Prüfstelle für Landmaschinen



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

OECD No. 2/2125
14th May 2004

Agricultural Tractor

John Deere 6320 NA PowrQuad Plus (4WD) TIER2

Manufacturer

DEERE & COMPANY, Moline, Illinois, USA

This is a report on a tractor test in accordance with OECD STANDARD CODE for the Official Testing of Agricultural Tractor Performance (C(2002)17(FINAL), "Red Code", Code 2).

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

Duration of tests: October 2003 till January 2004

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: 14th May 2004 OECD No. 2/2125

A new OECD-test on the agricultural tractor John Deere 6320 NA PowrQuad Plus was necessary, because the engine setting has been changed in accordance to the exhaust emission standard TIER2, EPA.

Statement

The information opposite each item has been validated by the Testing Station. An item marked [C] indicates to the test report user that the information declared by the manufacturer has been checked; an item marked [D] indicates that the manufacturer's declaration has been endorsed.

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[C]	Tractor manufacturer's name and address:	DEERE & COMPANY, Moline, Illinois, USA
[C]	Location of tractor assembly:	JOHN DEERE Werke Mannheim, D-68163 Mannheim
[C]	Submitted for test by:	Manufacturer
[C]	Selected for test by:	Manufacturer with agreement by DLG
[D]	Place of running-in:	Mannheim and Gross-Umstadt
[D]	Duration of running-in:	Engine 20h, tractor 15h
[C]	Location of test:	DLG-Testing Station, D-64823 Gross-Umstadt

1 SPECIFICATIONS OF TRACTOR

1.1 Identification

1.1.1

[C]	- Make:	JOHN DEERE
[C]	- Model:	6320
[C]	- Type:	4WD, full frame design

1.1.2 Numbers

[D]	- 1st serial No.:	316456 (1st September 2001)
[C]	- Serial No.:	387488

1.1.3 Other specifications:

[C]	- Region version:	NA
[C]	- Transmission version:	PowrQuad Plus, 30 km/h
[D]	- Engine version:	exhaust emission according to TIER 2, EPA and guideline 2000/25/EG

1.2 Engine

[C]	Make/Model/Type:	JOHN DEERE / 4045HL270 (DD20211) / water-cooled 4-stroke Diesel-engine, direct injection, supercharged and intercooler, antivibration mounted
[C]	Serial No.:	807900

1.2.1	**Cylinders**	
[C]	Number/disposition:	4 / vertical in line
[D]	Bore/stroke:	106.5 mm / 127 mm
[C]	Capacity:	4525 cm^3
[D]	Compression ratio:	16.9 ± 0.5 : 1
[D]	Arrangement of valves:	Overhead valves, 2 per cylinder
[D]	Cylinder liners:	Wet
1.2.2	Supercharging	
[C]	- Make / Model / Type:	CZECH / K27 123 (RE518823) / exhaust driven supercharger with SAMSUNG water cooled intercooler (by low temperature section of water cooler)
[D]	- Pressure	Max. 69 kPa
1.2.3	Fuel system	
[C]	- Fuel feed system:	Electrical vane type fuel supply pump
	- Fuel filter	
[C]	Make/Model:	JOHN DEERE / -
[C]	Type :	2 replaceable paper element filter
[D]	- Capacity of fuel tank:	165 dm^3
	- Injection pump	
[C]	Make/Model:	STANADYNE / B3 DE2435-5780 (RE518167)
[C]	Type:	DE10; distributor injection pump with timing device
[C]	Serial no.:	10506721
[C]	Manufacturer's production setting:	77 ± 3 mm^3/stroke at full load and rated speed;
[C]	Flow rate:	21.2 ± 0.8 dm^3/h at 2300 min^{-1} and full load
[C]	Timing:	electronically controlled
	- Injectors	
[D]	Make/Model:	STANADYNE / 35107
[D]	Type :	Multi hole
[D]	Injection pressure:	26.3 ± 0.5 MPa
1.2.4	Governor	
[D]	- Make/Model/Type:	STANADYNE / - / electronically driven all speed governor
[C]	- Governed range of engine speed:	850 ± 50 to 2460 ± 50 min^{-1}
[C]	- Rated engine speed:	2300 min^{-1}

1.2.5	Air cleaner	
	- Pre-cleaner	
[C]	Make/Model:	DONALDSON / 991220
[C]	Type:	vacuum aspirated (cooling fan) cyclone type pre-cleaner integrated in front cover of main cleaner housing
[C]	Location of air intake:	Above water cooler, below bonnet
	- Main cleaner	
[C]	Make/Model:	DONALDSON / 991220
[C]	Type:	Dry paper element filter with additional safety cartridge
[C]	- Maintenance indicator:	Warning light on dashboard
1.2.6		
[D]	Lubrication system	Pressure lubrication with engine oil/cooling water heat exchanger in engine block
[D]	- Type of feed pump:	Gear pump
[C]	- Type of filter:	Full flow, replaceable cartridge
[C]	- Number of filters:	1
1.2.7		
[C]	Cooling system	Water cooling (high temperature section of water cooler)
[C]	- Type of coolant:	Water-anti-freeze mixture
[D]	- Type of pump:	Impeller pump
	- Specification of fan	
[C]	Number of fan blades:	9
[C]	Fan diameter:	600 mm
[D]	- Coolant capacity:	13.5 dm^3
[C]	- Type of temperature control:	Thermostat and by-pass circuit, BEHR viscous drive fan, belt driven; variable fan speed controlled by air flow temperature
[D]	- Superpressure system:	70 ± 20 kPa

1.2.8	Starting system	
[C]	- Make/Model/Type:	BOSCH EV / 12V / 0 001 230 003 (RE506589) electrical, solenoid pre-engaged drive starter motor, gear reduction starter
[D]	- Starter motor power rating:	3 kW
[C]	- Cold starting aid:	Heating spiral in air intake manifold
[C]	- Safety device:	Forward / reverse lever in neutral position at engine shut off
1.2.9	Electrical system	
[D]	- Voltage:	12 V
	- Generator:	
[C]	Make/Model/Type:	BOSCH / 14 V / 70 - 115 A / 3-phase alternator
[C]	Power:	1.6 kW
[C]	- Battery:	1 lead acid battery, 12 V / 154 Ah (AL119622) at 20 hours rating
1.2.10	Exhaust system	
[C]	- Make/Model/Type:	EBERSPÄCHER / AL82411 / single-chamber absorption type, oval 175 mm x 275 mm / 215 mm long
[C]	- Location:	Under bonnet, vertical stack at right A-post of cab, mouth showing upward / forward
1.2.11		
[D]	Operating hours meter:	Electronic, counts real hours when engine is running

1.3 Transmission

1.3.1	Clutch	
[D]	- Make/Model/Type:	JOHN DEERE / - / wet multi-plate
[D]	- Number of plates:	4
[D]	- Diameter of plates:	225 mm
[C]	- Method of operation:	By pedal and reverse lever, hydraulically, by low pressure hydraulic circuit, operated by valve

1.3.2 Gear box

[C] - Make/Model/Type: JOHN DEERE / PowrQuad Plus, 30 km/h / mechanical, 30 km/h version

[C] - Description: Speed change gear with 4 ranges (A, B, C, D; synchronized),
4 step power shift (1, 2, 3, 4) with automatic power shifting, power shifted reversing gear

		Forward	Reverse
[C]	No. of gears	4	4
[C]	No. of ranges	4	4
[C]	Total	16	16

2 levers, 2 buttons and 1 rocker switch

[D] - Available options (not fitted): PowrQuad (28/28) 30 km/h with creeper gear
PowrQuad (24/24) 40 km/h, 6 range gears without creeper gear
PowrQuad (36/36) 40 km/h, 6 range gears with creeper gear

[D] - Lubrication: Forced-feed lubrication, oil cooler (ring cooler) at the rear end of engine block, (low temperature section of water cooler), 2 filters

1.3.3 Rear axle and final drives

[D] - Make/Model/Type: JOHN DEERE / - / bevel gear drive with bevel gear differential and planetary final drives

- Differential lock:

[D] Type: Wet multi-plate

[C] Engagement: Electro-hydraulically by foot switch

[C] Disengagement: By pedal of service brake

1.3.4 Front axle and final drives

[C] - Make/Model/Type: ZF/ AS2035 / swing axle, driving and steering; axle driven through wet multi plate clutch, shaft in median plane of tractor, bevel gear;
clutch electro-hydraulically operated by rocker switch (two positions: engaged / engaged by service brake operation); planetary final drives

- Differential lock:

[D] Type: Limited slip multi-plate type

[C] Engagement: Automatic

[C] Disengagement: Automatic

1.3.5 Total ratios and travelling speeds

	Range	Gear	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 Speeds			
[C]	A	1	278.59	2.55
[C]		2	231.42	3.07
[C]		3	193.25	3.68
[C]		4	157.75	4.51
[C]	B	1	138.98	5.12
[C]		2	115.45	6.16
[C]		3	96.41	7.38
[C]		4	78.70	9.03
[C]	C	1	84.51	8.41
[C]		2	70.20	10.13
[C]		3	58.62	12.13
[C]		4	47.86	14.86
[C]	D	1	41.04	17.33
[C]		2	34.09	20.86
[C]		3	28.47	24.98
[C]		4	23.24	30.60
	Reverse Speed			
[C]	A	1	266.89	2.66
[C]		2	221.70	3.21
[C]		3	185.13	3.84
[C]		4	151.13	4.70
[C]	B	1	133.14	5.34
[C]		2	110.60	6.43
[C]		3	92.36	7.70
[C]		4	75.39	9.43
[C]	C	1	80.96	8.78
[C]		2	67.25	10.57
[C]		3	56.16	12.66
[C]		4	45.85	15.51
[C]	D	1	39.31	18.09
[C]		2	32.66	21.77
[C]		3	27.27	26.07
[C]		4	22.26	31.94

*) Calculated with a dynamic radius index of 820 mm
(in conformity with ISO 4251-1:1998)

[D] - Number of revolutions of front wheels for one revolution of rear wheels: 1.3481

1.4 Power take-off

1.4.1 Main power take-off

[C]	- Type:	Independent
[C]	- Method of engagement:	Driven by wet multi-plate clutch with 197 mm dia, electro-hydraulically operated by rotary switch through control valve; response of valve automatically controlled
[C]	- Number of shafts:	1
[C]	- Method of changing power take-off shaft ends and speeds:	Reversible stub giving two different standard speeds

1.4.1.1 Power take-off proportional to engine speed, 540 min^{-1} or 1000 min^{-1} p.t.o.

[C]	- Location:	At rear of tractor
[C]	- Diameter of p.t.o. shaft end:	35 mm
[C]	- Number of splines:	6 (540 min^{-1})in conformity with ISO 500:1991, type 1 21 (1000 min^{-1}) in conformity with ISO 500:1991, type 2
[C]	- Height above ground:	750 mm
[C]	- Distance from the median plane of the tractor:	0 mm
[C]	- Distance behind rear wheel axis:	530 mm

	P.t.o. type	P.t.o. transmission ratio	P.t.o. speed min^{-1}	Engine speed min^{-1}	Power restriction kW	Max. torque transmissible Nm
[D]	540	3.9685	540 580	2143 2300	not specified	
[D]	1000	2.2082	1000 1042	2208 2300	not specified	

[C]	- Direction of rotation (viewed from behind tractor):	Clockwise
1.4.1	Power take-off proportional to ground speed:	None
1.4.2	Optional power take-off:	Front p.t.o., independent, not fitted to tractor
1.5	**Hydraulic power lift**	
[C]	- Make/Model/Type:	JOHN DEERE / - / desintegrated, electronically controlled hydraulic power lift, lower link sensing
[C]	- Type of hydraulic system:	Closed center, load sensing pressure and flow compensated system
[C]	- Type and number of cylinders:	2 external cylinders, single acting, 70 mm bore, 175 mm stroke,
[C]	- Type of linkage lock for transport:	Hydraulic, lock of valve lever
[D]	- Relief valve pressure setting:	19.2 to 20.7 MPa
[D]	- Opening pressure of cylinder safety valve:	23.5 MPa
	- Lift pump:	
[D]	Make:	BRÜNINGHAUS HYDROMATIC
[D]	Model:	A10VNO41
[D]	Type:	41 cm^3 axial-piston pump with 100 dm^3/min delivery at rated speed; optional: 25 cm^3 axial-piston pump with 60 dm^3/min delivery at rated speed
[D]	- Transmission between pump and engine:	Gear driven by transmission
[D]	- Type and number of filters:	2 filters, 1 in feeding line of hydraulic pump, 1 on transmission housing

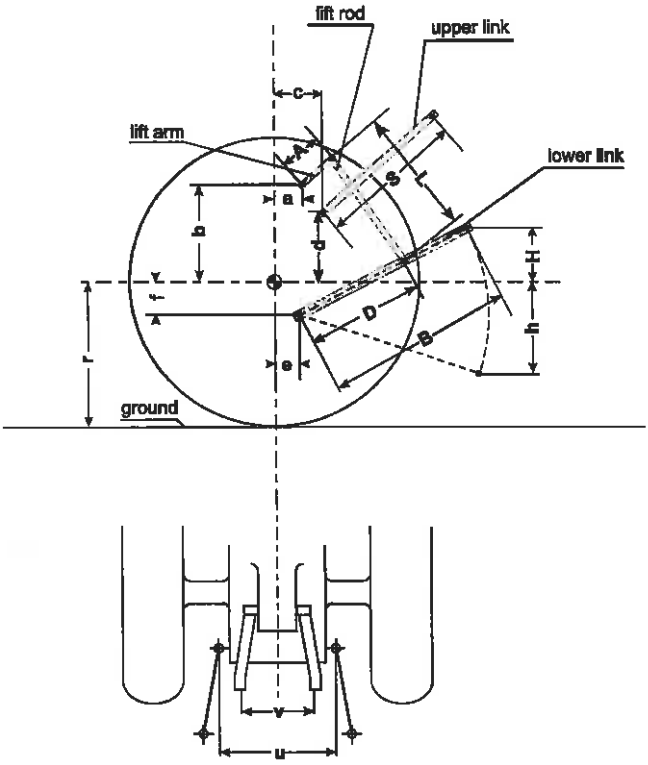
[C]	- Site of oil reservoir:	Transmission housing
[C]	- Type, number and location of tapping points:	3 double acting, quick-action couplers at rear of tractor
[D]	- Maximum volume of oil available to external cylinders:	Stationary 25 dm³, driving 15 dm³
[D]	- Oil cooler:	Engine cooling water / transmission-hydraulic oil heat exchanger at the rear end of engine block

1.6 Three-point linkage:

1.6.1 Three-point linkage at rear:

[C] - Category: 2, in conformity with ISO 730-1/1994 + Cor. 1:1995 with extendable lower links

[C] - Category adapter: None



Dimensions of rear implement linkage				Projected lengths in mm	
				Dimensions	Settings used in test-page 27
[D]	Rear tyres 18.4 - 38 Front tyres 16.9 - 24		(r) *) (r') *)	820 620	
[C]	Length of lift arms		(A)	305	
[C]	Length of lower links		(B)	945	
[C]	Distance of lift arm pivot points from rear wheel axis	horizontal vertical	(a) (b)	170 475	
[C]	Horizontal distance between the 2 lower link pivot points		(u)	480	
[C]	Horizontal distance between the 2 lift arm end points		(v)	535	
[C]	Length of upper link		(S)	from 550 to 730	660
[C]	Distance of upper link pivot point from rear wheel axis	horizontal vertical	(c) (d)	460 185	460 185
[C]	Distance of lower link pivot points from rear wheel axis	horizontal vertical	(e) (f)	135 225	
[C]	Distance of lower link pivot points from lift rod pivot points on lower links		(D)	505	
[C]	Length of lift rods		(L)	from 715 to 860	815

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

These data are valid for unloaded power lift

[C]	Length of lift rods	(L)	815	715	860
[C]	Linkage distance of lift rods	(D)	505		
[C]	Lowest position	(h)	620	385	710
[C]	Highest position	(H)	60	220	-60
[C]	Transport position	(H')	60	220	-60

*) Assuming r resp. r' = tyre dynamic radius index (in conformity with ISO 4251-1:1998)

1.7	**Swinging drawbar**		
[C]	- Type:	Adjustable in height and length	
[C]	- Height above ground	Maximum: Minimum:	600 mm 530 mm
[C]	- Type of adjustment:	Turning the drawbar	
[C]	- Distance of hitch point from rear wheel axis	Horizontal:	780 / 880 / 930 / 1080 mm
[C]	- Distance of hitch point from p.t.o. shaft end	Vertical: Horizontal:	150 / 220 mm 250 / 350 / 400 / 550 mm
[C]	- Lateral adjustment (centre of clevis)	Right/left hand side:	190 / 210 / 225 / 260 mm
[C]	- Distance of pivot point from rear-wheel axis, horizontally:		0 mm
[C]	- Diameter of drawbar pin hole:		33 mm
[C]	- Maximum permissible vertical load:		27 kN
1.8	**Trailer hitch**	None	
1.9	**Holed drawbar**	Optional: short bar, category 2, not fitted	
1.10	**Steering**		
[D]	- Make/Model/Type:	JOHN DEERE and DANFOSS/ - / hydrostatic steering, acting on front wheels	
	- Method of operation		
[D]	Pump:	Steering system connected to main hydraulic circuit	
[C]	Ram:	Integrated cylinder of symmetrical design, 224 mm stroke, 70 mm bore, 36 mm dia of piston rod	
[D]	- Working pressure:	18.5 MPa	

1.11 Brakes

1.11.1 Service brake

[D] - Make/Model/ Type: JOHN DEERE / - / muscle power braking system with hydraulic transmission with additional power fill, oil-immersed disc brake with 2 acting faces on each differential half shaft, disc 313 mm dia

[C] - Method of operation: Pedal operated, acting on rear wheels, front axle drive is automatically engaged when braking

[C] -Trailer braking take-off: None

1.11.2 Parking brake

[C] - Type: Parking lock of transmission

[C] - Method of operation: Range gear lever in "P" position

1.12 Wheels

- Number

[C] Front: 2, driving and steering

[C] Rear: 2, driving

[C] - Wheelbase: 2400 mm

- Track width adjustment:

		Minimum	Maximum	Adjustment method
[D]	Front	1516	2136	adjustable rims
[D]	Rear	1604	2004	adjustable rims

1.13 Protective structure

[C] - Make/Model/Type: JOHN DEERE / SG068 / Cab

[C] - Manufacturer's name and address: DEERE & COMPANY, Moline, Illinois, USA

- Protective device

[C] Cab: Welded and screwed profile steel tube construction, mounted on silent blocks, for service (repair) with separate device tiltable to the side

[C] Tiltable / not tiltbale: Not tiltable

- OECD approval

[C] Approval number: 4/0 694

[C] Date of approval: 11th October 2001

1.14 Seat

1.14.1	Driver's seat	Fitted to tractor
[C]	- Make/Model:	Grammer / MSG 95 AL / 731
[C]	- Type:	Air suspended upholstered seat with backrest and armrests
[C]	- Seat and steering wheel reversible:	No
[C]	- Type of suspension:	Pneumatic
[C]	- Type of damping:	Hydraulic
	- Range of adjustment	
[C]	Longitudinal:	195 mm
[C]	Vertical:	380 to 565 mm
[C]	- Safety belt:	Yes
1.14.2	Optional driver's seats	
[D]	- Make/Model/Type:	Grammer/MSG 95A; MSG 93; MSG 85 / mechanical suspension or pneumatic suspension
1.14.3	Passenger seat:	Optional, not fitted to tractor tested

1.15 Lighting

Electrical, 12 Volt, according to US legislation

		Height above ground of centre mm	Size mm	Distance from outside edge of lights to median plane of tractor mm
[C]	Headlights	1295	150 x 90	190
[C]	Sidelights	n.a.	n.a.	n.a.
[C]	Rearlights	1770	230 x 45	900
[C]	Reflectors	1730	160 x 25	865

2. TEST CONDITIONS

2.1 Overall dimensions

	Length	Width (track width as in 2.5)	Height at top of	
			protective structure	exhaust silencer pipe
	mm	mm	mm	mm
Unballasted	4280	2300	2750	2725

2.2 Ground clearance 425 mm

- Clearance-limiting part: Bracket for sway blocks

2.3 Tractor mass Unballasted (with cab)

	Without driver kg	With driver kg
Front	1800	1825
Rear	2800	2850
Total	4600	4675

2.4 Track specifications Not applicable

2.5 Tyres and track widths specifications

	Front	Rear
Tyres:	GOODYEAR DynaTorque II	
- Dimensions	16.9 - 24	18.4 - 38
- Load index speed index	6 PR	8 PR
- Type	cross ply	cross ply
- Maximum load (tyre manufacturer's)	17.50 kN	27.25 kN
- Maximum load (tractor manufacturer's)	21.0 kN	32.50 kN
at travelling speed	30 km/h	30 km/h
at tyre inflation pressure	150 kPa	140 kPa
dynamic radius index	620 mm	820 mm
Chosen track width:	1830 mm	1810 mm

2.6 Fuel

- Type: ARAL-Diesel-fuel, in conformity with DIN 51601
- Density at 15°C: At p.t.o. tests 0.830 g/cm³
  at drawbar power tests 0.828 g/cm³

2.7 Oils and lubrication

2.7.1 Capacity and change interval

	Capacity dm³	Oil change h	Filter-change h
Engine	16	500	500
Gear box and rear axle	52	1500	750
Front axle	5	1500	-
Rear axle	in common with gearbox		
Final drives (front each)	0.8	1500	-
Final drives rear (each)	in common with gearbox		
Hydraulic system	in common with gearbox		
Steering	in common with gearbox		

2.7.2 Specifications:

	Recommended	Used during test
Engine oil: Used in engine		Fuchs Titan
Type	engine oil	engine oil
Viscosity	SAE 20W40, 15W40, 10W40, JD PLUS-50, JD TORQ-GARD SUPREME	SAE 15W40
Classification	API CG-4 or CF-4; ACEA - E2 or E3;	API CF-4
Transmission oil: Used in gear box, rear axle, hydraulic system and brake system	John Deere HY-GARD John Deere Low Viscosity HY-GARD, John Deere BIO-HY-GARD	John Deere HY-GARD
Type	transmission oil	transmission oil
Viscosity	SAE 75	SAE 75
Classification	JDM J20C or J20D	JDM J20C
Transmission oil: Used in front axle and front final drives	John Deere HY-GARD, John Deere BIO-HY-GARD or transmission oil	Fuchs
Type	transmission oil	transmission oil
Viscosity	SAE 75 or SAE 80W90	SAE 80W90
Classification	JDM J20C	JDM J20C

2.7.3 Grease Multi purpose grease GC-LB

- Number of lubrication points: 18

3 COMPULSORY TESTS

3.1 Main power take off performance

Date of tests: 2003-10-14
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}	Speed Fan min^{-1}	Fuel consumption hourly kg/h	Fuel consumption hourly dm³/h	Fuel consumption specific g/kWh	Specific energy kWh/dm³
Maximum power							
3.1.1 At 2-hour test							
68.8	1901	861	1442	16.80	20.24	244	3.40
3.1.2 At rated speed							
62.9	2303	1043	1592	17.02	20.51	270	3.07
3.1.3 At standard p.t.o. speed							
66.6	2208	1000	1544	17.26	20.80	259	3.20
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							
62.9	2303	1043	1592	17.02	20.51	270	3.07
3.1.4.2 85% of the torque obtained in 3.1.4.1							
54.9	2362	1070	1672	15.93	19.19	291	2.86
3.1.4.3 75% of the torque defined in 3.1.4.2							
41.6	2389	1082	1676	13.76	16.58	331	2.51
3.1.4.4 50% of the torque defined in 3.1.4.2							
28.1	2429	1100	1636	10.99	13.24	391	2.12
3.1.4.5 25% of the torque defined in 3.1.4.2							
14.3	2449	1109	1569	8.19	9.87	575	1.45
3.1.4.6 unloaded							
-	2460	1114	1463	5.58	6.73	-	-

John Deere 6320 NA PowrQuad Plus(4WD) TIER2 — DLG-Test No. 2003-303

Power kW	Speed Engine min^{-1}	Speed P.t.o. min^{-1}	Speed Fan min^{-1}	Fuel consumption hourly kg/h	Fuel consumption hourly dm^3/h	Fuel consumption specific g/kWh	Specific energy kWh/dm^3
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							
66.6	2208	1000	1544	17.26	20.80	259	3.20
3.1.5.2 85% of the torque obtained in 3.1.5.1							
58.5	2272	1029	1574	15.98	19.25	273	3.04
3.1.5.3 75% of the torque defined in 3.1.5.2							
44.2	2292	1038	1583	13.90	16.75	315	2.64
3.1.5.4 50% of the torque defined in 3.1.5.2							
29.7	2312	1047	1568	10.89	13.12	366	2.26
3.1.5.5 25% of the torque defined in 3.1.5.2							
14.9	2329	1055	1510	8.01	9.65	537	1.54
3.1.5.6 unloaded							
-	2364	1070	1479	5.17	6.23	-	-

OPTIONAL RESULTS

Power kW	Speed Engine min^{-1}	Speed P.t.o. min^{-1}	Speed Fan min^{-1}	Fuel consumption hourly kg/h	Fuel consumption hourly dm^3/h	Fuel consumption specific g/kWh	Specific energy kWh/dm^3
3.1.6 Part loads at different engine speeds							
3.1.6.1 maximum power at rated engine speed							
62.9	2303	1043	1592	17.02	20.51	270	3.07
3.1.6.2 80% of power obtained in 3.1.6.1 at max. speed setting							
50.3	2378	1077	1609	15.37	18.52	306	2.72
3.1.6.3 80% of power obtained in 3.1.6.1 with governor control set to 90% of rated engine speed							
50.3	2069	937	1515	13.42	16.17	267	3.11
3.1.6.4 40% of power obtained in 3.1.6.1 with governor control set to 90% of rated engine speed							
25.0	2069	937	1484	8.43	10.16	337	2.46
3.1.6.5 60% of power obtained in 3.1.6.1 with governor control set to 60% of rated engine speed							
37.8	1380	625	1366	9.75	11.75	258	3.22
3.1.6.6 40% of power obtained in 3.1.6.1 with governor control set to 60% of rated engine speed							
25.2	1377	624	1376	7.03	8.47	279	2.98

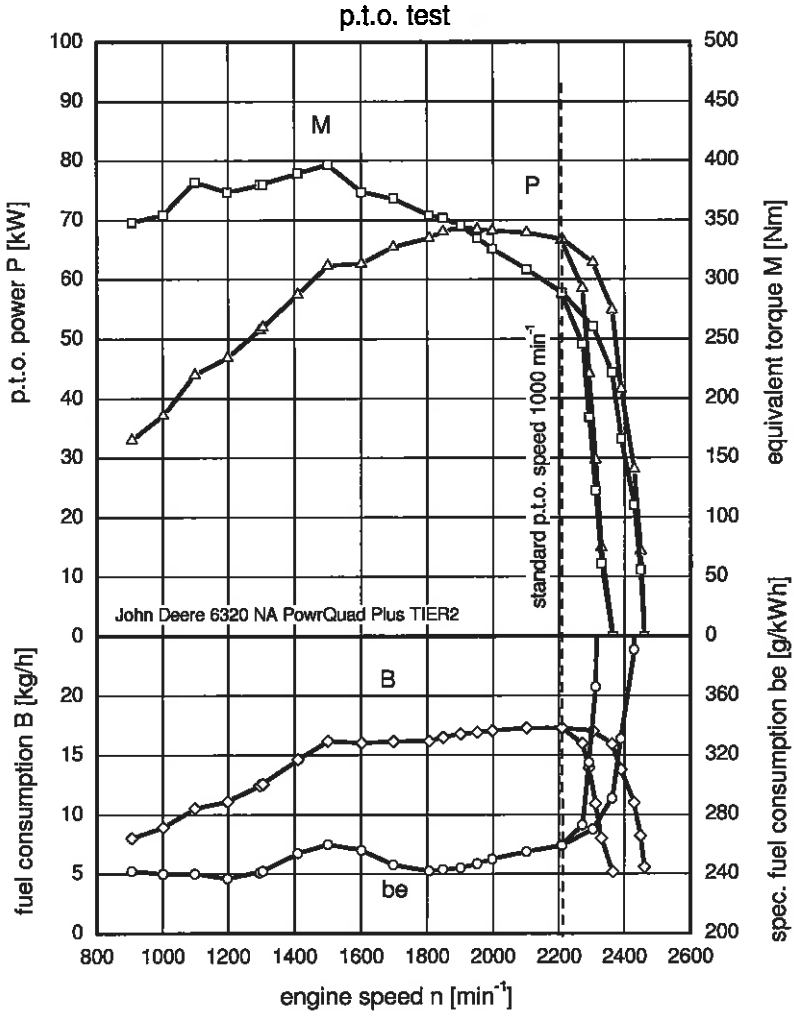
No load maximum engine speed:	2460 min^{-1}
Equivalent flywheel torque at rated engine speed:	261 Nm
Equivalent flywheel torque at 2-hour test:	345 Nm
at engine speed:	1901 min^{-1}
Maximum equivalent flywheel torque:	397 Nm
at engine speed:	1501 min^{-1}

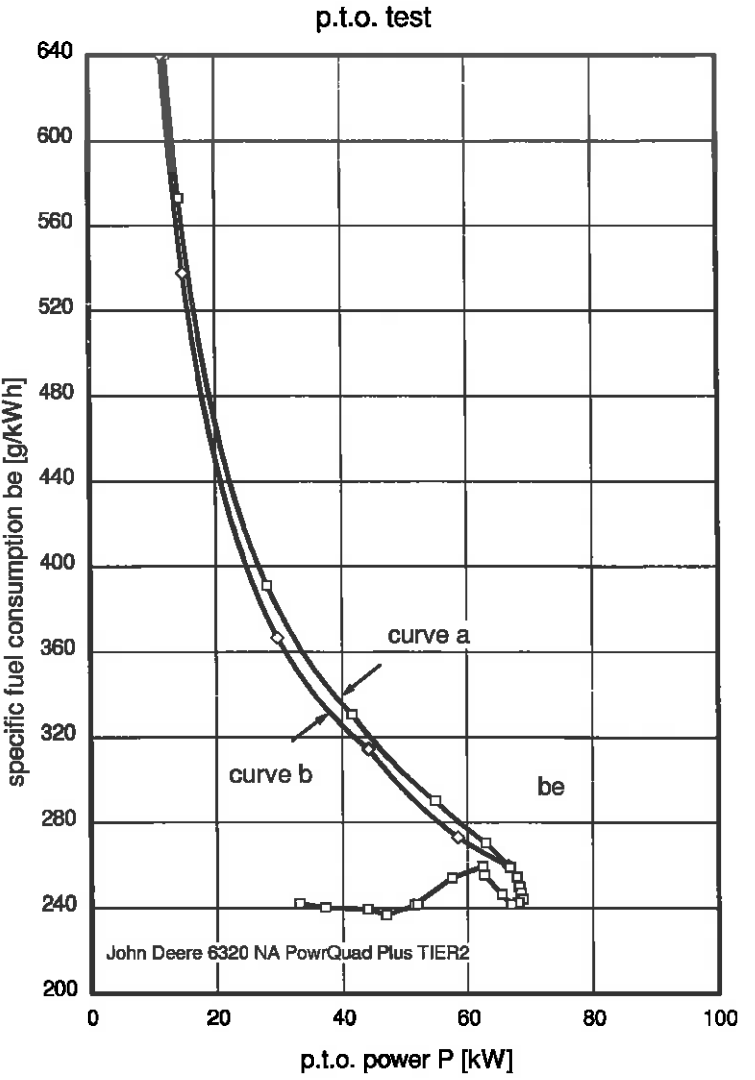
Mean atmospheric conditions

temperature:	21 °C
pressure:	100.7 kPa
relative humidity:	33 %

Maximum temperatures

coolant:	74 °C
oil:	105 °C
fuel:	29 °C
air intake:	21 °C


p.t.o. test
p.t.o. power P [kW]
equivalent torque M [Nm]
fuel consumption B [kg/h]
spec. fuel consumption be [g/kWh]
engine speed n [min-1]
standard p.t.o. speed 1000 min-1
M
P
B
be
John Deere 6320 NA PowrQuad Plus TIER2
100
90
80
70
60
50
40
30
20
10
0
500
450
400
350
300
250
200
150
100
50
0
360
320
280
240
200
15
5
800
1000
1200
1400
1600
1800
2000
2200
2400
2600


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
John Deere 6320 NA PowrQuad Plus TIER2

3.2 HYDRAULIC POWER AND LIFTING FORCE

- Date of tests: 15th January 2004

3.2.1 Hydraulic power test

3.2.1.1 Hydraulic fluid data

- Hydraulic fluid type: Transmission oil
- Viscosity index (ISO 3448+Corr 1:1993): SAE 75
- Viscosity at 65°C: n.a.

3.2.1.2 Compulsory Reporting (Test Results):

	Pressure	Reservoir oil Temperature °C (65°C traget)		Engine speed	Flow rate	Power
		Min.	Max.			
	MPa	°C	°C	min^{-1}	l/min	kW
Rated Engine Speed *(Manufacturers Specification)*	-	-	-	2300	-	-
3.2.1.2.1 Maximum (sustained) pressure with relief valve open as measured at the coupler Pump stalled: Yes/No	20.2	65	65	2430	-	-
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	18.2	65		2433 [1)] 2420 [2)]	88.0 [1)] 102.3 [2)]	26.7 [1)] 31.0 [2)]
3.2.1.2.3 Maximum available flow and maximum power from one coupler pair	4.5 17.5	65		2420 2423	112.3 103.2	- 30.1
3.2.1.2.4 Maximum available flow and maximum power from coupler pairs operating simultaneously (flow through two or more coupler pairs if required)	2.7 19.0	65		2419 2418	115.1 100.6	- 31.9

- Tapping point used for test: at rear of tractor

[1)] 1 double acting control valve
[2)] 2 double acting control valves parallel connection

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	684 mm 640 mm	887 mm 856 mm
Max. corrected force exerted through full range	25.20 kN	22.50 kN
Corresponding pressure	18.2 MPa	
Moment about rear axle	-	38.03 kNm
Max. tilt angle of mast from vertical		12 °

Lifting heights relative to horizontal lower links											
mm	-487	-400	-300	-200	-100	0	+100	+200	+240	+300	+370
Lifting forces at hitch points, corrected to 18.2 MPa											
kN		25.20	29.25	32.40	35.10	36.90	38.70	40.50	40.95		
Lifting forces at standard frame, corrected to 18.2 MPa											
kN	22.50	24.30	25.65	26.55	27.00	27.45	27.45	27.00		26.55	25.65

3.3 DRAWBAR POWER TEST (unballasted tractor)

Date of tests: 1st till 2nd December 2003
Type of track: Concrete

	Height of drawbar above ground	Tyre inflation pressure Front	Rear
Unballasted	540 mm	80 kPa	80 kPa

Gear number and range	Power	Drawbar pull	Speed	Engine speed	Slip of wheels	Fan speed	Specific fuel consumption	Specific energy	Temperature Fuel	Coolant	Engine oil	Atmospheric conditions Tempe-rature	Relative humidity	Pressure
	kW	kN	km/h	min^{-1}	%	min^{-1}	g/kWh	kWh/dm^3	°C	°C	°C	°C	%	kPa

3.3.1 MAXIMUM POWER IN TESTED GEARS (unballasted tractor)

B1	46.3	35.93	4.63	2349	14.8	1208	360	2.31	17	71	100	10	54	98.9
B2	52.4	36.93	5.11	2159	15.2	1064	328	2.54	14	71	86	8	54	98.9
B3	54.9	36.49	5.42	1907	15.0	1172	308	2.71	18	75	101	9	54	98.9
C1	56.0	31.83	6.33	1900	11.7	1229	301	2.77	19	75	102	10	54	98.9
B4	55.9	29.22	6.89	1900	10.4	1217	301	2.76	19	75	102	9	54	98.9
C2	57.2	26.26	7.84	1902	9.0	1226	295	2.83	19	75	102	10	54	98.9
C3	57.8	21.73	9.57	1902	7.0	1225	292	2.85	19	75	102	9	54	98.9
C4	57.0	17.20	11.93	1902	5.1	1248	295	2.82	19	75	102	9	54	98.9
D1	56.1	14.36	14.06	1905	4.1	1184	296	2.81	18	75	98	8	54	98.9

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Gear number and range	Power	Drawbar pull	Speed	Engine speed	Slip of wheels	Fan speed	Specific fuel consumption	Specific energy	Temperature			Atmospheric conditions		
									Fuel	Coolant	Engine oil	Tempe-rature	Relative humidity	Pressure
	kW	kN	km/h	min^{-1}	%	min^{-1}	g/kWh	kWh/dm^3	°C	°C	°C	°C	%	kPa
	FUEL CONSUMPTION													
3.3.2.1	In selected gear, at maximum power at rated speed													
C3	52.8	16.04	11.85	2304	4.6	1236	321	2.60	19	75	101	9	55	98.9
3.3.2.1.1	75 % of pull at maximum power at rated speed													
C3	40.5	11.76	12.40	2380	3.3	1329	373	2.23	20	74	103	9	55	98.9
3.3.2.1.2	50 % of pull at maximum power at rated speed													
C3	27.7	7.85	12.70	2410	2.0	1334	454	1.83	19	73	101	9	55	98.9
3.3.2.1.3	Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.1													
C4	40.6	11.69	12.49	1955	3.3	1203	321	2.59	19	74	100	8	55	98.9
3.3.2.1.4	Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.2													
C4	28.8	8.13	12.77	1979	2.3	1188	369	2.26	19	73	99	9	55	98.9
3.3.2.2	In selected gear nearest to 7.50 km/h at rated speed													
B3	51.8	27.04	6.89	2300	9.0	1234	328	2.54	18	76	102	10	55	98.9
3.3.2.2.1	75 % of pull at maximum power at rated speed													
B3	40.9	20.13	7.32	2380	6.1	1260	367	2.27	18	75	103	10	55	98.9
3.3.2.2.2	50 % of pull at maximum power at rated speed													
B3	28.0	13.24	7.60	2415	3.7	1266	436	1.91	18	73	101	10	55	98.9
3.3.2.2.3	Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.2.1													
C1	40.9	20.13	7.32	2083	6.0	1198	327	2.55	19	73	99	11	55	98.9
3.3.2.2.4	Next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.2.2													
C1	28.0	13.35	7.56	2105	3.8	1181	376	2.21	19	72	97	10	55	98.9

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: 3rd December 2003
Type of track: Concrete
Type of sound level meter: NORSONIC 118

Gear number and 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					
B 3	26.75	2301	6.91	4	75.0
C 4	12.03	2308	14.70	4	76.0
D 1	10.28	2292	17.11	4	76.0
D 2	7.91	2327	21.07	4	76.0
B 3	25.47	2357	6.68	2	73.0
C 1	24.18	2302	7.49	2	75.0
B 4	22.07	2303	8.18	2	74.5
C 2	19.88	2303	9.27	2	74.5
C 3	16.37	2305	11.34	2	74.5
C 4	12.76	2307	14.16	2	74.0
D 1	10.67	2320	16.74	2	74.0
D 2	8.03	2348	20.70	2	74.0
4.1.1.2 All openings open*)					
B 3	27.54	2300	6.80	4	81.0
C 4	12.30	2314	14.68	4	82.0
B 3	27.83	2300	6.37	2	81.0
D 1	10.72	2301	16.64	2	82.0

*) Openings: 2 side windows, rear window

Gear number and 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					
B 3	0	2444	7.83	4	72.0
B 3	0	2452	7.75	2	72.5
4.1.2.2. All openings open *)					
B 3	0	2452	7.93	4	81.0
B 3	0	2451	7.74	2	80.5
4.1.3 Unloaded test in the gear ratio giving the maximum forward speed					
4.1.3.1 All openings closed					
D 4	0	2460	32.0	2	74.0
4.1.3.2 All openings open *)					
D 4	0	2460	32.0	2	81.5

*) Openings: 2 side windows, rear window

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

Head of Vehicle Technology

Test carried out by

Dipl.-Ing. (FH) Ottmar Degrell

Dipl.-Ing. (FH) Thomas Feuerstein

Date: 2nd August 2004

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