Prüfstelle für Landmaschinen



REPORT on test in accordance with **OECD No. 2/1823**
OECD STANDARD CODE 2 for the *22nd April 1999*
Official Testing of Agricultural Tractor Performance

Agricultural Tractor

FENDT FARMER 309 C

Manufacturer
AGCO GmbH & Co.
D-87616 Marktoberdorf

This is a report on a tractor test in accordance with OECD STANDARD CODE for the Official Testing of Agricultural Tractor Performance, "Yellow Code", January 1998, Code 2 (Restricted Code).

It does not contain an evaluation of the tractor on practical work.

Duration of tests: August 1998 till November 1998

DLG-Testing Station for Agricultural Machinery, Max-Eyth-Weg 1,
D-64823 Groß-Umstadt

This report has been approved by the OECD Co-Ordinating Centre (CEMAGREF, France) as being in accordance with the OECD STANDARD CODE.

Date of approval: 22nd April 1999 OECD No. 2/1823

In this report all performance characteristics are given corresponding to the International System of Units.

The reference to the former used Technical System of Units is given by the following relations:

Forces	1 kN	=	1000 N	=	102 kp
Powers			1 kW	=	1.36 PS
Pressures	1 MPa	=	10 bar	=	10.2 kp/cm^2
	100 kPa	=	1000 mbar	=	750.10 mm Hg

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DLG-No. 306

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FENDT FARMER 309 C **DLG-Test No 98-336**

Tractor manufacturer:	AGCO GmbH & Co. D-87616 Marktoberdorf
Location of tractor assembly:	D-87616 Marktoberdorf
Submitted for test by:	AGCO GmbH & Co.
Selected by:	Manufacturer with agreement by DLG
Place of running-in:	Marktoberdorf and Groß-Umstadt
Duration of running-in:	engine175 h, tractor approximate 95 h
Location of test:	DLG-Testing Station, D-64823 Groß-Umstadt

1 SPECIFICATION OF TRACTOR

1.1 Identification

- Make/Model/Type:	FENDT / FARMER 309 C / wheel tractor, unit construction, four wheel driven
- Trade name:	FARMER 309 C
- Number of driving- wheels:	4
- Serial No.:	119/21/1072
- 1st serial No.:	119/21/1001

1.2 Engine

Make/Model:	DEUTZ / BF 4M 1012 EC
Type:	Water-cooled 4-stroke Diesel-engine, direct injection, supercharged, with intercooler
Serial no.:	00261273

1.2.1 Cylinders

Number/disposition:	4 / in line
Bore/stroke:	94 / 115 mm
Capacity:	3192 cm^3
Compression ratio:	17.5 ± 0.3
Arrangement of valves:	Overhead valves
Cylinder liners:	Linerless

1.2.2 Supercharging

- Make/Model	SCHWITZER / S1BS010D
- Type:	Exhaust driven supercharger
- Pressure	125 kPa

1.2.3 Fuel system

- Fuel feed system:	Internal-rotor type fuel supply pump, fuel cooler in front of engine's water cooler
- Fuel filter	
Make:	MANN & HUMMEL / WK 723
Type :	Replaceable paper element filter
- Capacity of fuel tank:	110 dm³
- Injection pump	
Make/Model:	BOSCH / PFM 1 P 90 S 1003
Type :	Single element unit pump for each cylinder, directly driven by camshaft
Serial no.:	Not applicable
Manufacturer's production setting:	72 ± 2 mm³/stroke at full load and rated speed;
Flow rate:	19.9 ± 0.55 dm³/h at 2300 min^{-1} and full load
Timing:	Commencement of delivery before TDC: 10 ± 1°, no timing device
- Injectors	
Make/Model:	BOSCH / DLLA 147 P 360
Type :	Multi hole
Injection pressure:	25 + 0.8 MPa

1.2.4 Governor

- Make/Model/Type:	Heinzmann / RQV / mechanical, centrifugal variable speed governor, with supercharge pressure compensating device
- Governed range of engine speed:	800 ± 50 to 2460 ± 50 min^{-1}
- Rated engine speed:	2300 min^{-1}

1.2.5 Air cleaner

- Pre-cleaner	Cyclon type, incorporated in main filter housing
- Main cleaner	
Make/Model:	MANN & HUMMEL / G 117.200.090.160
Type:	Dry paper element filter with additional safety cartridge
Location of air intake:	At top, next to left hand A-post of cab
- Maintenance indicator:	Electric warning indicator lamp

1.2.6	Lubrication system:	Pressure lubrication; oil/water heat exchanger integrated in engine; cooling circuit controlled by thermostat
	- Type of feed pump:	Internal gear pump
	- Type of filter:	Paper fine filter in full flow, replaceable cartridge
	- Number of filter:	1
1.2.7	Cooling system	
	- Type of coolant:	Water cooling
	- Type of pump:	Impeller pump
	- Specification of fan	
	Number of fan blades:	11
	Fan diameter:	440 mm
	- Coolant capacity:	13 dm³
	- Type of temperature control:	Thermostat and by-pass circuit, viscous drive fan, belt driven, variable fan speed controlled by air flow temperature
	- Superpressure system:	90 kPa
1.2.8	Starting system	
	- Make/Model/Type:	BOSCH / - / electrical, solenoid pre-engaged drive starter motor 3.1 kW
	- Cold starting aid:	Pencil-type glow plug in each cylinder
	- Safety device:	Starter only operable when clutch pedal is pressed
1.2.9	Electrical system	
	- Voltage:	12 V, negative earth
	- Generator	
	Make/Model/Type:	BOSCH / K1 / 3-phase alternator, 14V 95A
	Power:	1330 W
	- Battery:	1 lead acid battery, 90 Ah at 20 hours rating

1.2.10 Exhaust system

- Make/Model: EBERSPÄCHER / T 16.50.396.03.0.00
- Type: Reflection-absorption-type silencer, 300x200 mm oval, 220 mm long
- Location: Below bonnet, above the engine, vertical stack beside the right A-post; mouth showing forward to the right

1.2.11 Operating hours meter: Electronic, counts real hours when engine is running

.3 Transmission

1.3.1 Clutch (travel and power take-off)

1st clutch

- Make/Model/Type: VOITH / 360 TD-F5 / fluid coupling

2nd clutch

- Make/Model/Type: FICHTEL & SACHS / DUT 330 L / dry disc clutch
- Number of plates: 2 (one for travel drive and one for p.t.o. drive each)
- Diameter of discs: 330 mm, travel drive
295 mm, p.t.o. drive
- Method of operation: Hydraulical by pedal, travel drive
mechanical by lever, p.t.o. drive

1.3.2 Gear box

- Make/Model: FENDT / 21/21 Gang-Wendegetriebe
- Type: Mechanical, max. travelling speed 40 km/h
- Description:
  a) Synchro-mesh gearbox with 3 speeds
  b) close stepped synchro-mesh range gear with 3 ranges FL/FM/FS
  c) range gear with field range, dog clutch shifted and road range, sliding gear shifted
  d) 3 independent synchro-mesh overdrive speeds 25/30/40, these speeds are not disposable in field range
  e) synchro-mesh reversing gear forward/reverse

	forward	reverse
no. of gears	3+3	3+3
no. of ranges	2x3	2x3
total	21	21

4 shifting levers

	- Lubrication:	Forced-feed lubrication by own gear pump with 8 cm³/rev delivery: Pump III of the multiple gear pump BOSCH HY/ZFFS 11/16+14+8 BL 212/1D0.6, feeding the hydraulic circuit; oil cooler in front of engine's water cooler
1.3.3	Rear axle and final drives	
	- Make/Model/Type:	FENDT / - / portal axle; bevel gear drive, bevel gear differential with lock, spur gear final drives with double transmission
	- Differential lock	
	Type:	Claw
	Method of engagement and disengagement:	Mechanically foot-operated, pilot lamp
1.3.4	Front axle and final drives	
	- Make/Model	ZF / APL 2000-F3 56457
	- Type:	4WD axle, transmission via dry multi-plate clutch, universal transmission shaft, differential (with lock) and planetary final drives; clutch mechanically operated by lever
	- Differential lock	
	Type:	Automatic limited slip multi-plate lock
	Method of engagement: and disengagement:	Automatic

1.3.5 Total ratios and travelling speeds

Range	Close stepped range	Gear no.	Number of engine revolutions for one revolution of the driving wheels		Nominal travelling speed*) at rated engine speed 2300 min^{-1} km/h	
			forward	reverse	forward	reverse
A field	FL	1	472.26	539.07	1.34	1.17
		2	295.16	336.92	2.14	1.88
		3	186.94	213.38	3.39	2.97
	FM	1	389.61	444.73	1.62	1.42
		2	243.51	277.96	2.60	2.28
		3	154.22	176.04	4.10	3.60
	FS	1	327.67	374.03	1.93	1.69
		2	204.80	233.77	3.09	2.71
		3	129.70	148.05	4.88	4.28
S road	FL	1	118.06	134.77	5.36	4.70
		2	73.79	84.23	8.58	7.52
		3	46.73	53.34	13.55	11.87
	FM	1	97.40	111.18	6.50	5.69
		2	60.88	69.49	10.40	9.11
		3	38.56	44.01	16.42	14.38
	FS	1	81.92	93.51	7.73	6.77
		2	51.20	58.44	12.36	10.83
		3	32.43	37.01	19.52	17.10
1st overdrive		25	26.56	30.32	23.83	20.88
2nd overdrive		30	21.65	24.71	29.25	25.62
3rd overdrive		40	16.65	19.01	38.02	33.31

*) calculated with a tyre dynamic radius index of 745 mm (ISO 4251-1:1992) and 2.0% slip of the fluid coupling

Number of revolutions of front wheels for one revolution of rear wheels: 1.3553

1.4 Power take-off

1.4.1 Main power take-off

- Type: Independent
- Method of engagement: Mechanically engaged by lever (clutch see on page 7)
- Number of shafts: 1
- Method of changing power take-off shaft ends and speeds: One shaft, not changeable; 3 speeds shiftable by separate lever

1.4.1.1 Power take-off proportional to engine speed, type 540, 540 E or 1000

- Location: At rear of tractor
- Diameter of p.t.o. shaft end: 35 mm
- Number of splines: 6 in conformity with ISO 500:1991, type 1
- Height above ground: 697 mm
- Distance from the median plane of the tractor: 0 mm
- Distance behind rear-wheel axis: 359 mm

p.t.o. type	p.t.o. transmission ratio	p.t.o. speed min^{-1}	engine speed min^{-1}	power restriction kW
540	3.795	540 606	2049 2300	-
*) 540 E	2.905	540 792	1569 2300	-
1000	2.080	1000 1106	2080 2300	-

*) 540 E: Economic-type p.t.o. for reduced engine speed

- Direction of rotation (viewed from behind tractor): Clockwise

1.4.1.2 Power take-off proportional to ground speed: On request, not fitted

1.4.2 Optionally power take-off

- Type: Independent front p.t.o.
- Method of engagement: Mechanically engaged by lever; separate multi-plate dry clutch in front of crankshaft
- Number of shafts: 1, fixed speed
- Method of changing power take-off shaft ends and speeds: Not applicable

1.4.2.1 Power take-off proportional to engine speed

- Location: In front of engine
- Diameter of p.t.o. shaft end: 35 mm
- Number of splines: 6 in conformity with ISO 500:1991, type 1
- Height above ground: 685 mm
- Distance from the median plane of the tractor: 0 mm
- Distance to front-wheel axis: 500 mm (forward)

p.t.o. type	p.t.o. transmission ratio	p.t.o. speed min^{-1}	engine speed min^{-1}	power restriction kW
1000	2.033	1000 1131	2033 2300	-

- Direction of rotation (viewed to the front side of tractor): Anticlockwise

1.5 Hydraulic power lift

- Make/Model/Type: FENDT / - / mechanic-hydraulic power lift, unit construction, top link sensing
- Type of hydraulic system: Open centre constant flow with load sensing steering, 2-circuit-system fed by multiple gear pump

hydraulic circuit 1: 1st pump with 40 dm^3/min delivery at rated engine speed supplies power lift control valve and maximum 3 additional control valves

hydraulic circuit 2: 2nd pump with 35 dm^3/min delivery at rated engine speed supplies steering with priority (1 dm^3/min in tractor's standstill); maximum residual oil flow then 34 dm^3/min

fast-run operation: automatic flow valve feeds residual oil flow of circuit 2 into circuit 1, resulting in an oil flow of 74 l/min at rated engine speed; by opening a stopcock, the residual oil flow of circuit 2 may be directly drained into oil tank, then results an oil flow of 40 l/min at rated engine speed

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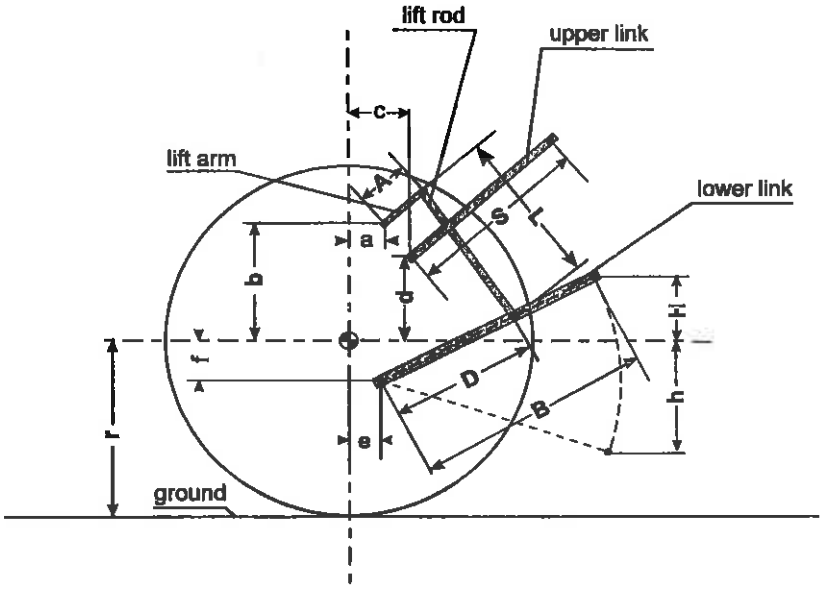
	- Type and number of cylinders:	1internal cylinder, single acting 137 mm stroke, 85 mm bore; 2 external cylinders single acting 185 mm stroke, 50 mm bore
	- Type of linkage lock for transport:	Hydraulic, lowering throttle
	- Relief valve pressure setting:	20.0 + 1.0 MPa
	- Opening pressure of cylinder safety valve:	23.0 MPa
	- Lift pump type:	BOSCH HY / ZFFS 11/ 16+14+8BL212/1DO.6 multiple gear pump with fixed delivery consisting of 3 single pumps, only the 2 first pumps supply the hydraulic system
	- Transmission between pump and engine:	By gear
	- Type and number of filters:	1 filter cartridge in return line, replaceable
	- Site of oil reservoir:	Separate hydraulic oil reservoir on the right, below the steps
	- Type, number and location of tapping points:	At rear of tractor: 3 pairs of couplings, double acting 1 coupling, single acting 1 coupling for low pressure return
	- Maximum volume of oil available to external cylinders:	30 dm³
1.5.1	Optional	Fitted to tested tractor
	Front power lift	
	- Make/Model/Type:	FENDT / - / hydraulic power lift, disintegrated construction, laterally stabilized lower links, vibration damping
	- Type of hydraulic system:	In common with rear power lift, connected with hydraulic circuit 2, controlled by double acting additional control valve
	- Type and number of cylinders:	2 cylinders, different bores, double acting; stroke 170 mm bores 55 mm and 70 mm
	- Type of linkage lock for transport:	Hydraulic, separate stopcock in hydraulic lines

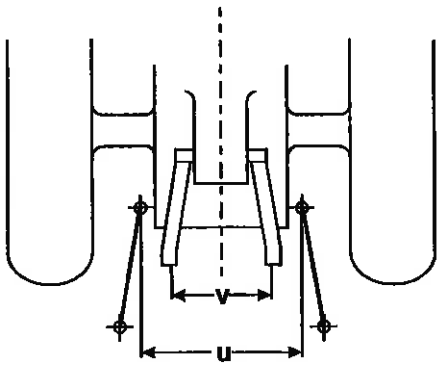
FENDT FARMER 309 C **DLG-Test No. 98-336**

1.6 Three point linkage

1.6.1 Three-point linkage at rear:

- Category: 2, in conformity with ISO 730-1/1994, with WALTERSCHEID quick couplers
- Category adapter: None





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Dimensions of rear implement linkage			projected lengths in mm: dimensions (general)	test-dimensions page 28
Rear tyres 540/65 R 34		(r) *)	745	
Front tyres 440/65 R 24		(r') *)	560	
Length of lift arms		(A)	285	
Length of lower links		(B)	850	
Distance of lift arm pivot points from rear wheel axis	horizontal	(a)	-15	
	vertical	(b)	303	
Horizontal distance between the 2 lower link pivot points		(u)	436	
Horizontal distance between the 2 lift arm end points		(v)	518	
Length of upper link		(S)	from 685 to 981	770
Distance of upper link pivot point from rear wheel axis	horizontal	(c)	240/247	247
	vertical	(d)	240/214	214
Distance of lower link pivot points from rear wheel axis	horizontal	(e)	152	
	vertical	(f)	211	
Distance of lower link pivot points from lift rod pivot points on lower links		(D)	515	
Length of lift rods		(L)	from 685 to 755	730

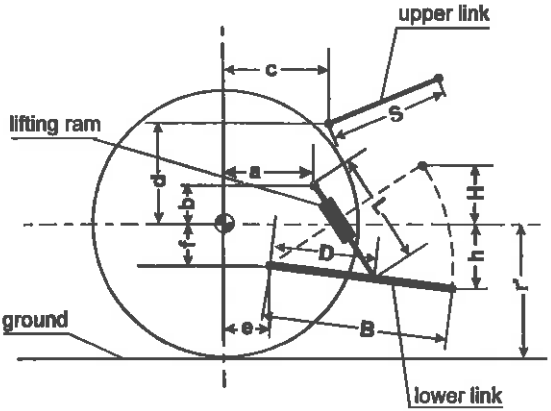
Heights (h, H, H') of lower link hitch points relative to rear wheel axis (situated 745 mm above ground), at different adjustments of L

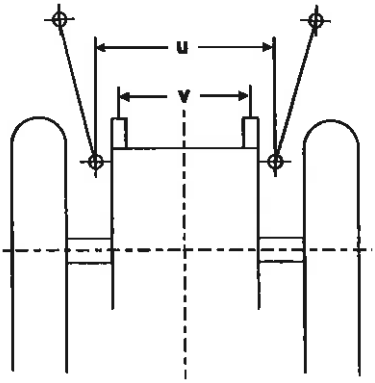
These data are valid for unloaded power lift

				test-dimensions page 28
Length of lift rods	(L)	685	755	730
Linkage distance of lift rods	(D)	515		
Lowest position	(h)	425	665	545
Highest position	(H)	220	65	155
Transport position	(H')	220	65	155

*) Assuming r resp. r' = tyre dynamic radius index of ISO 4251-1:1992

1.6.2 Three-point linkage at front: Category 2 acc. to ISO 730/1-1994





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Dimensions of front implement linkage			projected lengths in mm
Rear tyres 540/65 R 34		(r)	745
Front tyres 440/65 R 24		(r')	560
Length of lower links		(B)	775
Distance of lift cylinder pivot points from front wheel axis	horizontal	(a)	345
	vertical	(b)	328
Horizontal distance between the 2 lower link pivot points		(u)	555
Horizontal distance between the 2 lift cylinder pivot points		(v)	460
Length of upper link		(S)	from 555 to 790, 600 *)
Distance of upper link pivot point from front wheel axis	horizontal	(c)	495
	vertical	(d)	393
Distance of lower link pivot points from front wheel axis	horizontal	(e)	310
	vertical	(f)	95
Distance of lower link pivot points from fixing points of lift cylinders on lower links		(D)	220
Length of lift cylinders		(L)	from 361 to 531

Heights (h, H, H') of lower link hitch points relative to front wheel axis (situated 560 mm above ground)

These data are valid for unloaded power lift

Lowest position	(h)	340
Highest position	(H)	295
Transport position	(H')	295

*) used during test (see on page 29)

1.7	**Swinging drawbar**	Available on request, not fitted
1.8	**Trailer hitch**	
	- Make/Model/Type:	FENDT / AK -001/1 / non-automatical
	- Hole diameter:	32 mm
	- Height above ground:	Centre of clevis adjustable in 6 steps to 500/560/785/830/870/915 mm
	- Distance of hitch point from rear-wheel axis, horizontal:	560 mm
	- Distance of hitch point from power take-off shaft end vertical:	below 197/137 mm, above 88/133/173/218 mm
	horizontal:	201 mm
	- Maximum vertically permissible load:	20.0 kN
1.9	**Holed drawbar**	Short bar
	- Number of holes:	9
	- Distance between holes:	80 mm from centre to centre
	- Hole diameter:	33 mm
	- Thickness/width of the drawbar:	30/100 mm
	- Height above ground	
	minimum:	80 mm
	maximum:	965 mm
	- Horizontal distance to power take-off shaft end:	611 mm
1.10	**Steering**	
	- Make/Model/Type:	ZF / SERVOSTAT 8492 / hydrostatic front-wheel steering
	- Method of operation	By steering wheel and integrated cylinder directly acting on steering levers
	- Pump:	2nd pump of multiple gear hydraulic pump, supplying circuit 2 - see on page 11 -
	- Ram:	FENDT, symmetrical design; 236 mm stroke, 65 mm bore, 40 mm dia piston rod
	- Working pressure:	13.0 MPa

1.11 Brakes

1.11.1	Service brake:	
	- Make/Model:	LUCAS, TEVES, FAG / GMPD 6 ½"
	- Type:	Single circuit muscle power brake acting on: 2 dry disc brakes on differential half shafts of rear axle, 2 lining discs each, 168 mm dia and 1 internally ventilated double-caliper brake on universal joint shaft to front axle, 1 disc, 262 mm dia
	- Method of operation:	Pedal operated, hydraulic transmission
	- Trailer braking take-off:	Pneumatic (air brake)
1.11.2	Parking brake	
	- Type:	Independent of service brake; muscle power operated internal-expanding-shoe brake, acting on 2 brake drums on differential half shafts of rear axle drum 180 mm dia, 38 mm width
	- Method of operation:	Lever operated, ratchet, mechanic transmission

1.12 Wheels

- Number

  Front: 2, driving and steering
  Rear: 2, driving

- Wheelbase: 2280 mm

- Track width adjustment:

	Minimum mm	Maximum mm	Adjustment method
Front	1720	1720	not applicable
Rear	1510	1660	reversing the wheels

1.13 Protective structure

- Make/Model: FENDT / 117.810
- Type: FENDT-safety-cab, sound- and vibration insulated;
  2 doors and 2 steps each,
  water-heating, ventilation system
- Manufacturer's name and address: XAVER FENDT GmbH & Co.
  Postfach 1155
  D-87609 Marktoberdorf
- Protective device

  Cab/frame/rollguard: Cab;
  structure consists of a 6-post-frame with longitudinal and transverse bracing

  Not tiltable
- OECD approval

  Approval number: CSS 0479/1

  Date of approval: 3rd November 1997

  Minor modification certificate: CSS 0479/MOD1,
  established by DLG-Prüfstelle,
  Groß-Umstadt,
  date:19th October 1998

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1.14 Seat

1.14.1	Driver's seat	Fitted to tractor	
	- Make/Model:	GRAMMER / MSG 95 A/20	
	- Type:	Upholstered seat with back rest and arm rests	
	- Seat and steering wheel reversible:	No	
	- Type of suspension:	Pneumatical	
	- Type of damping:	Hydraulic	
	- Range of adjustment		
	Longitudinal:		210 mm
	Vertical:	above platform	410 to 570 mm
	- Safety belt:	On request, not fitted	
1.14.2	Optional driver's seats		
	- Make/Model/Type:	GRAMMER / DS95G/20 / pneumatical suspension or GRAMMER / DS85H1/90 / mechanical suspension	
1.14.3	Passenger seat:	On left mudguard	

1.15 Lighting

Electrical, 12 Volt

	Height above ground of centre mm	Size mm	Distance from outside edge of lights to median plane of tractor mm
Headlights	1030	145x83	240
Sidelights	1630	70x20	850
Rearlights	1545	80x58	849
Reflectors 1st pair 2nd pair	 1485 570	 120x28 75 dia	 865 350
Auxiliary lamps	2585	145x83	338

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2. TEST CONDITIONS

2.1 Overall dimensions

Length		Width	Height at top of	
with 3 point linkage at front	without 3 point linkage at front		protective structure	exhaust silencer pipe
mm	mm	mm	mm	mm
4475	3945	2250	2668	2682

2.2 Ground clearance

	with 3 point linkage at front	without 3 point linkage at front
Ground clearance mm	425	450
Clearance-limiting part	bracket of 3 point linkage at front	front axle

2.3 Tractor mass

Unballasted (with cab)

	Without driver kg	With driver kg
Front	2035	2050
Rear	2555	2615
Total	4590	4665

2.5 Tyres and track widths specifications

	Front	Rear
Tyres:	MICHELIN XM 108	
dimensions	440/65 R 24	540/65 R 34
load index speed index	122 A8	140 A8
type	radial ply	radial ply
maximum load (tyre manufacturer's)	14.7 kN	24.5 kN
at travelling speed	40 km/h	40 km/h
at tyre inflation pressure	120 kPa	120 kPa
radius index (ISO 4251-1:1992)	560 mm	745 mm
Chosen track width:	1720 mm	1660 mm
Technically permissible axle load:	29.4 kN	49.1 kN
Technically permissible total weight:	68.7 kN	

2.6 Fuel

- Type: ARAL-Diesel-fuel, in conformity with DIN 51601
- Density at 15°C: At p.t.o. test 0,834 g/cm³
  at drawbar power tests 0,843 g/cm³

2.7 Oils and lubrication

2.7.1 Capacity and change interval

	Capacity dm³	Oil change h	Filter-change h
Engine	9.3	500	500
Gear box	36.5	2000	2000
Front axle	6	1000	-
Rear axle	common with gearbox	common with gearbox	common with gearbox
Final drives at front, each	0.75	1000	-
Final drives at rear, each	5.7	2000	-
Hydraulic system	33.0	1000	1000
Steering	common with hydraulic system	common with hydraulic system	common with hydraulic system
Fluid coupling	7.2	-	-

2.7.2 Specifications:

	Recommended	Used during test
Engine oil		
Used in engine		
Type:	Multi-grade-oil	MOBIL DELVAC
Viscosity:	SAE 10W/30, 10W/40, 15/W30 or 15W/40	SAE 10W/30
Classification:	API-CD or CCMC-D4, CCMC-D5	API-CD
Used in fluid coupling		
Type:	Single-grade-oil	MOBIL DELVAC
Viscosity:	SAE 10W	SAE 10W
Classification:	API-CD	API-CD
Transmission oil		
Used in gearbox, rear axle, including final drives, front axle including final drives		
Type:	Hypoid-gear oil	BP
Viscosity:	SAE 80W/90, 85W/90 or SAE 90	SAE 85W/90
Classification:	API-GL5	API-GL5
Hydraulic fluid		
Used in hydraulic and steering system		
Type:	Super-tractor-oil-universal STOU	
Viscosity:	SAE 15W/30	
Classification:	API-GL4	
or		
Type:	Single-grade-engine-oil	ESSO
Viscosity:	SAE 20W/20 or SAE 30	SAE 20W/20
Classification:	API-CD	API-CD

2.7.3 Grease Multi-purpose grease, lithium-saponified NLGI class 2

- number of lubrication points: 11

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3.1 MAIN POWER TAKE OFF PERFORMANCE (1000 rev/min)

Date of tests: 1998-08-26
Location of tests: DLG-Testing Station Groß-Umstadt
Type of dynamometer: SCHENCK hydraulic dynamometer U1-40

Power kW	Speed Engine min^{-1}	Fluid clutch min^{-1}	P.t.o. min^{-1}	Fuel consumption hourly dm^3/h	hourly kg/h	specific g/kWh	Specific energy kWh/dm^3
Maximum power							
3.1.1 At 2-hour test							
70.6	2000	1932	928	20.06	16.73	237	3.52
3.1.2 At rated speed							
65.4	2300	2248	1080	19.75	16.47	252	3.31
3.1.3 At standard p.t.o. speed							
70.2	2140	2080	1000	20.55	17.14	244	3.41
3.1.4 Part loads, the governor hand lever in the position corresponding to maximum power at full load (curve a)							
3.1.4.1 the torque corresponding to maximum power at rated speed							
65.4	2300	2248	1080	19.75	16.47	252	3.31
3.1.4.2 85% of the torque obtained in 3.1.4.1							
55.9	2316	2267	1089	16.87	14.07	252	3.32
3.1.4.3 75% of the torque defined in 3.1.4.2							
42.7	2342	2300	1105	13.57	11.32	266	3.14
3.1.4.4 50% of the torque defined in 3.1.4.2							
29.0	2369	2342	1125	10.35	8.63	298	2.80
3.1.4.5 25% of the torque defined in 3.1.4.2							
14.8	2403	2387	1147	7.34	6.12	415	2.01
3.1.4.6 unloaded							
-	2455	2451	1178	4.28	3.57	-	-

FENDT FARMER 309 C **DLG-Test No. 98-336**

Power kW	Speed Engine min^{-1}	Fluid clutch min^{-1}	P.t.o. min^{-1}	Fuel consumption hourly dm³/h	hourly kg/h	specific g/kWh	Specific energy kWh/dm³
3.1.5 Part loads, the governor hand lever in the position corresponding to standard p.t.o. speed at full load (curve b)							
3.1.5.1 the torque corresponding to maximum power							
70.2	2140	2080	1000	20.55	17.14	244	3.41
3.1.5.2 85% of the torque obtained in 3.1.5.1							
61.0	2176	2125	1021	17.78	14.83	243	3.43
3.1.5.3 75% of the torque defined in 3.1.5.2							
46.3	2201	2154	1035	13.88	11.58	250	3.34
3.1.5.4 50% of the torque defined in 3.1.5.2							
31.5	2230	2196	1055	10.56	8.81	280	2.98
3.1.5.5 25% of the torque defined in 3.1.5.2							
16.1	2265	2246	1079	7.07	5.90	367	2.27
3.1.5.6 unloaded							
-	2305	2303	1106	3.81	3.18	-	-

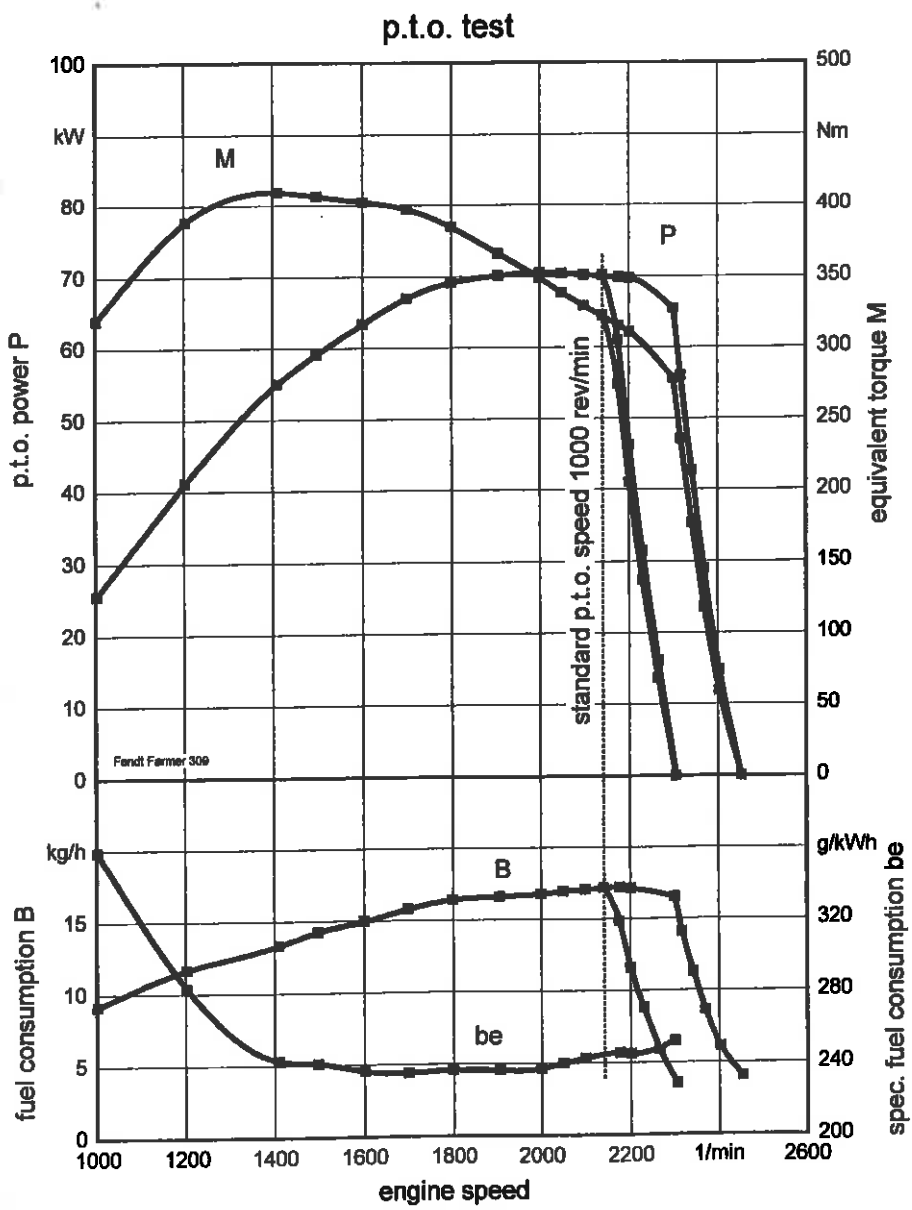
No load maximum engine speed:	2455 min^{-1}
Equivalent flywheel torque at rated engine speed:	278 Nm
Equivalent flywheel torque at 2-hour test:	349 Nm
at engine speed:	2000 min^{-1}
Maximum equivalent flywheel torque:	410 Nm
at engine speed:	1411 min^{-1}

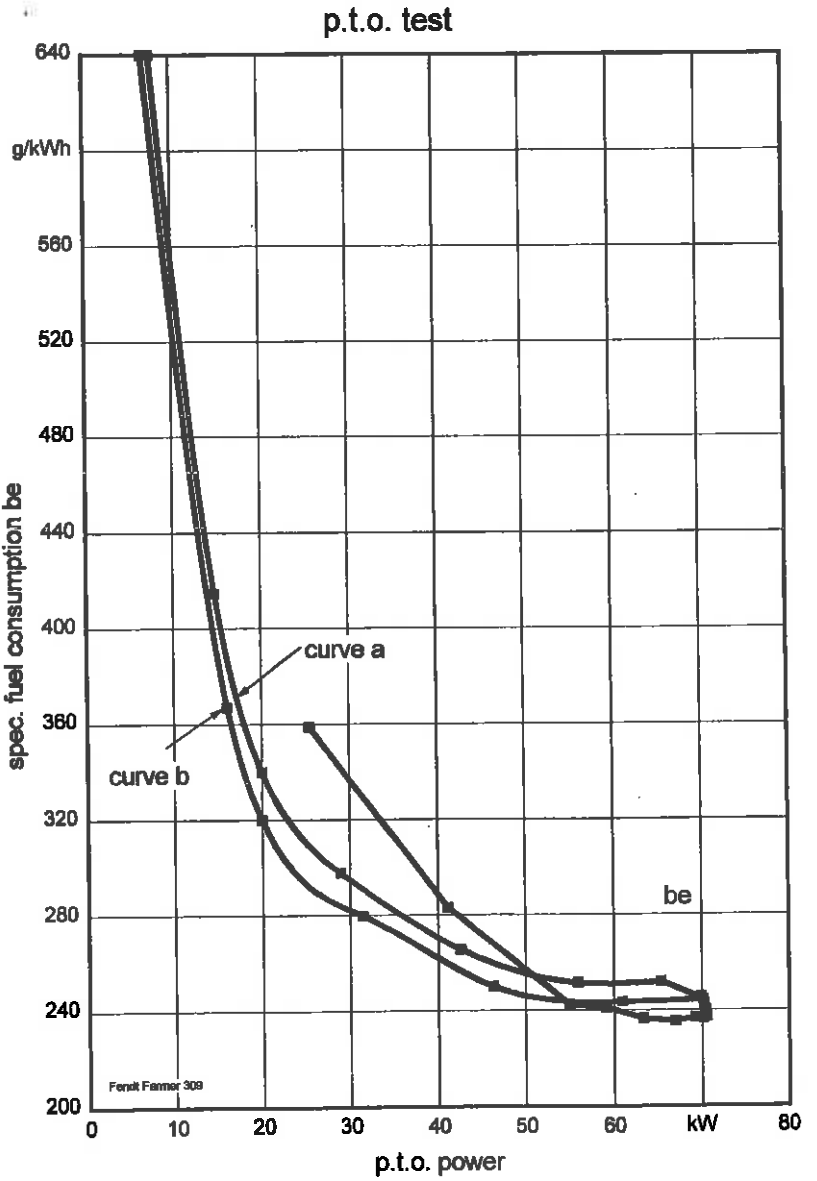
Mean atmospheric conditions

temperature:	28 °C
pressure:	1002 hPa
relative humidity:	33 %

Maximum temperatures

coolant:	90 °C
oil:	110 °C
fuel:	51 °C
air intake:	28 °C


p.t.o. test
p.t.o. power P
kW
M
P
equivalent torque M
Nm
standard p.t.o. speed 1000 rev/min
Fendt Farmer 309
fuel consumption B
kg/h
B
be
spec. fuel consumption be
g/kWh
engine speed
1/min
100
80
70
60
50
40
30
20
10
0
500
400
350
300
250
200
150
100
50
0
15
5
320
280
240
200
1000
1200
1400
1600
1800
2000
2200
2600


p.t.o. test
640
g/kWh
560
520
480
440
400
360
320
280
240
200
spec. fuel consumption be
curve a
curve b
be
Fendt Farmer 309
0
10
20
30
40
50
60
kW
80
p.t.o. power

3.2 HYDRAULIC POWER AND LIFTING FORCE

- Date of tests: 31st August and 3rd till 4th September 1998

3.2.1 Hydraulic power test

- Sustained pressure with relief valve open 21.0 MPa
- Pump delivery rate at minimum pressure 76.6 dm^3/min

	Hydraulic power kW	Flow rate dm^3/min	Pressure MPa	Oil Temperature °C
At 90% of the actual relief valve setting	14.2	45.2	18.9	65
Maximum	18.5	69.2	16.0	65

- Tapping point used for test: At rear of tractor, connected with yellow additional control valve

3.2.2 Power lift test at rear power lift

	At the hitch points	On the frame
Height of lower hitch points above ground in down position	200 mm	
Vertical movement without lifting forces with lifting forces	700 mm 680 mm	870 mm 835 mm
Max. corrected force exerted through full range	33.30 kN	27.00 kN
Corresponding pressure	18.9 MPa	
Moment about rear axle	-	42.66 kNm
Max. tilt angle of mast from vertical		10°

Lifting heights relative to horizontal lower links

mm	-430	-400	-345	-300	-200	-100	0	+100	+200	+300	+335	+400	+405
Lifting forces at hitch points. Corrected to 18.9 MPa													
kN			33.30	34.20	36.20	37.40	37.80	37.80	37.60	37.40	37.40		
Lifting forces at standard frame. corrected to 18.9 MPa													
kN	27.50	27.90		29.30	29.70	29.70	29.70	29.30	28.40	27.60		27.00	27.00

.2.3 Power lift test at front power lift

	At the hitch points	On the frame
Height of lower hitch points above ground in down position	220 mm	
Vertical movement without lifting forces with lifting forces	635 mm 620 mm	795 mm 765 mm
Max. corrected force exerted through full range	19.40 kN	17.10 kN
Corresponding pressure	18.9 MPa	
Moment about front axle		28.8 kNm
Max. tilt angle of mast from vertical		13°

Lifting heights relative to horizontal lower links

mm	-285	-245	-200	-100	0	+100	+200	+300	+375	+400	+480
Lifting forces at hitch points, corrected to 18.9 MPa											
kN		19.40	19.80	21.40	22.10	23.60	25.20	26.80	28.10		
Lifting forces at standard frame, corrected to 18.9 MPa											
kN	17.10		17.60	17.80	18.20	18.50	18.50	18.50		18.00	17.30

3.3 DRAWBAR POWER TEST (unballasted tractor)

- Date of test: 12th and 26th November 1998
- Type of track:: Concrete

Gear number and range	Power	Drawbar pull	Speed	Engine speed	Slip of wheels	Specific fuel consumption
	kW	kN	km/h	min^{-1}	%	g/kWh
3.3.1	MAXIMUM POWER IN TESTED GEARS (unballasted tractor)					
3.A.FS	53.9	50.75	3.82	2074	12.5	314
1.S.FL	56.5	49.16	4.14	2005	10.8	298
1.S.FM	59.1	40.92	5.20	2002	7.1	283
1.S.FS	59.4	33.93	6.30	1999	5.1	283
2.S.FL	60.9	31.10	7.05	1998	4.4	276
2.S.FM	60.2	25.01	8.66	2000	3.4	280
2.S.FS	60.4	20.91	10.40	2000	2.6	278
3.S.FL	60.3	19.10	11.37	1996	2.3	278
3.S.FM	60.1	15.66	13.82	1997	1.9	279
3.3.2	FUEL CONSUMPTION					
3.3.2.1	in selected gear, at maximum power at rated speed					
2.S.FL	57.2	24.61	8.36	2302	3.2	290
3.3.2.1.1	75 % of pull at maximum power at rated speed					
2.S.FL	43.8	18.47	8.53	2330	2.3	299
3.3.2.1.2	50 % of pull at maximum power at rated speed					
2.S.FL	30.0	12.35	8.74	2356	1.4	336
3.3.2.1.3	next higher gear at reduced engine speed; same pull and travelling					
2.S.FM	43.7	18.50	8.50	1950	2.2	274
3.3.2.1.4	next higher gear at reduced engine speed; same pull and travelling					
2.S.FM	29.8	12.34	8.70	1952	1.4	294
3.3.2.2	in selected gear nearest to 7.50 km/h at rated speed					
1.S.FS	56.6	27.18	7.49	2300	3.6	294
3.3.2.2.1	75 % of pull at maximum power at rated speed					
1.S.FS	43.5	20.40	7.67	2333	2.6	302
3.3.2.2.2	50 % of pull at maximum power at rated speed					
1.S.FS	29.7	13.57	7.88	2357	1.6	337
3.3.2.2.3	next higher gear at reduced engine speed; same pull and travelling					
2.S.FL	43.3	20.42	7.63	2105	2.5	279
3.3.2.2.4	next higher gear at reduced engine speed; same pull and travelling					
2.S.FL	29.7	13.54	7.89	2140	1.5	315

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	Height of drawbar above ground	Tyre inflation pressure	
		Front	Rear
nballasted	525 mm	80 kPa	80 kPa

Specific energy	Temperature			Atmospheric conditions		
	Fuel	Coolant	Engine oil	Temperature	Relative humidity	Pressure
kWh/dm³	°C	°C	°C	°C	%	kPa
.69	55	90	104	9	83	99.8
2.83	54	91	103	8	83	99.8
2.98	55	91	105	9	83	99.8
2.98	55	90	105	8	56	100.4
3.06	54	89	104	8	56	100.4
3.02	54	90	103	9	56	100.4
3.03	53	91	102	9	56	100.4
3.03	53	90	102	8	83	99.8
3.02	53	91	103	9	83	99.8
2.91	64	88	91	4	71	100.4
2.82	64	87	90	3	71	100.4
2.51	63	85	91	4	71	100.4
speed as in 3.3.2.1.1						
3.08	59	90	89	4	71	100.4
speed as in 3.3.2.1.2						
2.87	56	91	87	3	71	100.4
2.87	64	87	90	3	83	99.8
2.79	63	86	90	4	83	99.8
2.50	62	85	89	4	83	99.8
speed as in 3.3.2.2.1						
3.02	60	89	88	3	83	99.8
speed as in 3.3.2.2.2						
2.68	58	90	88	3	83	99.8

4	**OPTIONAL TEST RESULTS**	None
5	**REPAIRS**	None
6	**REMARKS**	The drawbar pull and wheel slip in 3.A.FS gear were limited to avoid excessive tractor bouncing

Head of tractor test section

Dipl.-Ing. Manfred Lober

Deutsche Landwirtschafts-Gesellschaft

Test carried out by

Dipl.-Ing. Bodo Huber

Date: 9th December 1999



Impulse für den Fortschritt

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