
- horizontally	(e)	435	435
- vertically	(f)	25	25
Distance of lower link pivot points to cylinders pivot points on lower links	(D)	215	215
Length of cylinders			
- in low position	(L)	303	303
- in high position	(L)	503	503
Height of lower hitch points relative to the front wheel axis			
- in low position	(h)	317	317
- in high position	(H)	260	260
Height above ground of lower hitch points (*)			750

(*) Assuming the dynamic radius index = 490 mm (ISO 4251/1-1992)

1.7 **Swinging drawbar** (optional, not fitted on tested tractor)

1.8 Trailer hitch

- Type:	DGM-GA 1189;
- Hole diameter:	28 mm;
- Height above ground	
. Min.:	515 mm;
. Max.:	865 mm;
- Distance of hitch point from rear wheel axis	
. Horizontally:	555 mm;
- Distance of hitch point from power take-off shaft end	
. Vertically:	225 mm below, 190 mm above;
. Horizontally:	110 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.:	80 mm;
. Max.:	985 mm;
- Horizontal distance behind power take-off shaft end:	555 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 OR;
- Type:	hydrostatic;
- Working pressure:	15 Mpa;

1.11 Brakes

1.11.1 *Service brake*

- Make: SAME DEUTZ-FAHR Group;
- Model: 649.54;
- 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: hydraulic brake system.

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	1440	1740	changing the position of the rims with respect to the disc
Rear	1400	1800	

1.13 Protective strutture

1.13.1 *Specifications*

- Make: S+L+H;
- Model: C 36;
- Type: cab, not tiltable;
- Manufacturer's name and address: SAME DEUTZ-FAHR GROUP S.p.A., Viale F. Cassani 15, 24047 Treviglio BG, Italy.

Tractor	Seat	OECD approval number
LAMBORGHINI L10S603WVT (4WD)	GRAMMER DS 83 H/7 L	CSS 0299/27
	KAB P2/XH 2	CSS 0299/28
HÜRLIMANN H10S603WVT (4WD)	GRAMMER DS 83 H/7 L	CSS 0299/11
	KAB P2/XH 2	CSS 0299/12

- Date of approval: 28 October 1994;
- Modification certificate
  . Certificate for minor modification numbered: CSS 0299/1 to 48/mod 1/I.M.A. (I - MILANO) dated 8 April 1997 established by and under the responsability of the National Authority: I.I.A. ISTITUTO di INGEGNERIA AGRARIA Via Celoria, 2 - MILANO - ITALY.

1.13.2 *Details of materials used for sound proofing the protective structure*

- Interior padding
  . Roof: vinyl +polyurethan, thickness 10 mm;
  . Roof front part: ABS, thickness 4 mm;
  . Floor: PVC, thickness 3 mm + polyurethan foam, 400/500 kg/m^3, thickness 25 mm+ polythene film;
  . Seat support: PVC, thickness 3 mm + polyurethan foam, 400/500 kg/m^3, thickness 25 mm+ polythene film;
  . Rear panel: PVC, thickness 3 mm + polyurethan foam, 400/500 kg/m^3, thickness 25 mm+ polythene film;
  . Console panel: ABS, thickness 4 mm;
  . Mudguards: polystyrene, thickness 3 mm.
- Padding of gear levers box: polyurethan 1470 kg/m^3
- Glass
  . Type: security glass, thickness 5 and 6 mm;
  . Model: 43 R - 002493(doors),43 R - 29091 (windscreen), 43 R - 005171 (windows);
- Windscreen wipers: OSLV, parallelogram type;
- Direction indicators: COBO E3;
- Heaters and ventilators: BORLETTI;
- Draught proofing: SAIAG 8546.

1.14 Seat

1.14.1 *Driver's seat*

- Make:	GRAMMER;
- Model:	DS 83 H/7L;
- 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:	P2/XH 2 (*) or U6/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.

(*) *fitted on tested tractor*

1.14.3 *Passenger's seat*

- Location:	at the left side of the driver seat;
- Number of places:	1.

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	1080	160 x 100	185
Front parking lights	1430	110 x 40	645
Front direction indicator	1465	110 x 40	645
Rear parking lights	1470	50 x 60	705
Rear direction indicator	1470	50 x 60	755
Brake lights	1470	50 x 60	655
Reflectors	1115	⌀ 80	702

2. TEST CONDITIONS

2.1 Overall dimensions

	Length		Width		Height at top of protective structure
	with front power lift mm	without front power lift mm	minimum mm	maximum mm	mm
Unballasted	4241	3726	1785	2215	2600
Ballasted	4311	4056	1785	2215	2600

2.2 Ground clearance:

390 mm below front axle (unballasted tractor).

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

	Unballasted		Ballasted	
	Without driver kg	With driver kg	Without driver kg	With driver kg
Front	1445	1465	1770	1790
Rear	1545	1600	1625	1680
Total	2990	3065	3395	3470

2.4 Ballast

	Weights		Water
	Number	Total mass kg	kg
Front	1	235	-
Rear wheels	4	170	-

2.5 Tyres and track width specifications

	Front	Rear
Tyres		
make	TAURUS	PIRELLI
model	POINT 7	TM 700
dimensions	360/70R20	420/70R30
ply rating	-	-
load index/speed index	120 A8	134 A8
type	radial	radial
maximum load (tyre manufacturer's)	1372 daN	2077 daN
inflation pressure (tyre manufact.'s)	160 kPa	160 kPa
dinamic radius index	490 mm	665 mm
Chosen track width	1450 mm	1500 mm
Technically permissible axle load	2254 daN	3136 daN
Other tyres available	320/70R20	420/70R28
	12.4R20	14.9R30
	11.2R20	14.9R28
	11.2R24	12.4R36

2.6 Fuel

- Type: AGIP DIESEL, DIN 51601;
  (in accordance with the national standard)
- Density at 15 °C: 0.838 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	6.7	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 June 1998, ISMA, Treviglio BG, Italy;
- Type of dynamometer: eddy-current, ZÖLLNER 350 AC.

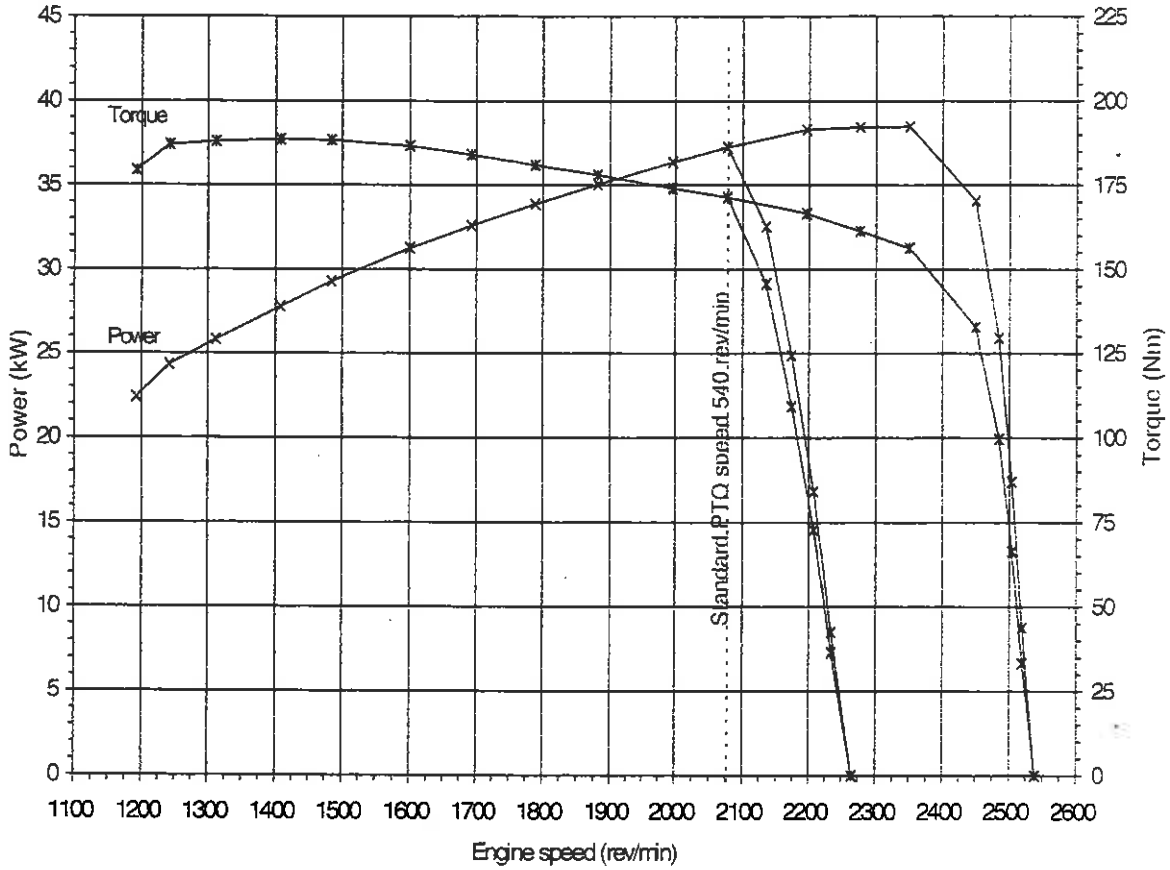
Power	Speed		Fuel consumption			Specific energy
	Engine	PTO	Hourly		Specific	
kW	rev/min	rev/min	l/h	kg/h	g/kWh	kWh/l
3.1.1 MAXIMUM POWER - TWO-HOUR TEST						
38.47	2350	611	13.15	11.02	286	2.93
3.1.2 POWER AT RATED ENGINE SPEED						
38.47	2350	611	13.15	11.02	286	2.93
3.1.3 STANDARD POWER TAKE-OFF SPEED (540 rev/min)						
37.26	2077	540	12.79	10.72	288	2.91
3.1.4 PART LOADS 3.1.4.1 The torque corresponding to maximum power at rated engine speed						
38.47	2350	611	13.15	11.02	286	2.93
3.1.4.2 85% of torque obtained in 1.4.1						
34.07	2450	637	11.17	9.36	275	3.05
3.1.4.3 75% of torque defined in 1.4.2						
25.92	2485	646	9.15	7.67	296	2.83
3.1.4.4 50% of torque defined in 1.4.2						
17.41	2504	651	7.41	6.21	357	2.35
3.1.4.5 25% of torque defined in 1.4.2						
8.76	2519	655	5.51	4.62	527	1.59
3.1.4.6 unloaded						
0	2538	660	4.15	3.48	-	-

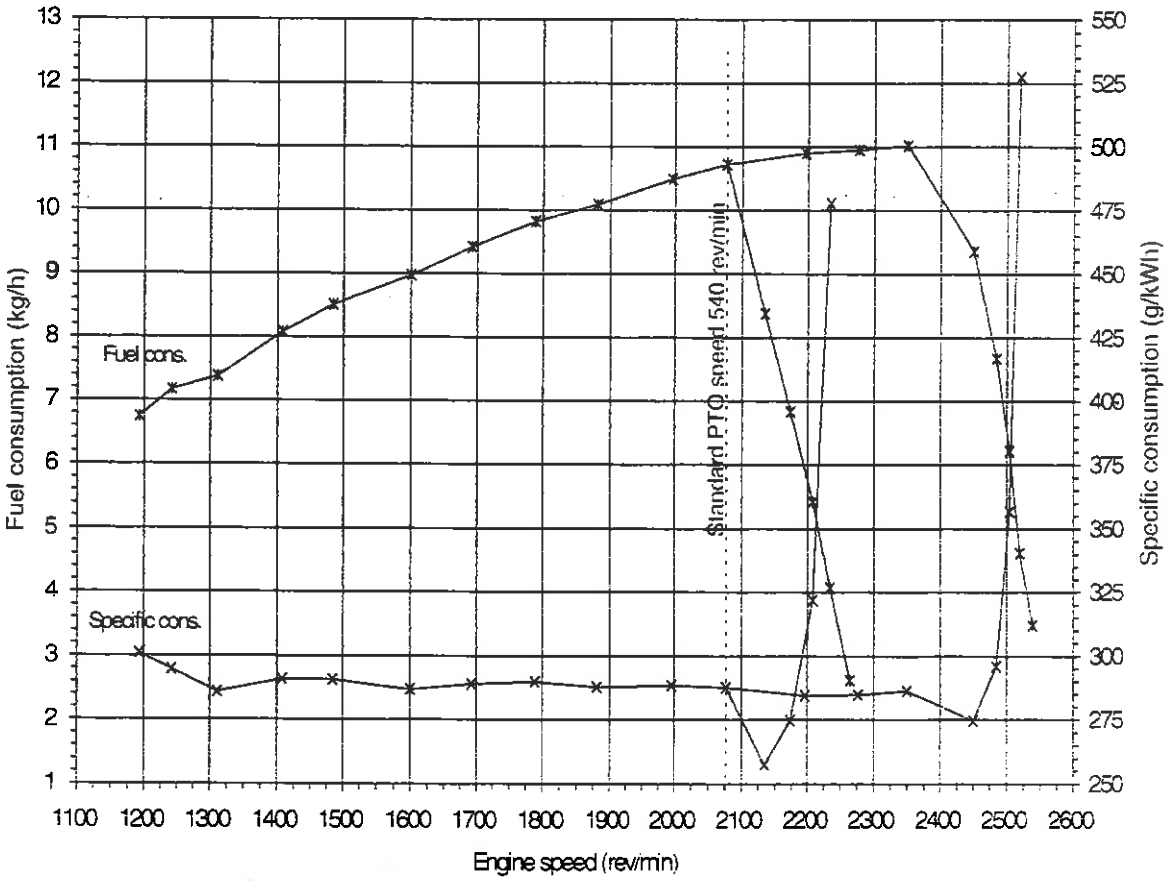
Power	Speed		Fuel consumption			Specific
	Engine	PTO	Hourly		Specific	energy
kW	rev/min	rev/min	l/h	kg/h	g/kWh	kWh/l
3.1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED (540 rev/min)						
3.1.5.1 The torque corresponding to maximum power available						
37.26	2077	540	12.79	10.72	288	2.91
3.1.5.2 85% of torque obtained in 1.5.1						
32.55	2135	555	10.00	8.38	257	3.25
3.1.5.3 75% of torque defined in 1.5.2						
24.86	2173	565	8.15	6.83	275	3.05
3.1.5.4 50% of torque defined in 1.5.2						
16.83	2208	574	6.47	5.42	322	2.60
3.1.5.5 25% of torque defined in 1.5.2						
8.52	2235	581	4.86	4.07	478	1.75
3.1.5.6 unloaded						
0	2265	589	3.13	2.62	-	-

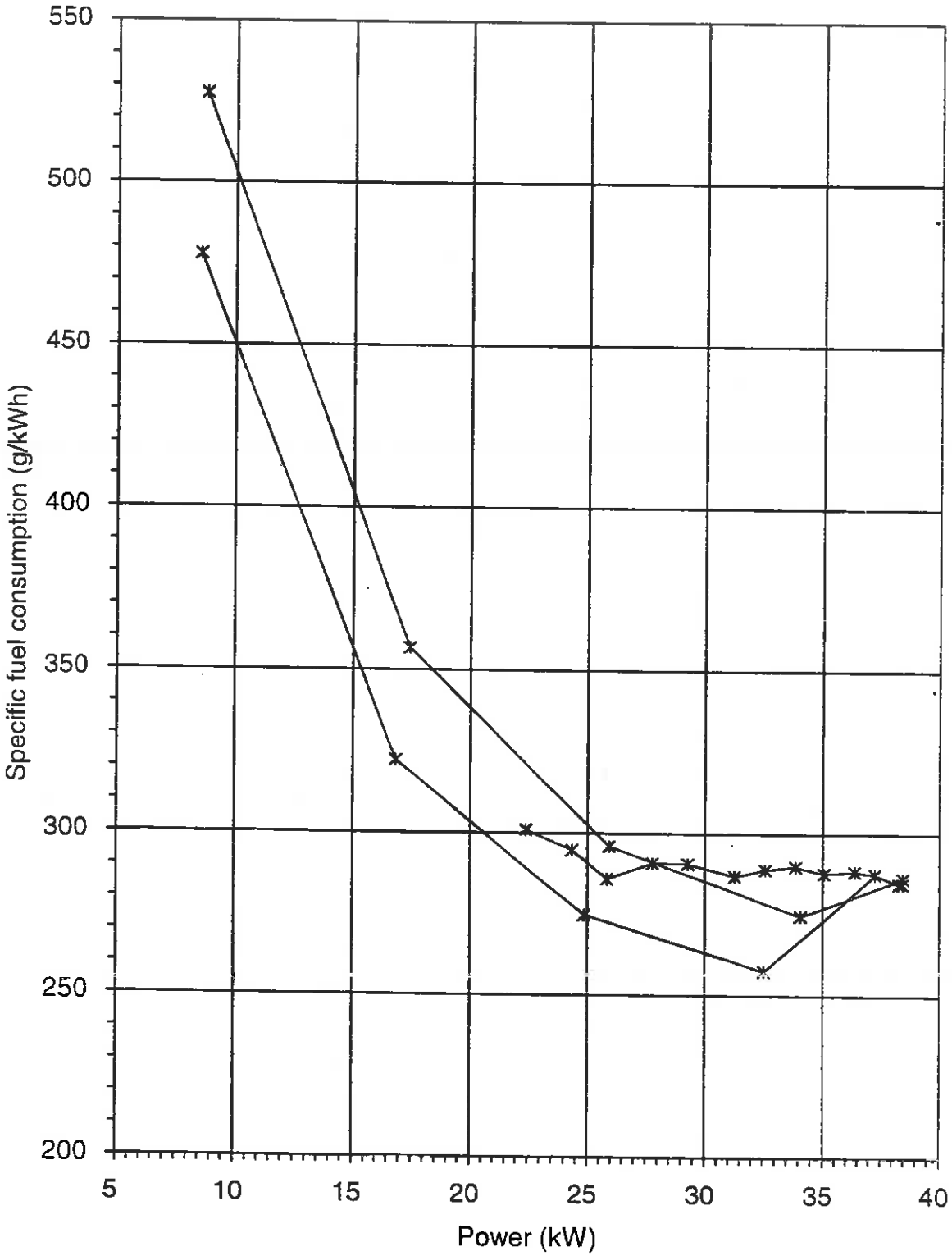
- No load maximum engine speed: 2538 rev/min;
- Equivalent flywheel torque at rated engine speed: 156.41 Nm;
- Equivalent flywheel torque at 2-hour test: 156.41 Nm;
- Maximum equivalent flywheel torque: 188.56 Nm at 1408 rev/min of the engine.

- Mean atmospheric conditions
  . Temperature: 28 °C
  . Pressure: 988 kPa
  . Relative humidity: 65 %

- Maximum temperatures
  . Coolant: 95 °C
  . Engine oil: 135 °C
  . Fuel: 37 °C
  . Engine air intake: 28 °C


Torque
Power
Power (kW)
Torque (Nm)
Standard PTO speed 540 rev/min
Engine speed (rev/min)


Fuel cons.
Specific cons.
Fuel consumption (kg/h)
Specific consumption (g/kWh)
Standard PTO speed 540 rev/min
Engine speed (rev/min)


550
500
450
400
350
300
250
200
Specific fuel consumption (g/kWh)
5
10
15
20
25
30
35
40
Power (kW)

3.2 Hydraulic power and lifting force

- Date of tests: 17 July 1998.

3.2.1 *Hydraulic power test*

- Sustained pressure with relief valve open: 18.0 MPa;
- Pump delivery rate at minimum pressure: 46.2 l/min;

	Flow rate l/min	Pressure MPa	Power kW
At 90% of the actual relief valve setting	19.5	16.2	5.27
Maximum	42.0	14.2	9.94

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

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	720	785
with lifting forces	mm	708	761
Maximum corrected force exerted through full range	kN	12.98	14.57
Corresponding pressure of hydraulic fluid	MPa	16.2	16.2
Moment about rear axle	kNm		
Maximum tilt angle of mast from vertical	degrees	-	6

Lifting heights relative to the horizontal lower links											
mm	-311	-300	-200	-100	0	+100	+200	+300	+397	+400	+461
Lifting forces at hitch points, corrected to 16.2 MPa											
kN	12.98	13.24	14.02	15.36	16.25	16.97	16.78	17.66	19.16	-	-
Lifting forces at test frame, corrected to 16.2 MPa											
kN	-	14.57	15.40	15.57	15.63	15.27	14.77	14.63	-	14.97	15.03

3.2.3 *Front power lift test*

		At hitch point	On the frame
Height of lower hitch point above ground in down position	mm	173	173
Vertical movement			
without lifting forces	mm	577	683
with lifting forces	mm	569	665
Maximum corrected force exerted through full range	kN	8.39	11.69
Corresponding pressure of hydraulic fluid	MPa	16.2	16.2
Moment about rear axle	kNm		
Maximum tilt angle of mast from vertical	degrees	-	9

Lifting heights relative to the horizontal lower links											
mm	-303	-300	-292	-200	-100	0	+100	+200	+277	+300	+362
Lifting forces at hitch points, corrected to 16.2 MPa											
kN	-	-	11.69	11.88	12.25	12.55	12.75	12.87	12.94	-	-
Lifting forces at test frame, corrected to 16.2 MPa											
kN	12.73	12.73	-	12.01	11.42	10.87	10.20	9.41	-	8.86	8.39

3.3 Drawbar performance

- Date of tests: 6 to 10 July 1998;
- Type of track: concrete.

	Height of drawbar above ground mm	Tyre inflation pressure	
		Front kPa	Rear kPa
Unballasted	513	160	160
Ballasted	513	160	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	3.87	26.28	0.53	2478	15.1	2062	0.41	28	79	125	23	63	100.2
4SM	4.31	25.46	0.61	2477	14.9	1856	0.45	28	79	125	23	63	100.2
5SL	4.94	25.06	0.71	2476	15.0	1644	0.51	28	79	125	23	63	100.2
4SH	5.05	24.58	0.74	2473	14.9	1650	0.51	28	79	125	23	63	100.2
5SM	6.06	25.69	0.85	2471	15.2	1386	0.60	27	80	127	23	63	100.3
5SH	6.95	24.31	1.03	2469	15.0	1213	0.69	27	80	127	24	63	100.3
1NL	8.01	25.75	1.12	2472	15.0	1042	0.80	28	80	127	24	62	100.3
1NM	9.13	24.53	1.34	2468	15.0	926	0.91	28	80	128	24	62	100.4
2NL	10.51	23.80	1.59	2465	14.4	826	1.01	27	81	128	24	62	100.3
1NH	11.20	25.20	1.60	2464	14.9	777	1.08	26	81	130	24	62	100.4
2NM	13.58	25.60	1.91	2462	15.0	647	1.29	26	81	130	24	62	100.4
3NL	16.11	25.78	2.25	2461	15.0	547	1.53	27	80	130	25	62	100.3
2NH	15.72	24.51	2.31	2457	15.0	573	1.46	27	81	130	25	62	100.3
3NM	18.45	24.33	2.73	2454	14.9	500	1.68	27	81	131	25	62	100.3
4NL	20.89	23.88	3.15	2438	15.0	461	1.82	27	82	131	26	62	100.3
3NH	20.25	22.23	3.28	2434	15.1	477	1.76	26	82	130	26	61	100.3
4NM	24.20	23.11	3.77	2430	14.3	402	2.09	26	82	131	26	61	100.3
5NL	28.00	23.34	4.32	2405	14.2	363	2.31	26	82	131	26	61	100.3
4NH	26.60	21.19	4.52	2404	14.9	383	2.19	26	82	132	26	61	100.4
5NM	31.06	20.91	5.35	2350	8.5	356	2.36	27	82	132	26	60	100.3
1FL	34.44	19.91	6.23	2347	7.5	322	2.60	27	82	132	26	60	100.3
5NH	29.98	16.11	6.70	2349	5.5	371	2.26	27	83	132	26	60	100.3
1FM	34.79	16.38	7.65	2348	5.3	320	2.62	28	83	133	26	60	100.3

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
3.3.1 MAXIMUM POWER IN TESTED GEARS (unballasted tractor) continued													
2FL	34.04	13.24	9.26	2351	3.9	325	2.57	27	83	133	26	60	100.4
1FH	33.17	12.64	9.45	2349	3.8	335	2.50	27	82	134	26	60	100.4
2FM	34.53	11.08	11.22	2348	2.8	323	2.59	27	83	133	26	61	100.4
3FL	32.57	8.69	13.50	2350	2.1	339	2.47	28	83	133	25	61	100.3
2FH	33.58	8.87	13.64	2345	2.0	331	2.54	27	83	133	26	60	100.3
3FM	34.29	7.57	16.31	2350	1.6	322	2.60	27	82	133	26	60	100.3

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	1.46	29.15	0.18	2491	14.7	5000	0.17	28	82	127	24	65	100.8
1SM	1.66	28.44	0.21	2491	14.8	4410	0.19	28	82	127	24	65	100.8
2SL	1.86	27.95	0.24	2487	14.7	4032	0.21	28	82	127	24	65	100.8
1SH	2.27	31.38	0.26	2487	15.0	3313	0.25	28	82	127	24	65	100.8
2SM	2.51	29.20	0.31	2487	15.0	3008	0.28	28	82	128	24	65	100.9
3SL	2.85	28.54	0.36	2487	14.9	2642	0.32	27	82	128	24	65	100.9
2SH	2.99	29.13	0.37	2483	15.0	2609	0.32	27	83	128	24	56	100.8
3SM	3.47	28.41	0.44	2483	15.2	2256	0.37	27	83	127	24	65	100.8
4SL	3.92	27.67	0.51	2480	15.0	2015	0.42	28	83	128	24	65	100.9
3SH	4.27	28.99	0.53	2476	15.1	1897	0.44	28	83	128	24	65	100.8
4SM	5.26	31.06	0.61	2476	15.0	1546	0.54	28	82	129	24	65	100.8
5SL	5.71	28.95	0.71	2472	15.0	1454	0.58	28	82	129	25	65	100.8
4SH	5.83	29.16	0.72	2472	15.1	1420	0.59	29	82	130	25	65	100.8
5SM	7.01	29.68	0.85	2468	14.8	1205	0.70	29	83	129	25	64	100.8
5SH	8.29	28.98	1.03	2464	14.9	1051	0.80	29	82	129	25	64	100.7
1NL	9.10	29.27	1.12	2472	15.0	914	0.92	29	82	130	25	64	100.7
1NM	10.82	29.08	1.34	2468	15.1	783	1.07	28	83	130	24	64	100.7
2NL	12.47	28.24	1.59	2464	14.7	699	1.20	28	83	130	25	64	100.7
1NH	12.29	27.66	1.60	2464	14.9	710	1.18	29	83	130	25	65	100.7

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
3.3.2 MAXIMUM POWER IN TESTED GEARS (ballasted tractor) continued													
2NM	14.91	28.11	1.91	2461	15.0	591	1.42	29	83	131	25	65	100.1
3NL	18.03	28.85	2.25	2449	14.8	520	1.61	28	83	131	25	64	100.1
2NH	18.83	29.48	2.30	2446	14.9	500	1.68	28	83	131	25	64	100.1
3NM	21.87	29.07	2.71	2438	15.0	440	1.91	28	83	132	26	64	100.1
4NL	25.42	29.06	3.15	2423	15.0	386	2.17	28	83	132	26	64	100.1
3NH	25.39	28.30	3.23	2419	15.0	391	2.14	29	84	132	26	64	100.1
4NM	27.27	26.25	3.74	2408	14.8	372	2.25	29	84	132	26	63	100.1
5NL	30.80	25.50	4.35	2350	9.9	360	2.33	29	84	133	27	63	100.1
4NH	31.57	24.24	4.69	2351	8.4	348	2.41	28	83	133	27	63	100.1
5NM	33.33	21.82	5.50	2350	6.1	332	2.53	29	83	133	26	63	100.1
1FL	32.98	18.58	6.39	2352	5.4	334	2.51	28	84	133	27	63	100.0
5NH	32.06	17.00	6.79	2350	3.7	344	2.44	28	83	134	27	62	100.0
1FM	35.26	16.41	7.74	2347	3.7	315	2.66	28	83	133	27	62	100.0
2FL	35.05	13.45	9.38	2350	2.6	316	2.66	28	84	133	27	62	100.0
1FH	33.77	12.68	9.59	2349	2.4	329	2.54	29	83	134	27	62	100.0
2FM	34.19	10.87	11.33	2349	1.6	325	2.58	29	84	134	27	61	100.0
3FL	34.21	9.07	13.58	2348	1.1	325	2.58	29	84	134	27	62	100.0
2FH	34.29	8.97	13.76	2351	1.0	322	2.60	29	83	134	27	61	100.0
3FM	33.37	7.34	16.38	2349	0.7	333	2.52	28	84	134	27	61	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													
5NH	25.37	12.85	7.11	2411	2.3	397	2.11	29	83	133	26	62	100.0
3.3.3.2 FIVE HOUR TEST at pull corresponding to 15% wheel slip, additional ballast: 85 kg													
4NM	28.84	26.29	3.95	2442	(*)	(*)	(*)	29	84	135	25	63	100.0

(*) Having the test been carried out with additional ballast, these figures are irrelevant

Oil consumption during ten hours duration of test 3.3.3.1 and 3.3.3.2: 54 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	3.45	3.43	5.30	5.37
Radius of turning circle	3.12	3.10	5.00	5.05

3.5 Location of centre of gravity

	mm
Height above ground	797
Distance forward from rear axle centre	983
Distance from tractor's median plane to the left	7

3.6 Braking

- Date of tests: 28 July 1998;

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	42.0	1.0	3.52
		1.5	3.82
		2.0	4.02
		2.5	4.10
		3.0	4.20
		3.5	4.42
		4.0	4.45
		4.5	4.52
		5.0	4.66
		5.5	4.75

3.6.1 *Cold service braking device test* (continued)

	Speed before application of brakes km/h	Braking device control force kN	Mean deceleration m/s^2
Unballasted tractor	42.0	1.0	4.00
		1.5	4.15
		2.0	4.55
		2.5	4.68
		3.0	4.88
		3.5	4.87
		4.0	5.14
		4.5	4.92
		5.0	5.10
		5.5	5.00

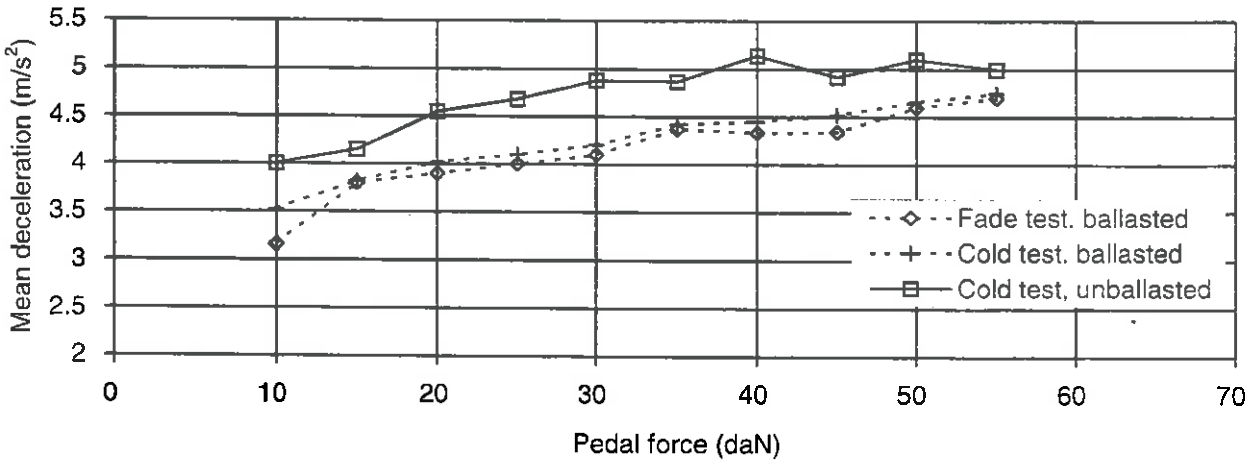
- Maximum deviation of tractor from its original course: none;
- Abnormal vibration: none;
- Brake heating method: heated by towing of the tractor for 1 km.

3.6.2 *Fade test*

	Speed before application of brakes km/h	Braking device control force kN	Mean deceleration m/s^2
Ballasted tractor	42.0	1.0	3.16
		1.5	3.80
		2.0	3.90
		2.5	4.00
		3.0	4.10
		3.5	4.37
		4.0	4.33
		4.5	4.34
		5.0	4.60
		5.5	4.70

- 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	12.5	12.5

3.7 Measurement of external noise level

- Date of test: 29 July 1998;
- 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	31.8	82.9

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)