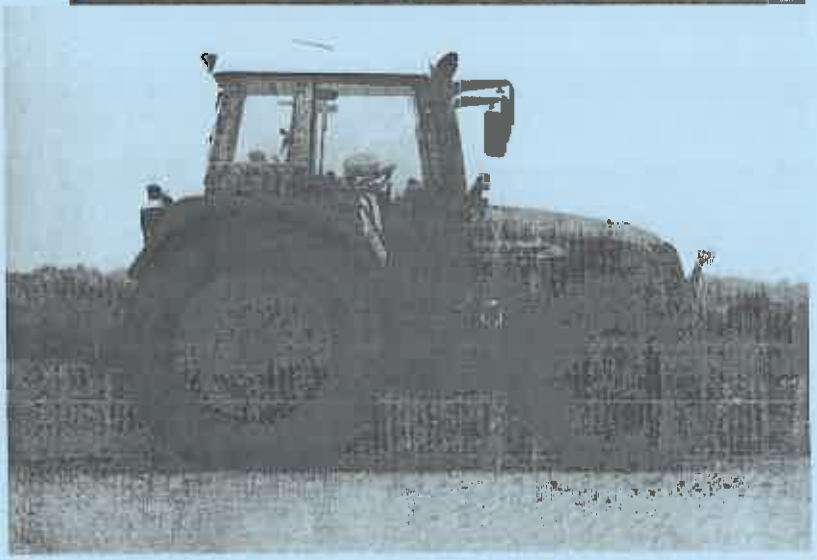
DLG

Prüfstelle für Landmaschinen



REPORT on test in accordance with OECD STANDARD CODE 2 for the Official Testing of Agricultural Tractor Performance

OECD No. 2/1962
9th July 2001

Agricultural Tractor

FENDT FARMER 411 Vario (4WD)

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, (C (2000)59(FINAL), Code 2)

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

Duration of tests: February till September 2000

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: 9th July 2001 OECD No. 2/1962

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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FENDT FARMER 411 Vario (4WD) **DLG-Test No. 2000-057**

Tractor manufacturer:	AGCO GmbH & Co. D-87616 Marktoberdorf
Location of tractor assembly:	D-87616 Marktoberdorf
Submitted for test by:	AGCO GmbH & Co. D-87616 Marktoberdorf
Selected by:	Manufacturer with agreement by DLG
Place of running-in:	Marktoberdorf and Groß-Umstadt
Duration of running-in:	Approx. 120 h
Location of test:	DLG-Testing Station, D-64823 Groß-Umstadt

1 SPECIFICATION OF TRACTOR

1.1 Identification

1.1.1	- Make:	FENDT
	- Model:	FARMER 411 Vario
	- Type:	4WD, semi frame construction
1.1.2	Numbers	
	- 1st serial no.:	411/21/0100
	- Serial no.:	411/21/0209

1.2 Engine

	Make/Model:	DEUTZ / BF 4M 2013 C
	Type:	Water-cooled 4-stroke Diesel-engine, direct injection, supercharged, intercooled, by 4 rubber-bonded metal buffers mounted on frame
	Serial no.:	0458755
1.2.1	Cylinders	
	Number/disposition:	4 / in line
	Bore/stroke:	98 / 126 mm
	Capacity:	3802 cm^3
	Compression ratio:	18.0 : 1
	Arrangement of valves:	Overhead valves, 4 valves per cylinder
	Cylinder liners:	Dry

1.2.2	Supercharging	
	- Make / Model:	KKK / K 14
	- Type:	Exhaust driven supercharger, with air to air intercooler
	- Pressure:	136 kPa
1.2.3	Fuel system	
	- Fuel feed system:	Centrifugal pump, V-belt driven fuel cooler in front of engine cooler
	- Fuel filter	
	Make/Model:	HENGST / -
	Type :	Replaceable paper element filter
	- Capacity of fuel tank:	167 dm^3
	- Injection pump	
	Make/Model:	BOSCH / PFM1R905-1007
	Type :	Separate injection pumps for each cylinder incorporated in crankcase (camshaft driven)
	Serial no.:	-
	Manufacturer's production setting:	84 ± 4 mm^3/stroke at full load and rated speed
	Flow rate:	21.2 ± 1.0 dm^3/h at 2100 min^{-1} and full load
	Timing:	8°- 1° before TDC
	- İnjectors	
	Make/Model:	BOSCH / DLLA 148P1010
	Type :	multi hole (6)
	Injection pressure:	25.0 + 1.2 MPa
1.2.4	Governor	
	- Make/Model:	HEINZMANN / RQV
	- Type:	Centrifugal, variable speed governor, supercharge pressure compensating device
	- Governed range of engine speed:	850 to 2260 ± 40 min^{-1}
	- Rated engine speed:	2100 min^{-1}
1.2.5	Air cleaner	
	- Pre-cleaner	
	Make/Model:	DONALDSON / -
	Type:	Cyclone type, aspirated, incorporated in housing of main cleaner
	Location of air intake:	On top of cab, beside left hand A-post
	- Main cleaner	
	Make/Model:	DONALDSON / FP6-09-0229
	Type:	Dry paper element filter with safety cartridge
	- Maintenance indicator:	Warning light on dashboard

1.2.6	Lubrication system	Pressure lubricated, engine oil/cooling water heat exchanger incorporated in oil-filter socket
	- Type of feed pump:	Internal gear pump
	- Type of filter:	Paper element fine filter (full flow oil filter) exchangeable
	- Number of filters:	1
1.2.7	Cooling system	
	- Type of coolant:	Water-antifreeze mixture
	- Type of pump:	Centrifugal pump
	- Specification of fan:	EATON viscous drive fan, model EV 660, belt driven
	Number of fan blades:	7
	Fan diameter:	550 mm
	- Coolant capacity:	16 dm^3
	- Type of temperature control:	Thermostat with by-pass
	- Superpressure system:	Overpressure relief valve set to 70+20 kPa
1.2.8	Starting system	
	- Make/Model:	BOSCH / EV
	- Type:	Electrical, solenoid pre-engaged drive starter motor
	- Starter motor power rating:	3.0 kW
	- Cold starting aid:	BERU flame glow plug in intake manifold
	- Safety device:	Starter only operable when clutch pedal is pressed down
1.2.9	Electrical system	
	- Voltage:	12 V, negative earth
	- Generator:	
	Make/Model:	BOSCH / NC
	Type:	3-phase alternator 14 V 73-143 A
	Power:	2 kW
	- Battery	
	Number:	1
	Rating:	90 Ah at 20 hours

1.2.10	Exhaust system	
	- Make/Model:	HJS/950 10 222
	- Type:	Reflection type silencer, 165 x 280 mm oval, 387 mm long
	- Location:	Silencer below bonnet, above engine; vertical stack beside the right hand A- post, mouth showing forward to the right
1.2.11	Operating hours meter:	Electronic, counts real operating hours when engine is running
1.3	**Transmission**	
1.3.1	Clutch (travel alone)	No clutch in usual sense, pedal present, controls the oil flow in hydrostatic drive by valve
1.3.2	Gear box	
	- Make/Model:	FENDT / ML 90
	- Type:	"VARIO"-gearbox with variable power branching in a hydrostatic and a mechanic branch
	- Power flow:	From crankshaft via torsional-vibration damper and primary shaft to the planetary-gear carrier of epicycloidal gear train; from there power splitting via the internal gear to the hydrostatic part, and via the sun gear to the mechanical part; both power branches are rejoint on a summation shaft and transmitted by a 2-step range gear to the rear axle
	- Hydrostatic branch:	Acts as travel clutch, as infinitely variable gearbox and as reversing gear; is composed of a variable displacement axial-piston pump and an adjustable axial-piston motor; the axial-piston pump, driven by internal gear of planetary gear train, is hydrostatically coupled to the axial-piston motor; both are adjusted in common according to the following scheme

Travel speed	displacement angle [°]	
	pump	motor
Min.	0	45
Max.	45	0

- Mechanical branch:

Consists of planetary gear train and of 2-step range gear (primary shaft of range gear simultaneously serves as summation shaft); the sun gear of planetary gear train propels the summation shaft;
electromagnetic change of travelling ranges at travelling speed below 2 km/h by momentary push-button and toggle switch (at drive-control lever)

range		travel speed [km/h]	
		forward	reverse
I	heavy use	0-28	0-16
II	fast transport	0-50	0-37

- Operation:

Is managed by the so-called drive-control lever which controls following functions:
1. off-position (engine stands still, tractor is blocked up force-locking)
2. quick reversing (change of driving direction)
3. continuous change of transmission ratio - forward
4. continuous change of transmission ratio - reverse
5. automatic control of travelling speed;

the operating speed of gear ratio change may be varied in 4 steps by means of slider switch at drive-control lever

- Lubrication:

Oil circuit in common with rear axle drive, gear-oil cooler in front of engine water cooler;
1 oil filter in suction line
1 oil filter in pressure line

1.3.3 Rear axle and final drives

- Make/Model: FENDT / HA 90
- Type: Bevel gear drive, bevel gear differential with lock, planetary final drives

- Differential lock
  - Type: Multi-plate lock,
  - Method of engagement/ disengagement: Electro-hydraulically operated by hand or automatically, indicator light

1.3.4	Front axle and final drives	
	- Make/Model:	ZF / APL 2000 / F 4
	- Type:	4WD axle, transmission via wet multi-plate clutch, propeller shaft, bevel gear drive, differential with lock, planetary final drives ; clutch electro-hydraulically operated by non locking push-button; swing-axle with longitudinal swivelling lever, hydro-pneumatic suspension, height-controlled (suspension stroke ± 50 mm); suspension switchable to on-off by push-buttons electro-hydraulically
	- Differential lock Type:	Wet multi- plate lock and additional limited slip multi-plate lock (LOCOMATIC)
	Method of engagement/ disengagement:	In common with rear axle differential lock, respectively automatical
	Number of revolutions of front wheels for one revolution of rear wheels:	1.327
1.3.5	Total ratios and travelling speeds:	Not applicable See specified speed ranges in 1.3.2
1.4	**Power take-off**	
1.4.1	Main power take-off	
	- Type:	Independent
	- Method of engagement:	Driven by wet multi-plate clutch, clutch by push-buttons electro-hydraulically operated; engaging-speed controlled depending on the actuating-time of push-button; additional remote control of p.t.o. clutch on rear mudguards
	- Number of shafts:	1
	- Method of changing power take-off shaft ends and speeds:	Flanged stub shaft, changeable; 3 speeds may be selected by push-button electro-hydraulically

1.4.1.1 Power take-off proportional to engine speed:
Shiftable as type 540, 540E*) or 1000 min^{-1} p.t.o.

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

P.t.o.-type:	540	540 E	1000
- Location:	at rear of tractor		
- Diameter of p.t.o shaft:	35 mm		
- Number of splines:	6		
- In conform. with ISO 500 :1991	type 1**)		
- Height above ground:	780 mm		
- Distance from the median plane of tractor:	0 mm		
- Distance behind rear wheel axis:	510 mm		
- PTO speed at rated engine speed 2100 min^{-1}:	587 min^{-1}	755 min^{-1}	1084 min^{-1}
- Engine speed at standard power take-off speed:	1932 min^{-1}	1502 min^{-1}	1937 min^{-1}
- Ratio of rotation speeds:	3.5789	2.7826	1.9375
- Power restriction:	- kW	- kW	- kW
- Max. torque transmissible:	- Nm	- Nm	-Nm
- Direction of rotation (viewed from behind tractor):	Clockwise		

**) On request in conformity with ISO 500:1991 type 2

1.4.1.2	Power take-off proportional to ground speed:	None
1.4.2	Optional power take-off:	Front p.t.o. on request, not fitted

1.5 Hydraulic power lift

- Make / Model:	FENDT and BOSCH /-
- Type:	electronic-hydraulic power lift at rear, hydraulic power lift at front, desintegrated constructions
- Hydraulic system:	Closed, load sensing, pressure and flow compensated system; supplies rear and front power lift including additional control valves, steering system and height-control of front axle suspension
- Rear power lift:	BOSCH, EHR CX1 switchable mechanically over to double acting additional control valve for operation "lifting" and "pushing"; external push-buttons on the left and right at rear mudguards; draft, position and intermixable control, control of cylinder pressure, floating position, fast raising (switch with transport lock and position "vibration damping"), raise limit, lowering throttle, lower link sensing
- Front power lift:	On request, fitted to tractor tested; BOSCH control valve SB 23, with operation "pushing"; laterally stabilized lower links, vibration damping

- Power beyond: On request, at rear of tractor, fitted to tractor tested

		rear power lift	front power lift
- Number of cylinders:		2	2
- Type of cylinders: Single or double acting		double	double
- Bore / stroke:	[mm]	90 and 80 / 247	70 and 55 / 170
- Piston rod diameter:	[mm]	40	28
- Type of linkage lock for transport:		hydraulic, lowering throttle	hydraulic, stopcock
- Opening pressure of cylinder safety valve:		23 + 2.0 MPa	no safety valve

- Relief valve pressure setting: 20.0 + 1.0 MPa
- Lift pump
  - Make / Model: REXROTH / A 10V028 DFR1/52 R-PSC 11
  - Type: Variable displacement axial-piston pump
- Transmission between pump and engine: Independently driven by gear box
- Type and number of filters: 1, exchangeable filter in return line
- Site of oil reservoir: Separate oil reservoir with 42 dm³ volume on left hand side below cab floor
- Type, number and location of tapping points:

  At rear of tractor:
  Total 4 pairs, double acting,
  with adjustable flow control (optional);

  1 coupler for low pressure return line

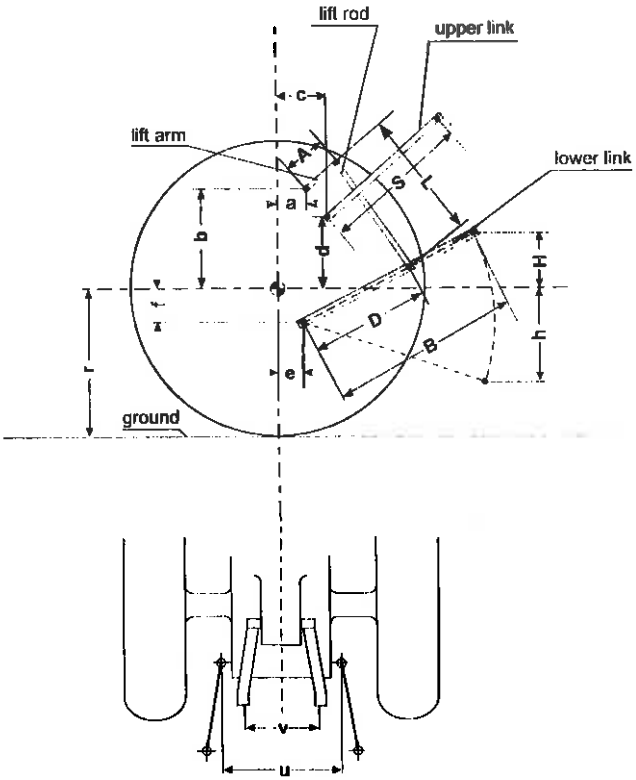
  At front of tractor:
  1 pair of couplers, double acting,
  1 coupler for low pressure return line

Maximum volume of oil available to external cylinders : 35 dm³

1.6 Three-point linkage

1.6.1 Three-point linkage at rear:

- Category:	2, acc. to ISO 730-1/1994 + Cor. 1:1995 with WALTERSCHEID quick couplers
- Category adapter:	None



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Dimensions of rear implement linkage			projected lengths in mm	
			dimensions (general)	dimensions used for tests on page 2
Rear tyres 520/70 R 38 Front tyres 480/70 R 24		r *) (r') *)	820 620	
Length of lift arms		(A)	340	
Length of lower links		(B)	965	
Distance of lift arm pivot points from rear wheel axis	horizontal vertical	(a) (b)	182 303	
Horizontal distance between lower link pivot points		(u)	462	
Horizontal distance between lift arm end points		(v)	613	
Length of upper link		(S)	615 to 915	748
Distance of upper link pivot point from rear wheel axis	horizontal vertical	(c) (d)	324 / 363 339 / 232	363 232
Distance of lower link pivot points from rear wheel axis	horizontal vertical	(e) (f)	145 223	
Distance of lower link pivot points from lift rod pivot points on lower links		(D)	634	
Length of lift rods		(L)	640 to 760	710

Heights (h, H, H') of lower link hitch points relative to rear wheel axis (situated 820 mm above ground), at different adjustments of L

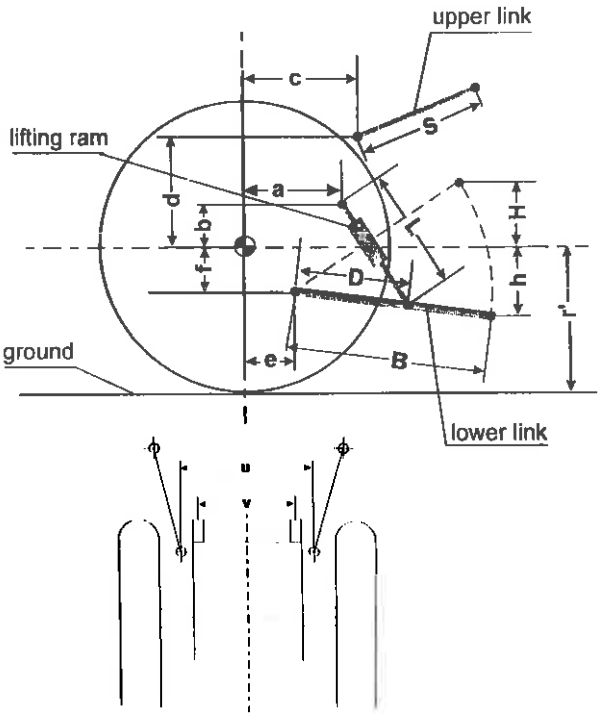
These data are valid for unloaded power lift (front axle suspension switched off)

Length of lift rods	(L)	640	760	710
Linkage distance of lift rods	(D)	634		
Lowest position	(h)	480	690	620
Highest position	(H)	220	60	120
Transport position	(H')	220	69	120

*) Assuming r resp. r' = tyre dynamic radius index (not in conformity with ISO 4251-1/1998)

1.6.2 Three-point linkage at front:

- Category:	2, acc. to ISO 730-1/1994 + Cor. 1:1995 with WALTERSCHEID quick couplers
- Category adapter:	None



FENDT FARMER 411 Vario (4WD) **DLG-Test No. 2000-057**

Dimensions of front implement linkage			projected lengths in mm
Rear tyres 520/70 R 38		r *)	820
Front tyres 480/70 R 24		(r') *)	620
Length of lower links		(B)	770
Distance of lift cylinder pivot points from front wheel axis	horizontal	(a)	284
	vertical	(b)	295
Horizontal distance between the 2 lower link pivot points		(u)	460
Horizontal distance between the 2 lift cylinder pivot points		(v)	460
Length of upper link		(S)	from 520 to 790, 595 **)
Distance of upper link pivot point from front wheel axis	horizontal	(c)	494
	vertical	(d)	400
Distance of lower link pivot points from front wheel axis	horizontal	(e)	270
	vertical	(f)	95
Distance of lower link pivot points from fixing points of lift cylinders on lower links		(D)	217
Length of lift cylinders		(L)	from 360 to 530

Heights (h, H, H') of lower link hitch points relative to front wheel axis (situated 620 mm above ground)

These data are valid for unloaded power lift (front axle suspension switched off)

Lowest position	(h)	395
Highest position	(H)	270
Transport position	(H')	270

*) Assuming r resp. r' = tyre dynamic radius index (not in conformity with ISO 4251-1/1998

**) used during test on page 29

1.7	**Swinging drawbar**	On request, not fitted	
1.8	**Trailer hitch**		
	- Make / model / type:	ROCKINGER / 850 U 140 / automatical, with remote control	
	- Pin diameter:		30 mm
	- Height above ground:	Mouth of coupling adjustable to	555 / 615 / 841 / 883 / 925 / 967 / 1009 mm
	- Distance of hitch point from: rear wheel axis, horizontally		720 mm
	power take-off shaft end vertically	below	225 / 165 mm
		above	61 / 103 / 145 / 187 / 229 mm
	horizontally		210 mm
	- Maximum vertically permissible load:		2000 kg
1.9	**Holed drawbar**	Short bar optionally available, not fitted	
1.10	**Steering**		
	- Make / model / type:	DANFOSS / OSPC 125 LSR / hydrostatic front wheel steering	
	- Method of operation:	By steering wheel and cylinder directly acting on steering levers	
	Pump:	Gear pump with 32 dm³/min delivery at rated engine speed (only if delivery of axial-piston pump of hydraulic circuit is ordered by control valves)	
	Ram:	1 integrated FENDT ram (symmetrical design) 251 mm stroke, 70 mm bore and 40 mm dia of piston rod	
	- Working pressure:		20 MPa

1.11 Brakes

1.11.1 Service brake:

- Make/Model:	FENDT and KNOTT / -
- Type:	Muscle power braking system, acting on 2 axles 1 wet multiple-disc brake with 5 discs with 222 mm diameter each on the differential half shafts, automatic engagement of front wheel drive when brake activated
- Method of operation:	Pedal operated, hydraulic transmission
- Trailer braking take-off:	Combined one line / two line air braking system

1.11.2 Parking brake

- Type:	Muscle power brake, acting on rear axle brake
- Method of operation:	Operated by lever with ratchet

1.12 Wheels

- Number

  Front: Steering and driving, 2 pneumatics
  Rear: Driving, 2 pneumatics

- Wheel base: 2417 mm

- Track width adjustment:

	Minimum mm	Maximum mm	Adjustment method
Front	1674	1880	Adjustable gauge-bowl rims
Rear	1736	1936	

1.13 Protective structure

- Make/Model: FENDT / 411.810
- Type: Safety-cab, sound- and vibration insulated;
  cab supports:
  By antivibration silent blocks fixed at front to the frame, at rear to the rear axle;
  1 door and 3 steps on the left and right each;
  water-heating, ventilation system, air conditioner
- Manufacturer's name and address: AGCO GmbH & Co.
  D-87616 Marktoberdorf
- Protective device
  Cab/frame/rollguard: Cab;
  structure consists of a 6-post-frame with longitudinal and transverse bracing,
  tiltable to the front for maintenance routine
- OECD approval
  Approval number: 4 / 0626
  Date of approval: 14th March 2000
  Nos. of minor modification certificates: None

1.14 Seat

1.14.1 Driver's seat

- Make/Model: GRAMMER / MSG 95 A / 731
- Type: Upholstered seat with back rest and arm rests
- Seat and steering wheel reversible: No
- Type of suspension: Pneumatic
- Type of damping: Hydraulic
- Range of adjustment
  - Longitudinally: 210 mm
  - Vertically: 80 mm
- Safety belt: Yes, optionally

1.14.2 Optional driver's seats

- Make / model: None

1.14.3 Passenger's seat

- Location: On the left mudguard
- Capacity (number): 1

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	1188	125 ∅	265
Auxiliary lamps	2745	138 x 75	190
Sidelights	1762	70 x 20	900
Rearlights	1630	125 x 48	920
Reflectors, 1st pair	1555	72 ∅	925
2nd pair	820	72 ∅	330

2 TEST CONDITIONS

2.1 Overall dimensions, unballasted

Length		Width	Height at top of	
with front power lift	without	(track widths as in 2.5)	protective structure	exhaust silencer pipe
mm		mm	mm	mm
4695	4260	2370	2850	2825

2.2 Ground clearance

- (unballasted tractor): 450 mm (with front power lift)

- Clearance-limiting part: Front axle

2.3 Tractor mass

	Without driver kg	With driver kg
Front	2230	2235
Rear	3270	3340
Total	5500	5575

2.4 Track specifications: Not applicable

2.5 Tyres and track widths specifications

	Front		Rear	
Tyres:	KLEBER SUPER 8L		KLEBER SUPER 9L	
dimensions	480/70 R 24		520/70 R 38	
load index speed index	138 A8	125 B	150 A8	147 B
type	radial			
maximum load (tyre manufacturer's)	23.15 kN	21.39 kN	32.86 kN	30.17 kN
at travelling speed	40 km/h	50 km/h	40 km/h	50 km/h
at tyre inflation pressure	160 kPa			
maximum load (tractor manufacturer's)	39.24 kN		63.77 kN	
dynamic radius index	620 mm		820 mm	
Chosen track width	1820 mm		1800 mm	

2.6 Fuel

- Type: ARAL-Diesel-fuel, in conformity with DIN 51601
- Density at 15°C: At p.t.o. test 0.835 g/cm³
  at drawbar power test 0.839 g/cm³

2.7 Oils and lubricants

2.7.1 Capacity and change interval

	Capacity dm³	Oil change h	Filter-change h
Engine	11	500	500
Gear box	38	2000 or 2 years	2000 (intake filter) 500 (pressure filter)
Front axle	6	1000	-
Rear axle	In common with gearbox		
Final drives at front	0.8 each	1000	-
Final drives at rear	6.5 each	2000	-
Hydraulic system	42	1000	1000
Steering	in common with hydraulic system		

2.7.2 Specifications

	Specified	Used during test
Engine		
Type	Full-Year Engine oil	BAYWA SUPER 2000 CD-MC
Viscosity	SAE 10W/30, 10W/40 SAE 15W/30 or 15W/40	SAE 10W/30
Classification	API-CD, CCMC-D4 or CCMC-D5	CCMC-D4
or	Full-Year Super High Performance Diesel Oil SHPD	
Viscosity	10W/40	
Classification	CCMC-D5	
Gearbox Rear axle drive		
Type	Super-Tractor-Oil-Universal STOU	BAYWA SUPER 2000 CD-MC
Viscosity	SAE 10W/30, 15W/30	SAE 10W/30
Classification	API-GL4	API-GL4
Rear axle final drives Front axle drive Front axle final drives		
Type	Hypoid-Gear-Oil	MOBILUBE HD 85 W-90-A
Viscosity	SAE 80W/90, 85W/90 or SAE 90	SAE 85 W/90
Classification	API-GL5	API-GL5
Hydraulic system		
Type	Super-Tractor-Oil-Universal STOU	ESSOLUBE XD - 3 +
Viscosity	SAE 10W/40, 10W/30, 15W/30	SAE 20W/20
Classification	API-GL5	API-CD
or	Engine oil	
Viscosity	SAE 20W/20	
Classification	API-CD (at temperatures > +10°C)	

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

- number of lubrication points: 14

3 COMPULSORY TESTS RESULTS

3.1 Main power take off performance (1000 min^{-1})

Date of tests: 24th February 2000
Location of tests: DLG-Testing Station Groß-Umstadt
Type of dynamometer: SCHENCK hydraulic dynamometer U1-40

Power kW	Speed Engine min^{-1}	Speed P.t.o. min^{-1}	Fuel consumption hourly kg/h	Fuel consumption hourly dm^3/h	Fuel consumption specific g/kWh	Specific energy kWh/dm^3
Maximum power						
3.1.1 At 2-hour test						
82.7	1805	932	18.44	22.09	223	3.74
3.1.2 At rated speed						
75.3	2102	1085	17.91	21.45	238	3.51
3.1.3 At standard p.t.o. speed						
80.7	1939	1001	18.33	21.95	227	3.68
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						
75.3	2102	1085	17.91	21.45	238	3.51
3.1.4.2 85% of the torque obtained in 3.1.4.1						
66.3	2177	1124	16.57	19.84	250	3.34
3.1.4.3 75% of the torque defined in 3.1.4.2						
50.8	2212	1142	13.57	16.25	267	3.13
3.1.4.4 50% of the torque defined in 3.1.4.2						
33.9	2237	1155	10.59	12.68	312	2.68
3.1.4.5 25% of the torque defined in 3.1.4.2						
17.3	2263	1168	7.52	9.01	434	1.93
3.1.4.6 Unloaded						
-	2294	1184	4.63	5.55	-	-

FENDT FARMER 411 Vario (4WD) **DLG-Test No. 2000-057**

Power kW	Speed Engine min⁻¹	Speed P.t.o. min⁻¹	Fuel consumption hourly kg/h	Fuel consumption hourly dm³/h	Fuel consumption 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						
80.7	1939	1001	18.33	21.95	227	3.68
3.1.5.2 85% of the torque obtained in 3.1.5.1						
71.9	2030	1048	16.99	20.35	237	3.53
3.1.5.3 75% of the torque defined in 3.1.5.2						
55.0	2075	1071	13.77	16.49	251	3.33
3.1.5.4 50% of the torque defined in 3.1.5.2						
37.1	2113	1091	10.60	12.69	285	2.92
3.1.5.5 25% of the torque defined in 3.1.5.2						
19.1	2150	1110	7.42	8.89	389	2.15
3.1.5.6 Unloaded						
-	2191	1131	4.33	5.19	-	-

No load maximum engine speed:	2294 min⁻¹
Equivalent flywheel torque at rated engine speed:	342 Nm
Equivalent flywheel torque at 2-hour test:	437 Nm
at engine speed:	1805 min⁻¹
Maximum equivalent flywheel torque:	511 Nm
at engine speed:	1251 min⁻¹

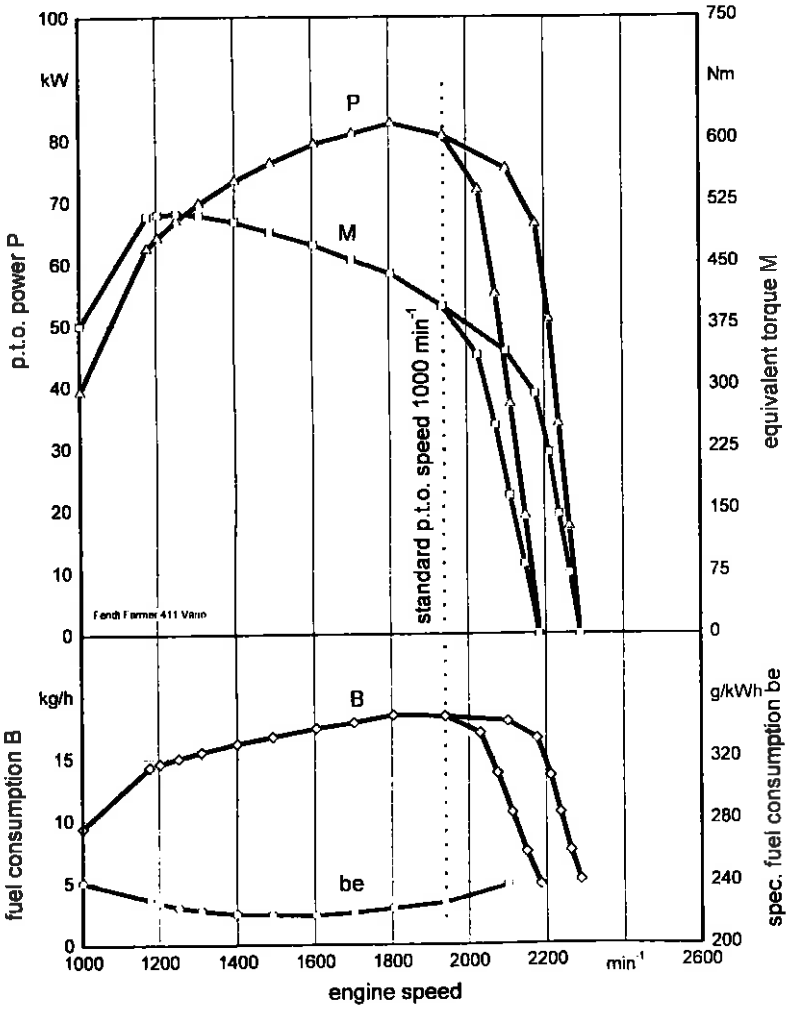
Mean atmospheric conditions

temperature:	20 °C
pressure:	100,5 kPa
relative humidity:	35 %

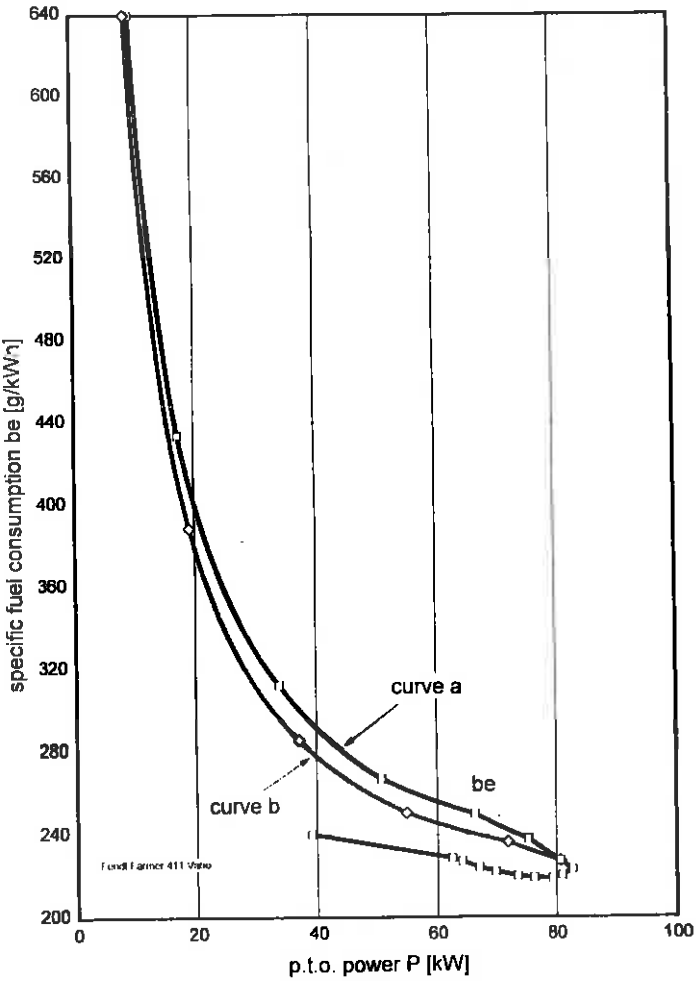
Maximum temperatures

coolant:	95 °C
oil:	117 °C
fuel:	67 °C
air intake:	30 °C

P.t.o.-test


p.t.o. power P
kW
100
80
70
60
50
40
30
20
10
0
P
M
standard p.t.o. speed 1000 min-1
equivalent torque M
Nm
750
600
525
450
375
300
225
150
75
0
Fendt Farmer 411 Vario
fuel consumption B
kg/h
15
10
5
0
B
be
spec. fuel consumption be
g/kWh
320
280
240
200
1000
1200
1400
1600
1800
2000
2200
min-1
2600
engine speed

P.t.o. test


specific fuel consumption be [g/kWh]
640
600
560
520
480
440
400
360
320
280
240
200
0
20
40
60
80
100
p.t.o. power P [kW]
curve a
curve b
be
Fendt Farmer 411 Vario

3.2 HYDRAULIC POWER AND LIFTING FORCE

- Date of tests: 31st August to 6th September 2000

3.2.1 Hydraulic power test

- Sustained pressure with relief valve open 20.2 MPa
- Pump stalled: No
- Pump delivery rate at minimum pressure 82.3 l/min

	Hydraulic power kW	Flow rate l/min	Pressure MPa	Oil Temperature °C
At 90% of the actual relief valve setting	20.8	68.6	18.2	65
Maximum	20.9	67.6	18.5	65

- Tapping point used for test: At rear of tractor, connected with additional control valve no. 1
- Opening/closing pressure of unloading valve: Not applicable

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	740 mm 720 mm	865 mm 847 mm
Max. corrected force exerted through full range	44.30 kN	38.20 kN
Corresponding pressure	18.2 MPa	
Moment about rear axle	-	65.32 kNm
Max. tilt angle of mast from vertical		9°

Lifting heights relative to horizontal lower links

mm	-462	-400	-397	-300	-200	-100	0	+100	+200	+300	+323	+385
Lifting forces at hitch points, corrected to 18.2 Mpa												
kN			44.30	46.90	49.50	52.90	56.70	59.80	62.50	63.50	62.10	
Lifting forces at standard frame, corrected to 18.2 Mpa												
kN	38.20	39.60		41.00	43.10	44.40	45.80	46.80	46.80	45.00		41.40

3.2.3 Power lift test at front power lift

	At the hitch points	On the frame
Height of lower hitch points above ground in down position	225 mm	
Vertical movement without lifting forces	665 mm	825 mm
with lifting forces	640 mm	795 mm
Max. corrected force exerted through full range	18.90 kN	16.00 kN
Corresponding pressure	18.2 MPa	
Moment about front axle	-	27.36 kNm
Max. tilt angle of mast from vertical	-	11°

Lifting heights relative to horizontal lower links

mm	-350	-300	-200	-100	0	+100	+200	+300	+340	+400	+445
Lifting forces at hitch points, corrected to 18.2 MPa											
kN		18.90	19.50	20.40	21.70	23.20	24.90	26.80	27.50		
Lifting forces at standard frame, corrected to 18.2 MPa											
kN	16.00	16.00	16.40	16.90	17.40	17.70	18.00	18.00		17.70	17.50

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3.3 DRAWBAR POWER TEST (unballasted tractor)

- Date of test: 10th August 2000
- Type of track: Concrete

Number of 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 GEAR RATIOS (unballasted tractor)					
I	46.9	57.07	2.96	2145	15.1	367
I	54.7	57.25	3.44	1979	15.0	337
I	61.5	53.36	4.15	1800	9.1	300
I	64.3	45.41	5.10	1794	5.6	286
I	65.3	39.69	5.92	1802	4.4	284
I	65.4	35.46	6.64	1803	3.9	283
I	64.5	28.40	8.17	1802	3.4	288
I	63.5	23.43	9.76	1800	2.7	292
II	60.9	27.59	7.95	1800	3.6	303
II	62.5	23.51	9.57	1798	3.0	294
II	63.2	20.03	11.36	1799	2.3	292
II	63.2	17.17	13.26	1799	1.8	292
II	61.6	15.01	14.78	1802	1.7	299
3.3.2 3.3.2.1	FUEL CONSUMPTION in selected gear ratio, at maximum power at rated speed					
I	58.0	26.35	7.93	2104	3.1	306
3.3.2.1.1	75 % of pull at maximum power at rated speed					
I	46.0	19.77	8.38	2187	2.4	336
3.3.2.1.2	50 % of pull at maximum power at rated speed					
I	31.6	13.19	8.62	2211	1.4	385
3.3.2.1.3	gear ratio about 20% higher, reduced engine speed; same pull and travelling speed as in 3.3.2.1.1					
I	46.0	19.66	8.42	1796	2.7	306
3.3.2.1.4	gear ratio about 20% higher, reduced engine speed; same pull and travelling speed as in 3.3.2.1.2					
I	31.4	13.27	8.53	1784	1.5	339
3.3.2.2	in selected gear ratio nearest to 7.5 km/h at rated speed					
I	57.5	29.45	7.03	2102	3.4	310
3.3.2.2.1	75 % of pull at maximum power at rated speed					
I	45.4	22.06	7.42	2190	2.7	338
3.3.2.2.2	50 % of pull at maximum power at rated speed					
I	31.5	14.85	7.63	2212	1.8	388
3.3.2.2.3	gear ratio about 20% higher, reduced engine speed; same pull and travelling speed as in 3.3.2.2.1					
I	45.3	22.13	7.37	1756	2.6	300
3.3.2.2.4	gear ratio about 20% higher, reduced engine speed; same pull and travelling speed as in 3.3.2.2.2					
I	31.2	14.87	7.56	1767	1.7	323

FENDT FARMER 411 Vario (4WD) **DLG-Test No. 2000-057**

	Height of drawbar above ground	Tyre inflation pressure	
		Front	Rear
unballasted	530 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
2.29	71	94	109	25	55	100.5
2.49	70	94	108	25	55	100.5
2.80	71	96	111	26	55	100.5
2.93	69	95	109	25	55	100.5
2.95	67	94	110	20	61	100.5
2.96	67	94	110	21	61	100.5
2.91	67	94	109	25	61	100.5
2.87	68	95	110	25	61	100.5
2.77	72	97	112	25	55	100.5
2.85	72	97	112	25	54	100.3
2.87	70	96	110	25	54	100.3
2.87	72	97	111	26	54	100.3
2.81	72	97	112	26	54	100.3
2.74	71	95	108	27	54	100.3
2.50	71	93	109	27	54	100.3
2.18	70	91	107	27	54	100.3
2.75	67	91	105	27	54	100.3
2.48	65	88	103	27	54	100.3
2.71	72	94	110	28	54	100.3
2.48	71	92	108	28	54	100.3
2.16	69	91	106	28	54	100.3
2.80	68	92	105	28	54	100.3
2.60	67	89	103	28	54	100.3

4 ADDITIONAL TESTS under the responsibility of the DLG Testing Station

4.1 Measurement of noise at the driving position carried out in accordance with OECD CODE 5

Results of sound level test - "Under load" procedure

Date of test: 15th and 16th August 2000
Type of track: Concrete
Type of sound level meter: BRÜEL & KJAER model 2233

Number of range	Drawbar pull	Engine speed	Measured travelling speed	Number of driving wheels	Sound level
	kN	min^{-1}	km/h		dB(A)
4.1.1 Test with the drawbar pull for which the tractor gives the maximum sound level (gear ratio giving the nearest nominal forward speed to 7.5 km/h and also in any speed settings with a sound level increase of at least 1 dB(A))					
4.1.1.1 All openings closed					
I	31.23	2099	7.05	4	72.0
I	14.06	2105	14.66	4	73.5
II	16.55	2100	12.34	4	73.0
I	31.97	2109	6.85	2	72.0
4.1.1.2 All openings open *)					
I	29.98	2097	6.95	4	80.0
I	15.30	2109	12.69	4	81.0
I	13.19	2100	14.55	4	81.5
II	16.67	2101	12.54	4	81.5
II	14.68	2108	14.66	4	81.5
I	30.23	2110	6.75	2	79.5
I	41.43	2096	4.83	2	81.0
I	18.41	2105	12.44	2	81.5
I	14.18	2106	14.25	2	80.5
II	24.63	2105	8.36	2	81.0
II	17.67	2100	10.68	2	81.0
II	15.18	2110	12.44	2	81.5
II	12.19	2108	14.86	2	81.0

Number of range	Drawbar pull	Engine speed	Measured travelling speed	Number of driving wheels	Sound level
	kN	min^{-1}	km/h		dB(A)
4.1.2	**Unloaded test in the gear ratio giving the forward speed nearest to 7.5 km/h**				
4.1.2.1	**All openings closed**				
I	0	2261	8.06	4	69.0
I	0	2268	7.96	2	69.5
4.1.2.2.	All openings open *)				
I	0	2264	8.06	4	77.5
I	0	2265	7.96	2	76.5
4.1.3	Unloaded test in the gear ratio giving the maximum forward speed				
4.1.3.1	All openings closed				
II	0	2200	50.0	2	73.5
4.1.3.2	All openings open *)				
II	0	2200	50.0	2	79.5

*) Openings: 2 side windows, rear window, roof hatch

5	**REPAIRS**	None
6	**REMARKS**	None

Head of tractor test section

Dip.-Ing. Manfred Lober

Deutsche Landwirtschafts-Gesellschaft

Test carried out by

Dipl.-Ing. Bodo Huber

Date: 17th August 2001



Impulse für den Fortschritt

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