I. S. M. A.

ISTITUTO SPERIMENTALE PER
LA MECCANIZZAZIONE AGRICOLA
Sezione di Treviglio

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



SAME LASER 150
LAMBORGHINI 1506
DEUTZ-FAHR AGROTRAC 150

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

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

ISTITUTO SPERIMENTALE PER
LA MECCANIZZAZIONE AGRICOLA
Sezione di Treviglio

Table of contents

1. SPECIFICATIONS OF TRACTOR 1

2. TEST CONDITIONS 13

3. TEST RESULTS

3.1 Main power take-off performance 16

3.2 Hydraulic power and lifting force 20

3.3 Drawbar performance 22

3.4 Turning area and turning circle 25

3.5 Location of centre of gravity 25

3.6 Braking performance 25

3.7 Measurement of external noise level 27

4. OPTIONAL TEST RESULTS 28

5. REPAIRS 28

6. REMARKS 28

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

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

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

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

1. SPECIFICATIONS OF TRACTOR

1.1 Identification

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

1.1.2 Numbers

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

1.1.3 Other specification

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

1.2 Engine

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

1.2.1 Cylinders

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

1.2.2 Supercharging

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

1.2.3 Fuel system

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

1.2.4 Governor

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

1.2.5 Air cleaner

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

1.2.6 Lubrication system

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

1.2.7 Cooling system

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

1.2.8 Starting system

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

1.2.9 Electrical system

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

1.2.10 Exhaust system

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

1.3 Transmission

1.3.1 Clutch (utilized only for travelling of tractor)

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

1.3.2 Gear box

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

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

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

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

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

1.3.3 Rear axle and final drives

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

- Differential lock

D . Type: wet multiplate;

C . Method of engagement: pedal operated;

C . Method of disengagement: pedal operated.

1.3.4 Front axle and final drives

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

- Differential lock

D . Type: wet multiplate;

C . Method of engagement: pedal operated;

C . Method of disengagement: pedal operated.

1.3.5 Total ratios and travelling speeds

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

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

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

1.4 Power take-off

1.4.1 Main power take-off

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

1.4.1.1 Power take-off proportional to engine speed

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

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

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

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

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

1.4.2 Optional power take-off: none.

1.5 Hydraulic power lift

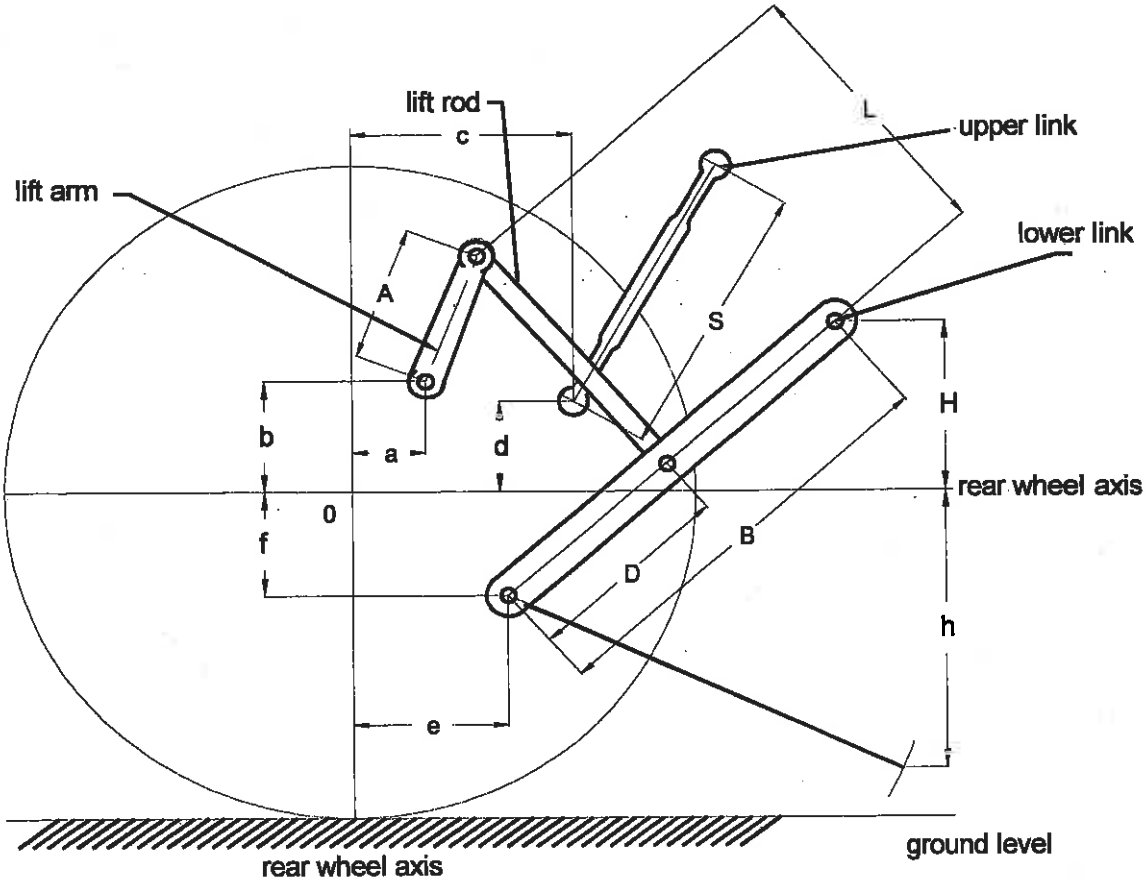
C	- Make/Model/Type:	SAME DEUTZ-FAHR ITALIA / C52.59 / open centre system, load sensing;
C	- Type and number of cylinders:	1 internal and 2 external single-acting;
C	- Type of linkage lock for transport:	not available;
D	- Relief valve pressure setting:	19.0 ± 0.5 MPa;
D	- Opening pressure of cylinder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

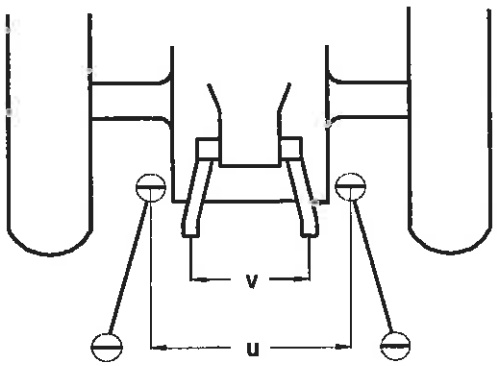
1.6 Three-point linkage

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

C - Category adapter: 2.

Linkage geometry





Dimensions of linkage geometry when connected to the standard frame

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

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

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

1.11 Brakes

1.11.1 Service brake

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

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

C - Trailer braking take-off: none.

1.11.2 Parking brake

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

C - Method of operation: mechanical by hand lever.

1.12 Wheels

- Number

C . Front: 2, steering and driving;

C . Rear: 2, driving;

C - Wheelbase: 2750 mm.

-Track width adjustment:

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

1.13 Protective structure

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

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

C - OECD approval

. Approval number: CSD-0760-2;

C . Date of approval: 28 December 1983;

C . Modification certificate: IIA MOD 001/2004.

1.14 Seat

1.14.1 Driver's seat

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

1.14.2 Optional driver's seats — not available.

1.14.3 Passenger's seat

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

1.15 Lighting

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

2. TEST CONDITIONS

2.1 Overall dimensions

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

2.2 Ground clearance:

550 mm bracket of trailer hitch (unballasted tractor).

2.3 Tractor mass (with full fuel tanks, cab)

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

2.4 Ballast

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

2.5 Track specifications

Not applicable

2.6 Tyres and track width specifications

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

2.7 Fuel

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

2.8 Oils and lubricants

2.8.1 Capacity and change interval

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

(*) Or when the warning lamp is lighted

2.8.2 Specifications

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

2.8.3 Grease

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

3. COMPULSORY TESTS RESULTS

3.1 Main power take-off

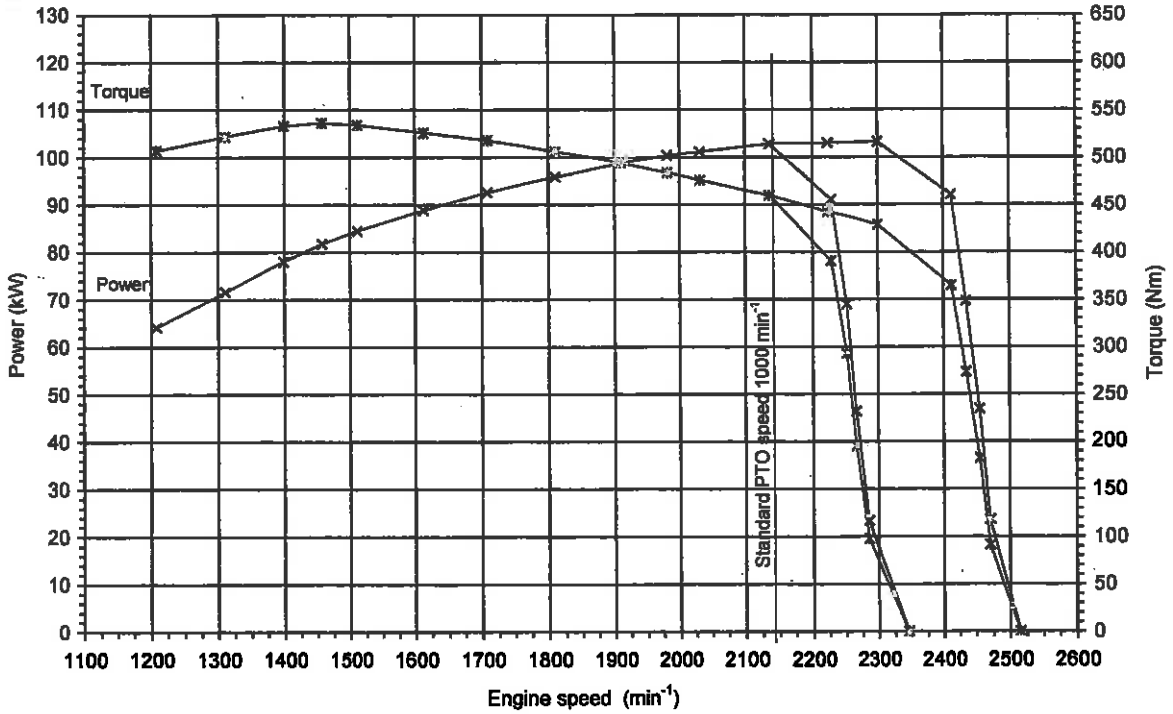
- Date and location of tests: 10 November 2003, ISMA, Treviglio BG, Italy;
- Type of dynamometer bench: eddy-current, ZÖLLNER B500.

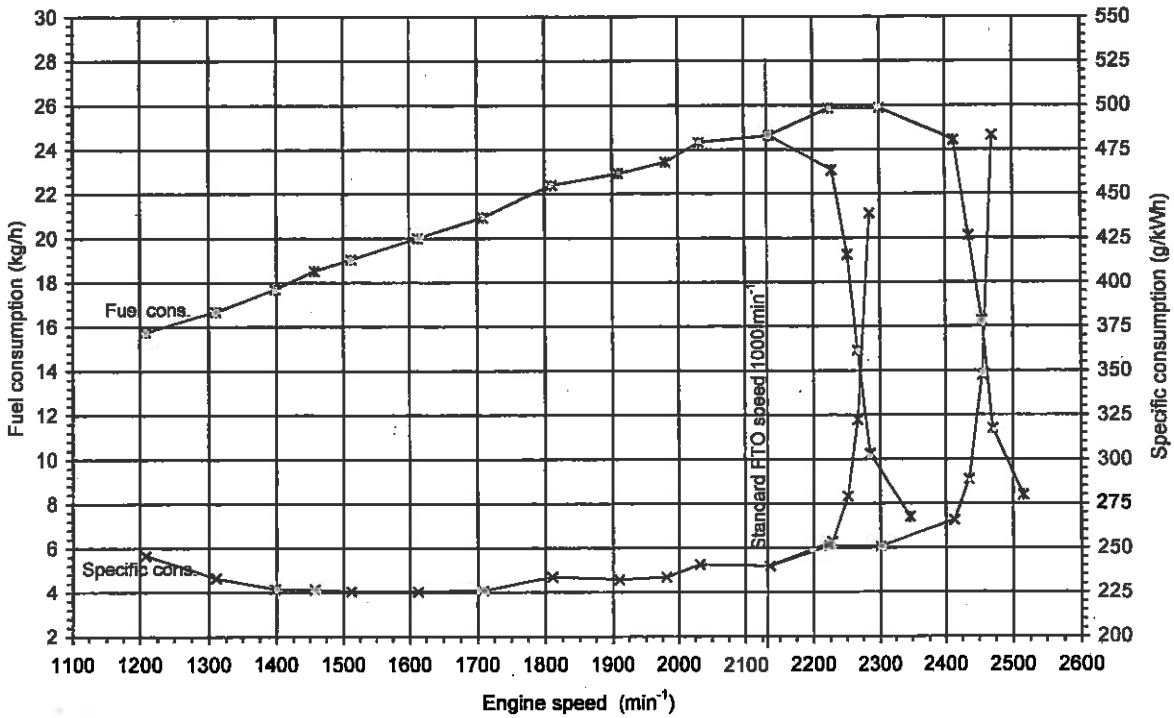
Power	Speed			Fuel consumption			Specific energy
	Engine	P.T.O.	Fan	Hourly		specific	
kW	min^{-1}			kg/h	l/h	g/kWh	kWh/l
3.1.1 MAXIMUM POWER - TWO-HOUR TEST							
103.2	2300	1077	2760	25.88	30.88	251	3.34
3.1.2 POWER AT RATED ENGINE SPEED							
103.2	2300	1077	2760	25.88	30.88	251	3.34
3.1.3 STANDARD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

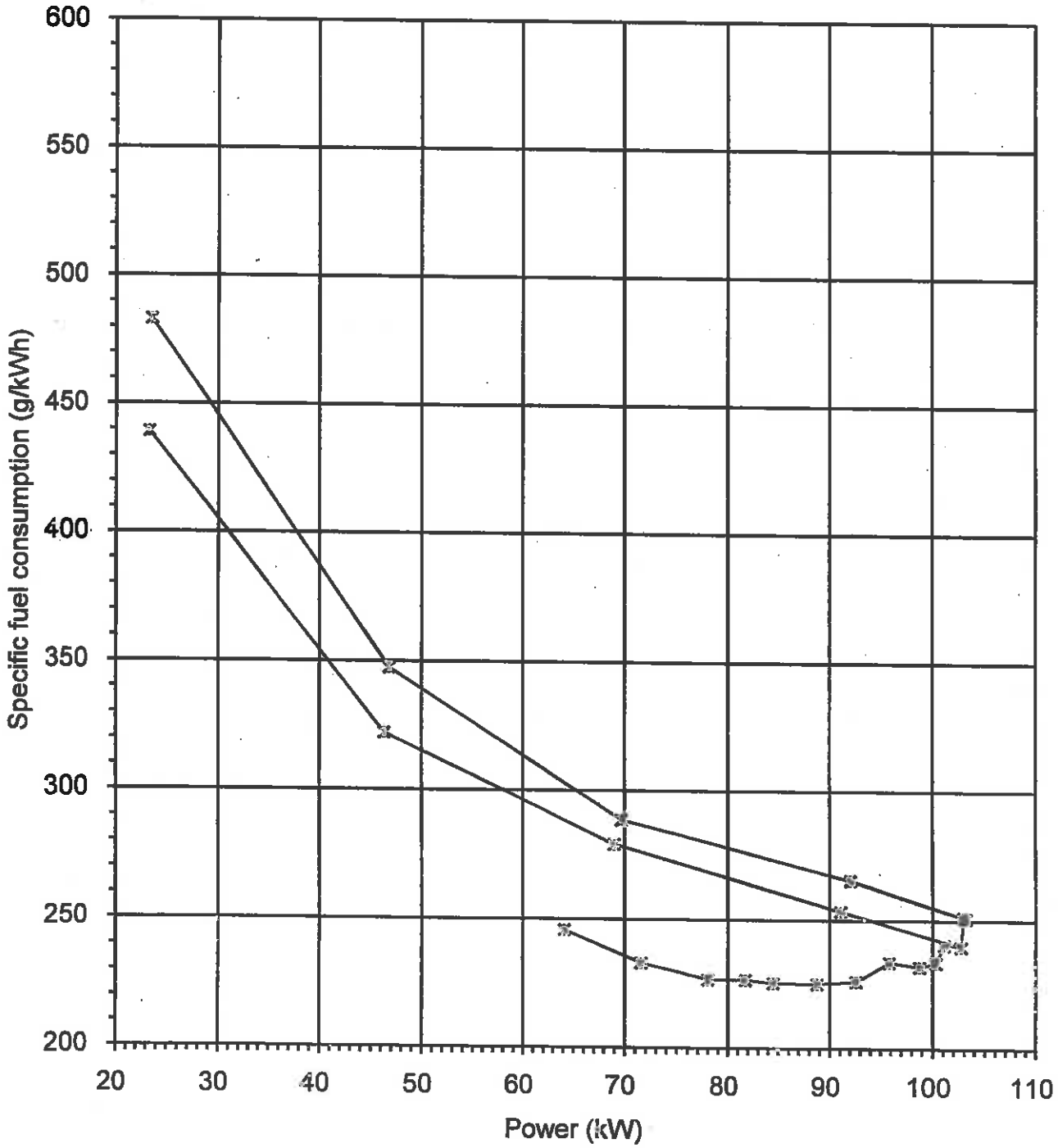
Power	Speed			Fuel consumption			Specific energy
	Engine	P.T.O.	Fan	Hourly		specific	
kW	min^{-1}			kg/h	l/h	g/kWh	kWh/l
3.1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED (1000 ± 25 min^{-1})							
3.1.5.1 The torque corresponding to maximum power available							
102.7	2136	1000	2536	24.62	29.38	240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

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

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


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


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


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

3.2 Hydraulic power and lifting force

- Date of tests: 19 November 2003

3.2.1 *Hydraulic power test*

3.2.1.1 Hydraulic fluid data

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

3.2.1.2 Compulsory Reporting (Test Results)

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

3.2.2 *Power lift test*

Linkage setting for test - see paragraph 1.6

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

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

3.3 Drawbar performance

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

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

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

3.3 Drawbar performance (continued)

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

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

3.3 Drawbar performance (continued)

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

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

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

3.4 Turning area and turning circle

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

3.5 Location of centre of gravity

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

3.6 Braking

Date of tests: 18 November 2003

3.6.1 *Cold service braking device test*

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

3.6.1 *Cold service braking device test* (continued)

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

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

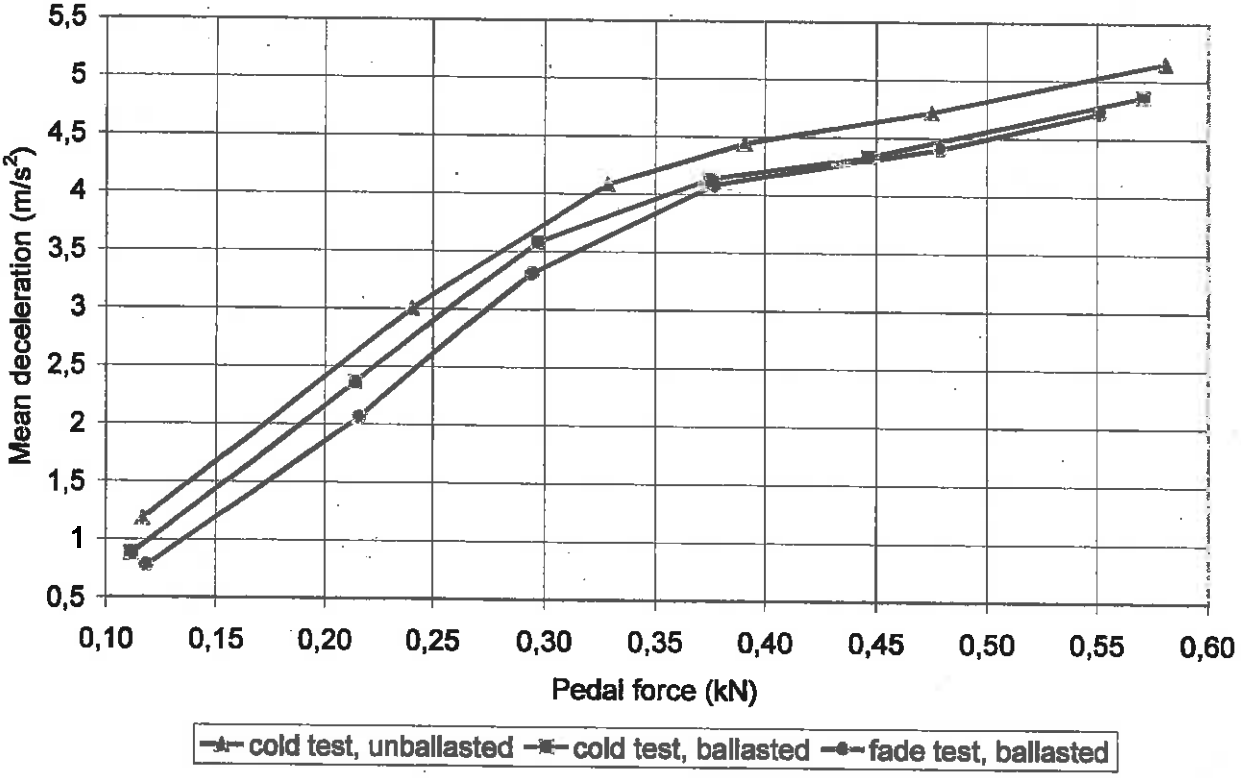
3.6.2 *Fade test*

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

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

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

Service brake test



3.6.3 *Parking brake device test*

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

3.7 Measurement of external noise level

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

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

4. OPTIONAL TEST RESULTS: none.

5. REPAIRS: none.

6. REMARKS: none.

TEST ENGINEER
(Dr. Carlo BISAGLIA)

HEAD OF ISMA
(Ing. Giovanni SANTORO)