DLG	Report on test in accordance with O.E.C.D. STANDARD CODE	O.E.C.D. No. 568



Agricultural Tractor GUTBROD 2500

Manufacturer

Gutbrod-Werke GmbH, D-6601 Saarbrücken-Bübingen

This bulletin is based on engineering tests in accordance with the O.E.C.D. STANDARD CODE for the Official Testing of Agricultural Tractor Performance. It does not contain an evaluation of the performance of the tractor on practical work.

Execution of tests:

April 1976 till June 1977

DLG-Testing-Station for Agricultural Machinery, Max-Eyth-Weg 1,
D-6114 Groß Umstadt

This report has been approved by the O.E.C.D. Coordinating Centre (C.N.E.E.M.A., France) as being in accordance with the O.E.C.D. STANDARD CODE.

Date of Approval: 24th November 1977 O.E.C.D. No. 568

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 N = 0,102 kp	or 1 kp = 9,81 N
Powers	1 kW = 1,36 PS	or 1 PS = 0,736 kW
Pressures	1 bar = 1,02 kp/cm²	or 1 kp/cm² = 0,981 bar
	1000 mbar = 750,1 mm Hg	

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PRÜFUNGS-ABTEILUNG
GUTBROD 2500

Test No. 76-81

Tractor manufacturer:	GUTBROD WERKE GMBH D-6601 Saarbrücken-Bübingen
Submitted for test by:	Manufacturer
Selected by:	Manufacturer with agreement by DLG
Place of running-in:	Saarbrücken and Groß-Umstadt
Duration of running-in:	Engine and tractor appr. 100 hours

SPECIFICATION OF TRACTOR

Tractor

Make:	GUTBROD WERKE GMBH
Model:	2500
Type:	Wheeled tractor, chassis construction, rear wheel driven
Serial No:	443 310

Engine

Make:	RENAULT FRANCE
Model:	800-01
Type:	4-stroke OTTO engine, watercooled
Serial No:	1254 128
Cylinders:	4 in-line, bore 58 mm, stroke 80 mm; displacement 845 cm^3, compression ratio 8:1; replaceable wet cylinder liners
Valves:	Overhead
Fuel system:	GUIOT fuel feed pump model U, SOLEX carburetor DIS 22-26, main jet 90, idling jet 40, compensating jet 165, KARCOMA screen filter, optionally AMFG; replaceable cartridge, capacity of fuel tank 14 l
Engine speed control:	Throttle flap in venturi of carburetor; GUTBROD centrifugal maximum speed type governor; rated engine speed 3200 rev/min no load minimum engine speed 1000 rev/min

Ignition system:	Electrical, radio-screened; firing order 1-3-4-2; BOSCH spark plugs W 175/T1; optionally BERU W 175/T1 or AC 44 F or MARCHAL 36 or AUTOLITE AE 32 or CHAMPION L 87 Y; firing point 5° before TDC; distributor with automatically acting speed governed ignition timing device
Air cleaner:	PROUST oil bath air cleaner, capacity o,3 l; recommended oil same as engine oil; replaceable cartridge; cyclonic precleaner
Exhaust silencer:	ROTH multi-chamber expansion type silencer; 100 x 190 mm oval, 330 mm long; on the right hand side of engine; mouth showing rearward
Lubrication system:	Forced-feed from gear type pump; strainer in sump; RENAULT oil filter in full flow with by-pass; replaceable cartridge; cartridge change at all oil changes; oil capacity 2,5 l; oil changing interval 100 hours; recommended oil viscosity: winter HD SAE 5W/20 summer HD SAE 10W/30 tropics HD SAE 20W/40
Cooling system:	Liquid cooling impeller assisted; special cooling fluid RENAULT 806 835/09; frost resistant to -35°C or water mixed with glysantine or similar product; thermostat without by-pass; overpressure relief valve set to 0,5 bar; fan with 6 blades, 300 mm diameter; cooling fluid capacity 5,5 l
Starting system:	Electrical; DUCELLIER, optional PARIS-RHONE; screw-push-starter motor 12 V 0,88 kW; choke as starting aid

Electrical equipment:	12 Volt, negative earth; BOSCH alternator G1 14V 28A 22; 1 lead acid battery 18 Ah at 20 hours rating

Transmission

Clutch:	FERODO dry single disc clutch; diameter 160 mm; for travelling and main p.t.o. drive; pedal operated
Gear box:	Own make; speed change gear with 4 forward and 1 reverse speeds; 1st and 4th speed collar shifted; 2nd, 3rd and reverse speed sliding gear shifted; group gear with 2 groups (slow and fast group); slow group sliding gear shifted; fast group collar shifted; totally 8 forward and 2 reverse speeds It is not allowed to use the tractor for long uninterrupted high drawbar pull because of high temperature raise of the transmission lubricant
Rear axle:	Worm drive; bevel gear type differential with lock; hand lever operated; not self-disengaging
Oil capacity:	4 l SAE 140 hypoid-oil
Oil changing interval:	200 hours

Power take-off

Main p.t.o.:	Dependent p.t.o. (proportional engine speed p.t.o.); at rear of tractor, 400 mm above ground, in tractor's median plane; 23,5 x 28,5 x 7 mm = 1 1/8 in, 6 splines; 1097 rev/min at rated engine speed; standard p.t.o.speed 1000 rev/min at 2917 rev/min engine speed direction of rotation anticlockwise, viewed from tractor rear

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Total ratios and speeds

Group	Gear	Total ratio engine : driving wheel	Theoretical travelling speed at rated engine speed *) km/h
slow	1	499,4	0,76
	2	355,4	1,06
	3	216,2	1,75
	4	120,8	3,13
fast	1	82,7	4,57
	2	58,8	6,43
	3	35,8	10,57
	4	20,0	18,91
reverse	1	355,8	1,07
	2	58,8	6,43

*) calculated with the rolling radius 314 mm

Secondary p.t.o.: Independent p.t.o. (live p.t.o.)
at front of tractor, 290 mm above ground,
in tractor's median plane;
mounted in the front axle case;
V-belt driven from crankshaft front end;
engageable and disengageable under load
mechanically by stretching and releasing
V-belt;
2 p.t.o. stub shafts, one showing forward,
one showing rearward;
23,5 x 28,5 x 7 mm = 1 1/8in, 6 splines;
1600 rev/min at rated engine speed

direction of rotation clockwise,
viewed from tractor rear,
no tractormeter fitted

Power lift	Disintegrated construction; BOSCH hydraulic pump 0542 507/301 assembled with control valve and hydraulic oil tank; pump delivery 2 cm^3/rev or 6 l/min at rated engine speed; V-belt driven by engine; control valve for upward and downward motion and floating position; maximum pressure 150 bar; 1 single acting ram, 25 mm bore, 140 mm stroke; no overpressure relief valve in ram; hydraulic oil tank with 1,5 l capacity; additional hydraulic oil tank with 1,5 l capacity too; 1 l may be taken off through oil tapping when tractor is working driving or stationary; up to 4 oil tappings at front and 1 oil tapping at rear of tractor available; recommended oil quality: engine oil HD SAE 10W; oil changing interval 600 hours or once a year
Implement linkage: (at rear)	Three point linkage of own construction; the ram is acting with pull rods on the lower links; lower link pivot point 140 mm behind rear axle centre line, on level of rear axle; projected length of lower links 500 mm; pull rods length adjustable from 620 to 690 mm; lifting range above ground with long pull rods from 121 to 491 mm short pull rods from 421 to 696 mm
Implement linkage: (at front)	Optionally an implement quick coupling system at front of tractor is available; not fitted on tractor tested; the rams of this quick coupling system are connected to the hydraulic system through the front end oil tappings

Holed drawbar	Long bar, constructed in U-section; fitted on the clevis of lower links of the implement linkage; total length 650 mm; length between the ball joints of the hitch points 330 mm; height of the bar 86 mm, width 68 mm; centre hole and 6 holes on either side with 50 mm distance each; all holes 17 mm diameter; height above ground adjustable from 250 to 825 mm, depending on pull rods length, measured at the surface of the bar; mechanically fixable in 775 mm height above ground; with lower links in horizontal position distance of centre hole to rear axle centre 645 mm to p.t.o. shaft end 430 mm
Trailer hitch	WESTFALIA model 339 001 not automatical; height above ground 520 mm; hitch hole 25 mm diameter; distance from hitch hole to rear axle centre 230 mm; permissible vertical load 200 kg permissible trailer weight 1550 kg
Towing lug	Height above ground 460 mm
Steering	CAM-GEARS model 14 : 1/1 TD ST 62; one finger worm gear steering; mechanically acting on front wheels
Brakes	
Parking brake:	Oil immersed disc type brake; mechanically acting on 1 disc with 87 mm diameter on the worm gear shaft; operated by hand lever with ratchet

Brakes (Continuation)

Service brake:	KNOTT shoe type brake, mechanically acting on 2 brake drums with 200 mm diameter on the rear wheels; pedal operated
Steering brake:	Divided pedal of service brake; for normal use locked together

Wheels

Steered wheels:	2 pneumatics at front 4,00-10 AM 2 ply; maximum permissible load 185 kg per tyre at 1,5 bar inflation pressure and 20 km/h; track width 735 mm, not adjustable; rims 3,00 B x 10
Driving wheels:	2 pneumatics at rear 6,5-15 AS 2 ply; diagonal type tyre casing; maximum permissible load per tyre 280 kg at 0,8 bar inflation pressure and 20 km/h; track width 760 mm not adjustable; rims 5 J x 15
Wheel base:	1400 mm

Seat	GRAMMER (optionally SIFRA) DS 2014 upholstered seat with back rest; adjustable spring with shock absorber; height of driver's platform above ground 440 mm; height of seat above platform 490 mm, seat not compressed; not adjustable up and down; fore and aft adjustable 45 mm steplessly

Number of grease points 5

Test No. 76-81

Weights — Ready for use as tested

		without driver	with driver
Without ballast:	front	231 kg	238 kg
	rear	326 kg	396 kg
	total	557 kg	634 kg
Front ballast:	None		
Rear ballast:	1 weight per wheel	36 kg each	72 kg
With ballast:	front	231 kg	238 kg
	rear	398 kg	468 kg
	total	629 kg	706 kg

Dimensions

Total length:	2270 mm with implement linkage
Total width:	930 mm
Total height:	1180 mm to top of back rest
Ground clearance:	190 mm below front axle

Lighting equipment — Electric 12 V
acc. to German legislation

	Dimensions mm	Height above ground of centre mm	Distance from outside edge of tractor to centre mm
Head lights	88 ø	900	355
Rear lights	70 ø	850	275
Reflectors	50 ø	695	175

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Permissible axle loads and total weights

for all available wheel equipment

Wheel equipment front	Wheel equipment rear	Permissible front axle load kg	Permissible rear axle load kg	Permissible total weight kg
4,00-10 AM	6,5-15 *)			
18x7,00-8	27x8,50-15	350	550	900
18x8,50-8	27x8,50-15			

all tyres 2 ply

*) Production of DUNLOP FRANCE

FUELS AND LUBRICANTS USED IN TESTS

Fuel: ARAL-OTTO-fuel (DIN 51600)

specific gravity at 15°C

at engine tests	0,740 kg/l
at p.t.o. tests	0,743 kg/l
at drawbar tests	0,748 kg/l

Engine oil: FUCHS HD SAE 10W/30

Transmission oil: VALVOLINE hypoid oel SAE 140

Hydraulic oil: FUCHS engine oil HD SAE 10

PRÜFUNGS-ABTEILUNG
GUTBROD 2500

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COMPULSORY TESTS

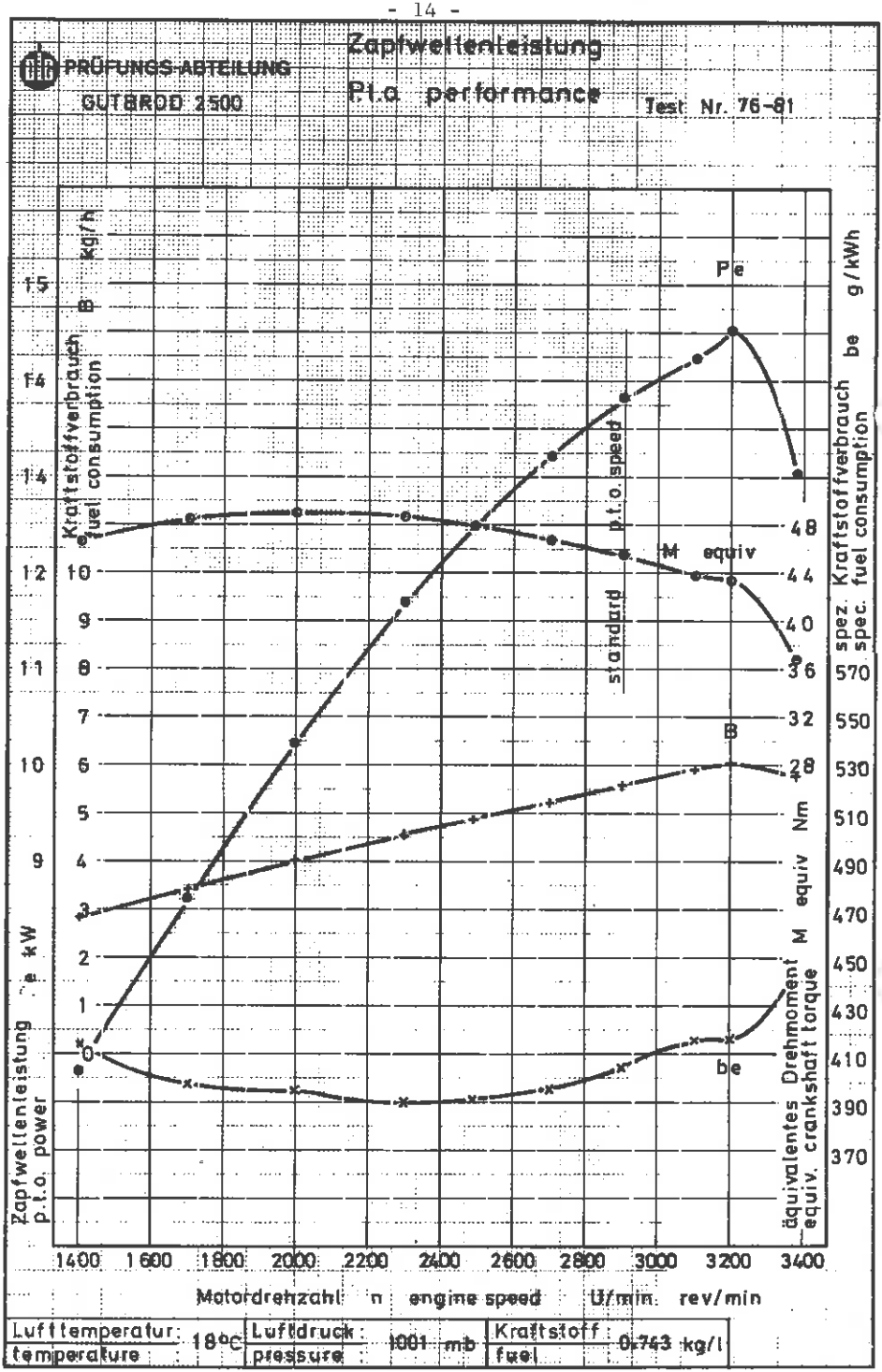
(1) MAIN POWER TAKE-OFF PERFORMANCE

Date of tests: 3rd June 1976
Type of dynamometer: SCHENCK eddy-current dynamometer W 150

Power kW	Speed engine rev/min	Speed p.t.o. rev/min	Fuel consumption total l/h	Fuel consumption total kg/h	Fuel consumption specific g/kWh	Specific energy kWh/l
Maximum power						
At 2-hour test						
14.5	3200	1097	8.13	6.04	417	1.78
At standard p.t.o. speed (1000 rev/min)						
13.8	2917	1000	7.54	5.60	405	1.83
At the speed recommended for drawbar work						
14.5	3200	1097	8.13	6.04	417	1.78
Part loads						
(i) 85% of the torque at maximum power at 2-hour test						
13.0	3378	1158	7.77	5.78	443	1.68
(ii) unloaded						
-	3521	1207	3.21	2.39	-	-
(iii) 50% of the load defined in (i)						
6.7	3460	1186	5.47	4.07	611	1.22
(iv) maximum power						
14.5	3200	1097	8.13	6.04	417	1.78
(v) 25% of the load defined in (i)						
3.3	3479	1193	4.32	3.21	961	.77
(vi) 75% of the load defined in (i)						
9.9	3446	1182	6.74	5.01	504	1.47

No load maximum engine speed: 3521 rev/min
Equivalent crankshaft torque at maximum power (2 hours): 43 Nm
Maximum equivalent crankshaft torque: 49 Nm at 1997 rev/min of the engine

Mean atmospheric conditions:	temperature	18 °C
	pressure	1001 mbar
	relative humidity	75 %
Maximum temperatures:	coolant	85 °C
	engine oil	75 °C
	fuel	18 °C
	engine air intake	21 °C


PRÜFUNGS-ABTEILUNG
GUTBROD 2500
Zapfwellenleistung
P.t.o. performance
Test Nr. 76-81
Pe
be
M equiv
B
standard
p.t.o. speed
Kraftstoffverbrauch fuel consumption kg/h
spez. Kraftstoffverbrauch spec. fuel consumption g/kWh
Zapfwellenleistung p.t.o. power Pe kW
äquivalentes Drehmoment equiv. crankshaft torque M equiv Nm
Motordrehzahl n engine speed U/min rev/min
1400 1600 1800 2000 2200 2400 2600 2800 3000 3200 3400
Lufttemperatur temperature 18°C
Luftdruck pressure 1001 mb
Kraftstoff fuel 0.743 kg/l

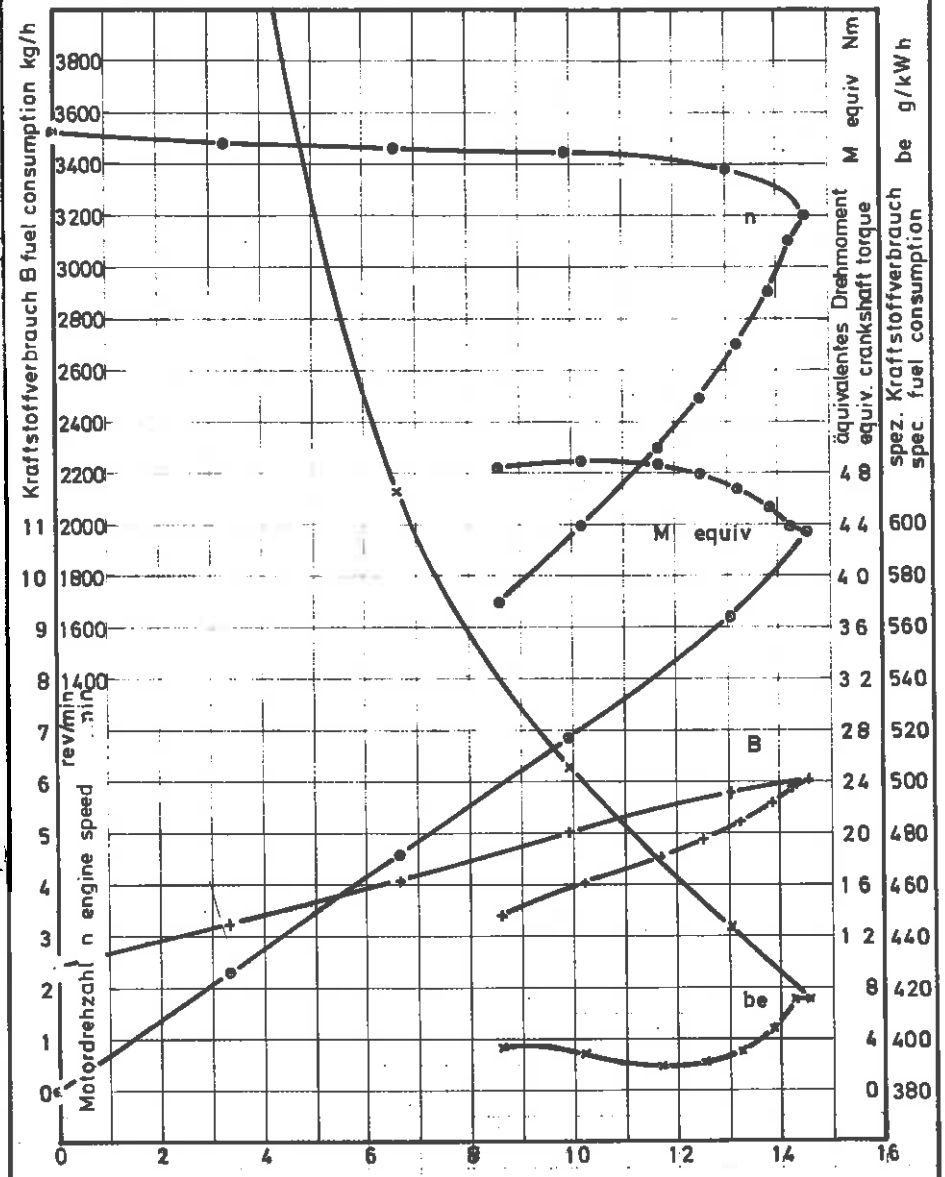
PRÜFUNGS-ABTEILUNG

GUTBROD 2 500

Zapfwellenleistung

P.t.o. performance

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Lufttemperatur: temperature	18 °C	Luftdruck: pressure	1001 mb	Kraftstoff: fuel	0,743 kg/l

PRÜFUNGS-ABTEILUNG
GUTBROD 2500

(2) DRAWBAR PERFORMANCE

Date of tests: 4th May till 23rd June 1977
Type of track: Concrete

Gear No. and Group	Speed km/h	Power kW	Drawbar pull N	Engine speed rev/min	Slip of wheels %	Specific energy kWh/l
(i) MAXIMUM POWER with ballast height of drawbar above ground 350 mm						
1 slow	0,71	1,0	5240	3451	14,9	0,24
2 slow	0,99	1,4	5200	3451	15,0	0,32
3 slow	1,62	2,4	5200	3445	14,9	0,45
4 slow	2,88	4,0	5030	3413	14,9	0,60
1 fast	4,12	5,8	5080	3366	15,1	0,74
2 fast	5,68	7,5	4750	3200	12,7	0,92
3 fast	9,94	7,8	2810	3202	6,5	0,96
(ii) FIVE-HOUR-TEST at 50% of pull at maximum power in 2nd gear of fast group*)						
2 fast	6,91	4,6	2380	3550	3,6	0,76
(iii) FIVE-HOUR-TEST at pull corresponding to 15% wheel slip in test (i) *)						
2 slow	-	-	5240	-	-	-
(iv) MAXIMUM POWER without ballast height of drawbar above ground 350 mm						
4 slow	2,90	3,7	4600	3425	14,9	0,58
1 fast	4,18	5,4	4680	3395	15,0	0,70
2 fast	5,60	6,9	4430	3200	14,1	0,86
3 fast	9,90	7,7	2790	3200	7,8	0,95

Total oil consumption during ten hours duration of tests (ii) and (iii): 8 g/h

*) at test (ii) drawbar pull reduced and at test (iii) choice of a lower gear because of high temperature raise of transmission lubricant; see note on page 6

Test No. 76-81

Tyres make and size front: DUNLOP 4,00-10 AM 2 ply
rear: DUNLOP 6,5-15 AS 2 ply

Tread bar height at the beginning of drawbar tests 94% of the value when new

Specific fuel consumpt. g/kWh	Temperatures Fuel °C	Coolant °C	Engine-oil °C	Atmospheric conditions Tempe-rature °C	Relative humidity %	Pressure mbar
tyre inflation pressure 0,8 bar rolling radius of tyres under static load 319 mm						
3068	14	78	65	14	88	993
2315	14	78	66	14	88	993
1675	15	80	66	14	83	993
1233	22	85	69	27	67	983
960	22	85	69	27	67	983
804	23	85	71	27	67	983
772	23	86	72	27	67	984
978	24	85	71	24	95	999
-	24	85	70	25	90	998
tyre inflation pressure 0,8 bar rolling radius of tyres under static load 322 mm						
1280	19	80	65	23	78	985
1063	19	82	67	23	78	984
865	22	85	70	27	70	984
781	23	85	70	27	67	984

Test (iii) was carried out with additional ballast, the figures not quoted are therefore irrelevant

(3) TURNING SPACE AND TURNING CIRCLE

Wheel equipment front: 4,00-10 AM 2 ply
rear: 6,5-15 AS 2 ply

Track of wheels front: 735 mm
rear: 760 mm

	With brakes		Without brakes	
	left-hand m	right-hand m	left-hand m	right-hand m
Radius of turning space	2,83	2,58	2,93	2,78
Radius of turning circle	2,75	2,50	2,85	2,70

(4) LOCATION OF CENTRE OF GRAVITY

Height above ground	557 mm
Distance forward from the vertical plane containing the axis of the rear wheels	558 mm
Distance of the median plane of the tractor	0 mm

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Test No. 76-81

(5) BRAKING PERFORMANCE

A) SERVICE BRAKE

Date of tests: 22nd October 1976
Type of track: Concrete
Type of decelerometer: MOTO METER-Bremsverzögerungs- und Pedalkraftschreiber

Weight of ballasted tractor: 706 kg with driver

Cold brakes

		With ballast	Without ballast
Travelling speed	km/h	21,2	21,2
Deceleration	m/s^2	4,4	4,4
Stopping distance	m	4,4	4,4
Force on pedal	N	118	88
Force on pedal to achieve a deceleration of 2,5 m/s^2	N	30	39

Brake fade characteristics (hot tests)

Deceleration	hot/cold	%	104	100
Stopping distance	cold/hot	%	100	79
Force on pedal	cold/hot	%	92	75

B) PARKING BRAKE on the 16%-slope

Tractor facing up slope:
Pull on hand brake 40 N, tractor does not roll

Tractor facing down slope:
Pull on hand brake 40 N, tractor does not roll

PRÜFUNGS-ABTEILUNG
GUTBROD 2500

Test No. 76-81

(6) AMBIENT NOISE EMITTED BY THE TRACTOR

Date of test:	4th May 1977
Type of track:	Concrete
Type of sound level meter:	BRÜEL AND KJAER model 2203

Results of test

Gear:	4 fast
Travelling speed before acceleration:	15,6 km/h
Sound level:	78,5 dB(A)

(7) NOISE AT THE DRIVER'S EAR LEVEL

Date of the tests:	5th May 1977
Type of track:	Concrete
Type of sound level meter:	BRÜEL AND KJAER model 2607
Type of frequency analyser: (fitted with octave filter)	BRÜEL AND KJAER model 1614

No cab or frame fitted on tractor

Results of tests

Gear	Drawbar pull at which the tractor develops the maximum sound level N	Travelling speed nominal km/h	Travelling speed effective km/h	Sound level dB(A)
1 slow	4660	0,76	0,73	87
2 slow	4700	1,06	1,03	87
3 slow	4690	1,75	1,63	87
4 slow	4640	3,13	2,93	87
1 fast	4670	4,57	4,17	88
2 fast*)	4400	6,43	5,58	88
3 fast	2800	10,57	9,89	87,5
4 fast	light load	18,91	20,80	87,5

*) the 2nd fast gear corresponds to the travelling speed nearest to 7,25 km/h

PRÜFUNGS-ABTEILUNG
GUTBROD 2500

Test No. 76-81

(8) POWER LIFT AND HYDRAULIC PUMP PERFORMANCE

Date of tests: 20th October 1976

HYDRAULIC PUMP

(1) Opening pressure of relief valve in remote circuit — 119 bar

Sustained pressure by open relief valve — 150 bar

(2) Pump delivery rate at minimum pressure and maximum engine speed — 6,0 l/min

(3) Pump delivery rate — 5,8 l/min
Delivery pressure — 127 bar
Hydraulic power — 1,2 kW

POWER LIFT

Lifting forces at hitch points
(no measurements carried out at the test frame, because no standard implement linkage)

Lifting heights relative to horizontal lower links

mm	-193	-100	0	+100	+107	+177	+200	+300	+382
maximum mechanical advantage, pull rods 620 mm									
N					2530		2460	2350	2220
minimum mechanical advantage, pull rods 690 mm									
N	1640	1830	1990	1950		1850			

Max. force exerted throughout the whole range 2220 N

Front of tractor does not lift.
All values of forces for pressure at max. hydraulic power 127 bar, calculated from measurements at max. oil pressure 150 bar

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Test No. 76-81

OPTIONAL TESTS

(1) ENGINE PERFORMANCE

Date of tests: 29th April 1976
Type of dynamometer: SCHENCK eddy-current dynamometer W 150

Power kW	Engine speed rev/min	Fuel consumption total l/h	Fuel consumption total kg/h	Fuel consumption specific g/kWh	Specific energy kWh/l
Maximum power					
At 2-hour test					
15.6	3200	8.16	6.04	388	1.91
At standard p.t.o. speed (1000 rev/min)					
15.1	2917	7.39	5.47	362	2.04
At the speed recommended for drawbar work					
15.6	3200	8.16	6.04	388	1.91
Part loads					
(i) 85% of the torque at maximum power at 2-hour test					
14.2	3429	7.84	5.80	409	1.81
(ii) unloaded					
-	3695	3.42	2.53	-	-
(iii) 50% of the load defined in (i)					
7.5	3596	5.73	4.24	568	1.30
(iv) maximum power					
15.6	3200	8.16	6.04	388	1.91
(v) 25% of the load defined in (i)					
3.8	3618	4.52	3.35	892	.83
(vi) 75% of the load defined in (i)					
10.9	3522	6.78	5.02	459	1.61

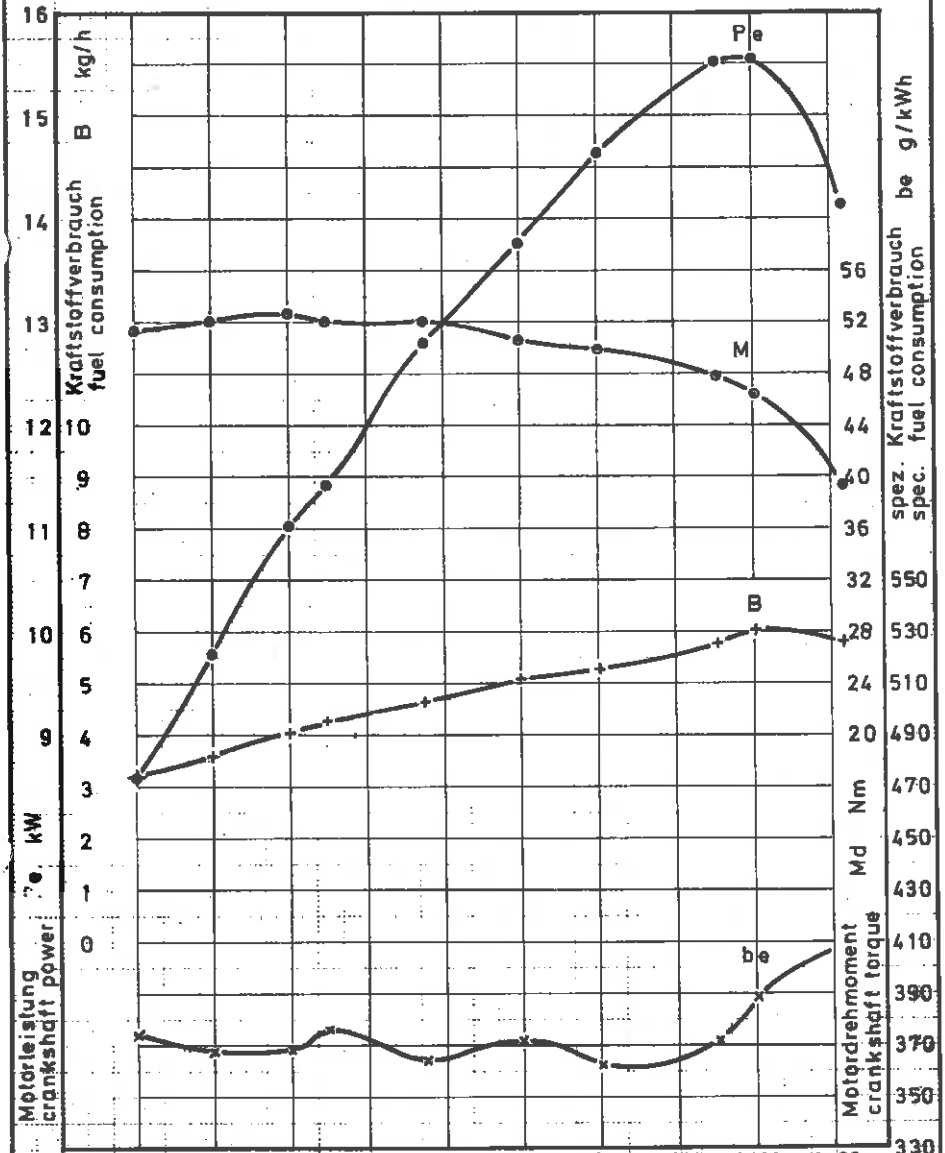
Optimum fuel consumption: 365 g/kWh at 13.3 kW and 2502 rev/min
No load maximum engine speed: 3695 rev/min
Torque at maximum power (2 hours): 46 Nm
Maximum torque: 52 Nm at 1999 rev/min of the engine

Mean atmospheric conditions:	temperature	19 °C
	pressure	1005 mbar
	relative humidity	45 %
Maximum temperatures:	coolant	85 °C
	engine oil	63 °C
	fuel	19 °C
	engine air intake	20 °C

PRÜFUNGS-ABTEILUNG
GUTBROD 2500

Motorleistung
Engine performance

Test Nr. 76-81



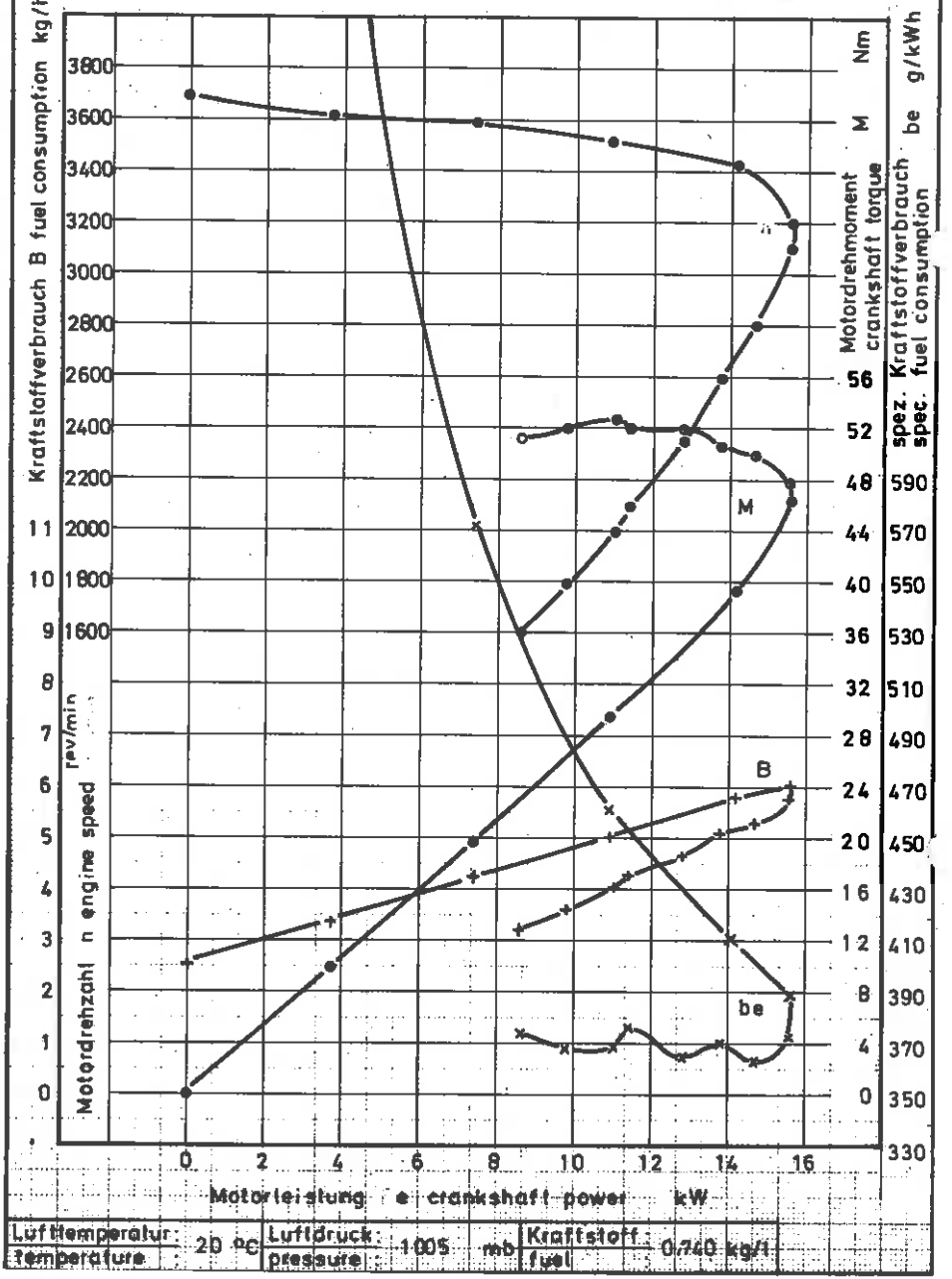
Lufttemperatur: temperature	20 °C	Luftdruck: pressure	1005 mb	Kraftstoff: fuel	0.740 kg/l

PRÜFUNGS-ABTEILUNG

GUTBROD 2500

Motorleistung
Engine performance

Test Nr. 76-81

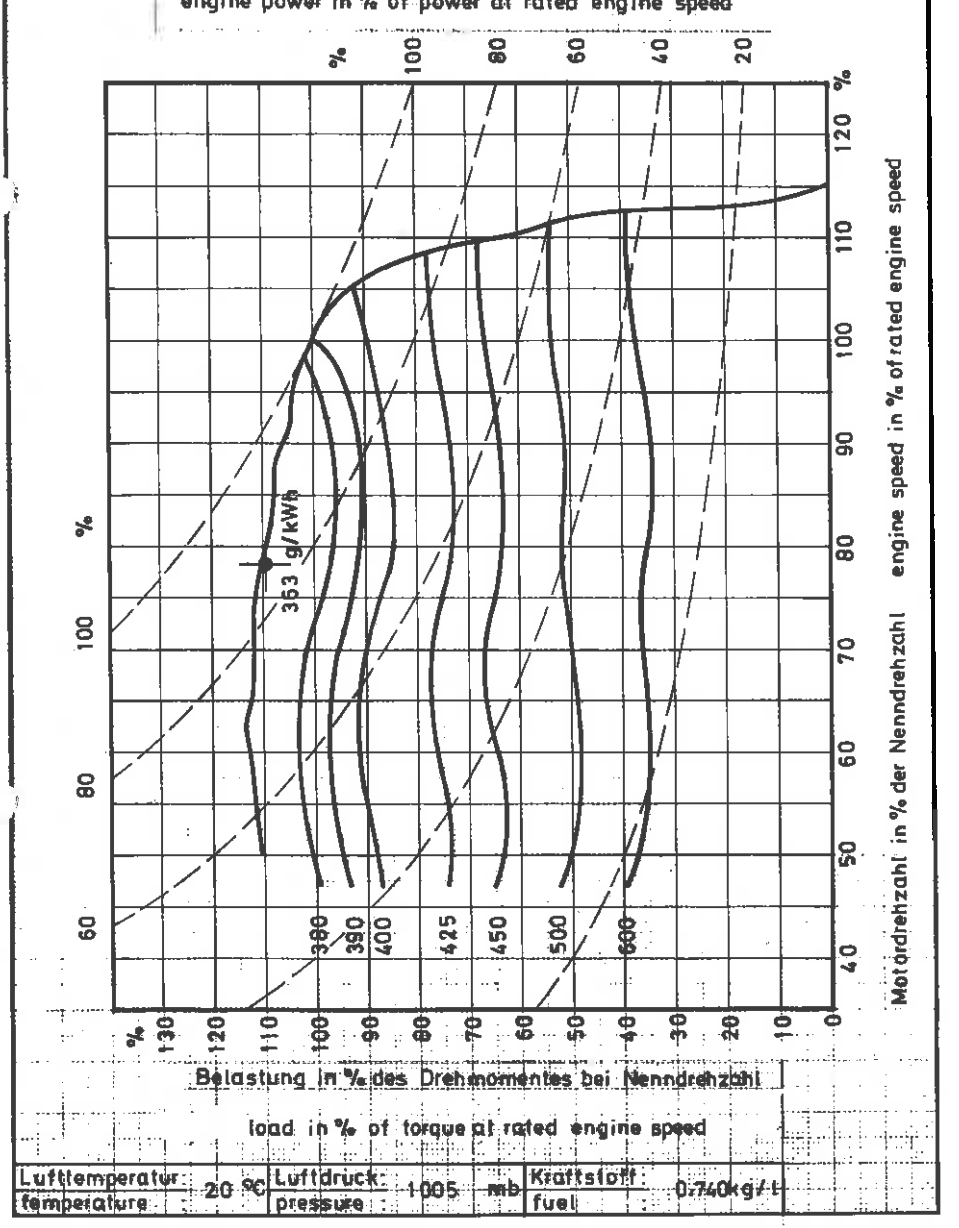


Lufttemperatur: temperature:	20 °C	Luftdruck: pressure:	1005 mb	Kraftstoff: fuel	0,740 kg/l

PRÜFUNGS-ABTEILUNG
GUT BRODY 2500

Motorleistung
Engine performance

Test Nr. 76-81



Lufttemperatur: temperature	20 °C	Luftdruck: pressure	1005	mb	Kraftstoff: fuel		0,740 kg/l

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