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Report on test in accordance with
O.E.C.D. STANDARD CODE for the Official Testing
of Agricultural Tractors



DEUTZ-AGRICULTURAL TRACTOR D 45 06

Manufactured by: Klöckner-Humboldt-Deutz AG
D-5000 Köln-Deutz

Date of Tests: May and June 1972

DLG-Testing Station for Agricultural Machinery
D-6114 Groß-Umstadt

DEUTSCHE LANDWIRTSCHAFTS-GESELLSCHAFT e.V.
Prüfungsabteilung für Landmaschinen
D-6000 Frankfurt/Main 1, Zimmerweg 16

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

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

Date of Approval: 24th October 1972

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PRÜFUNGS-ABTEILUNG
Deutz D 45 06

Test No. 72-24

Tractor manufacturer:	Klöckner-Humboldt-Deutz AG D-5000 Köln-Deutz
Submitted for test by:	Manufacturer
Selected by:	Manufacturer with agreement of DLG
Place of running-in:	Köln-Deutz and Groß-Umstadt
Duration of running-in:	Engine and tractor appr. 50 hours

SPECIFICATION OF TRACTOR

Tractor

Make:	Klöckner-Humboldt-Deutz AG, D-5000 Köln-Deutz
Model:	D 45 06
Type:	Wheel type tractor, unit construction rear wheel driven
Serial No:	7876/1

Engine

Make:	Klöckner-Humboldt-Deutz AG, D-5000 Köln-Deutz
Model:	F3L 912
Type	Air cooled 4-stroke Diesel engine direct injection
Serial No:	505 9749
Cylinders:	3 in-line, vertical, bore 100 mm, stroke 120 mm capacity 2826 cm^3, compression ratio 17 : 1 replaceable, ribbed single cylinders overhead valves
Fuel system:	PIERBURG fuel feed pump PE 15 252 BOSCH in-line injection pump PES 3 A 75C 410/ 3 RS 1183 manufacturer's production setting 45,5 mm^3/stroke at rated engine speed injection timing 28° before TDC BOSCH multihole injection nozzles DLLA 149 S 394 injection pressure 175 kp/cm^2 MANN fuel filter with replaceable cartridge capacity of fuel tank 70 l
Governor:	BOSCH mechanically acting variable speed type governor EP/RSV 325-1150 A 8 B 474 DL governed range of engine speed: 650 to 2400 rev/min rated engine speed 2300 rev/min

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Air cleaner:	Mainfilter Own make DEUTZ-SICCOPUR filter Precleaner incorporated in mainfilter
Lubrication system:	Forced feed from gear type pump strainer in sump MANN full flow filter replaceable paper cartridge oil capacity 9,4 l oil changing period 200 to 240 hours recommended oil viscosity winter SAE 10W summer SAE 20W/20 tropics SAE 30
Cooling system:	Air cooling with V-belt driven axial blower
Starting system:	Electrically BOSCH starter JD 12 V 3 PS
Electrical equipment:	12 Volt, negative earth BOSCH three phase generator G 1 14 V 18 A 20 1 lead acid type battery 110 Ah 20 hours rating

Transmission

Clutch:	Lamellen und Kupplungsbau GmbH D-7580 Bühl/Baden dry double disc type dual clutch DT 225/225 G driving part pedal operated p.t.o.-part hand lever operated
Gear box:	Own make TW 35.4 constant mesh synchronized 4 speed change gear group gear with 2 forward and 1 reverse group total 8 forward and 4 reverse speeds

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Rear axle and final drive: Own make
crown wheel and pinion transmission
bevel type differential
differential lock fitted, pedal operated
self disengaging

Oil capacity: Gear box and rear axle 14 l

Oil change period: 1500 hours

Total ratios and speeds

Group	Gear No	Number of engine revolutions for one revolution of the driving wheel	Theoretical travelling speed for 2300 rev/min rated engine speed km/h	m/s
slow	1	263,60 : 1	2,14	0,594
	2	165,90 : 1	3,39	0,942
	3	113,60 : 1	4,90	1,361
	4	67,41 : 1	8,36	2,220
fast	1	88,64 : 1	6,36	1,767
	2	55,77 : 1	10,10	2,805
	3	38,18 : 1	14,50	4,030
	4	22,65 : 1	24,86	6,910
reverse	1	233,00 : 1	2,42	0,672
	2	146,60 : 1	3,84	1,067
	3	100,40 : 1	5,50	1,528
	4	59,59 : 1	9,45	2,625

Power take-off

a) Main p.t.o.: Live power take-off
manually engaged
at rear of tractor in median plane of tractor
620 mm above ground
29 x 34,9 x 8,7 mm; 6 splines = 1 3/8"
(DIN 9611 Form A; BS. 1495; ASAE S 203.5)
two speeds may be engaged
598 rev/min or 993 rev/min
at rated engine speed
standard p.t.o.-speeds:
540 rev/min at 2077 rev/min engine speed
1000 rev/min at 2316 rev/min, adjustable only at part load
standard p.t.o.-speeds may set by means of tractormeter
direction of rotatiom clockwise viewed facing driving end

b) Ground speed p.t.o.
Main p.t.o. changeable to ground speed p.t.o.
dimensions and location as main p.t.o.
transmission ratio 11.54 revolutions of p.t.o. for 1 revolution of driving wheel
0,35 m travelling distance for 1 revolution of p.t.o.-shaft
direction of rotation clockwise when travelling forward

Belt pulley

(Not fitted on tractor tested, figures according to manufacturer's specifications)
At the rear of tractor
driving unit fitted on p.t.o.-shaft
manually engaged
320 mm diameter, 140 mm width
1268 rev/min at rated engine speed
linear belt speed 21,25 m/s
direction of rotation anticlockwise viewed from right hand side of tractor

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Power lift	Own make hydraulic power lift, unit construction DEUTZ-Transfermatic model K 35 power control, position control, floating position single acting ram relief valve in cylinder adjusted to 210 kp/cm² BOSCH gear type pump HY/ZFR 1/11 CL (112/1) when tractor is equipped with a hydraulic-steering device HY/ZFR 1/14 CL (112/1) directly driven by the engine DEUTZ control valve maximum oil pressure 175 kp/cm² 3 external tappings for single or dual acting remote cylinders and additional DEUTZ control valves available oil capacity 10 l hydraulic linkage lock for transport
Implement linkage	Three point linkage, category I (DIN 9674) operated by power lift lifting rods length adjustable from 520 mm to 640 mm lifting range above ground with the length of lifting rods 520 mm from 400 to 965 mm lifting rods 640 mm from 158 to 795 mm
Drawbar	Fitted on clevis of lower links centre hole and 3 holes on either side 80 mm distance each (DIN 9671) height above ground adjustable in the range between 158 mm and 965 mm in 450 mm standard height above ground mechanically lockable with 625 mm lifting rods length with lower links in horizontal position distance of centre hole: from rear axle centre 900 mm from the end of p.t.o.-shaft 500 mm

Pull attachement

Trailer hitch:	Height above ground 665-795-860 mm and 600-730-795 mm changed by shifting and reversing hitch
Towing hitch:	At front of tractor height above ground 650 mm

Steering

ZF-Zahnradfabrik Friedrichshafen AG
Werk Schwäbisch Gmünd
D-7070 Schwäbisch Gmünd
ZF-Gemmer steering 73 model GD 28 A
hand wheel operated
(optional: ZF-hydrostatc steering
74 model 09)

Brakes

Parking brake:	Mechanically acting shoe type brake acting on a brake drum on a gear shaft operated by hand lever with locking ratchet
Foot brake:	Mechanically acting shoe type brake acting on brake drums in the rear wheels pedal operated
Steering brake:	Operated by single parts of the divided foot brake pedal for normal use both parts connected by a safety bolt

Wheels

Steering wheels:	Two pneumatics at front 7,50-16 AS Front 6 ply (DIN 7808) maximum permissible weight on each tyre 710 kp at 2,5 kp/cm² inflation pressure when transporting mounted implements 888 kp track width from 1390 to 1890 mm changeable in steps of 100 mm by extending telescopic front axle rims 5,50 F x 16

PRÜFUNGS-ABTEILUNG
Deutz D 45 06 Test No. 72-24

Driving wheels:	Two pneumatics at rear 14,9/13-28 AS 6 ply (DIN 7807) maximum permissible weight on each tyre 1535 kp at 1,3 kp/cm² inflation pressure when transporting mounted implements 1765 kp track width 1319, 1441, 1541, 1634, 1734 mm changeable by reversing wheels and offset lug type rims rims W 12 x 28		
Wheel base:	1995 mm		
Weights	Ready for use with full tanks, as tested		
		without driver	with driver
Weight of tractor without ballast:	front	720 kp	725 kp
	rear	1190 kp	1265 kp
	total	1910 kp	1990 kp
Front ballast:	2 built-in weights		87 kp
	9 front weights		247 kp
Rear ballast:	11 weights per wheel		866 kp
	water in the tyres		310 kp
Weight of tractor with ballast:	front	1100 kp	1110 kp
	rear	2320 kp	2390 kp
	total	3420 kp	3500 kp
Seat	Grammer, D-8450 Amberg model DS 20/3 upholstered mould seat with back rest adjustable spring and shock absorber height above ground 1275 mm in median position distance of back rest from drawbar centre from 735 to 980 mm changeable		

Number of grease points (Whole tractor): 14

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Overall dimensions

Overall lenght:	3470 mm with three-point linkage
Overall width:	1700 mm at 1320 mm track, without ballast
Overall height:	1740 mm to the top of backrest of attendant's seat
Maximum ground clearence:	420 mm in median plane of tractor

Lighting equipment: Electric
12 Volt
acc. to German Govt. regulations additional with main head light beam

	Dimensions of area mm	Height above ground to centre mm	Distance from outside edge of tractor to centre mm
Head lights	130 ø	965	694
Side lights *)	150 x 55	1410	150
Rear lights **)	150 x 55	1320	158
Reflectors	75 ø	1055	55

*) in combination with direction indicator

**) in combination with direction indicator and stop light

FUELS AND LUBRICANTS USED IN TESTS

Laboratory tests

Fuel:	ARAL Diesel oil (DIN 51 601) commercially available quality specific gravity at 15°C: 0,829 kg/l
Engine oil:	SHELL-Rotella HD 20
Transmission oil:	SAE 90
Hydraulic oil:	ARAL-engine oil SAE 20

Track tests

Fuel:	ARAL Diesel oil (DIN 51 601) commercially available quality specific gravity at 15°C: 0,820 kg/l
Engine oil:	SHELL-Rotella HD 20
Transmission oil:	SAE 90
Hydraulic oil:	ARAL-engine oil SAE 20

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COMPULSORY TESTS

(1) MAIN POWER TAKE-OFF PERFORMANCE

Date of tests: 24th May, 1972
Type of dynamometer: Schenck hydraulic dynamometer U1-40

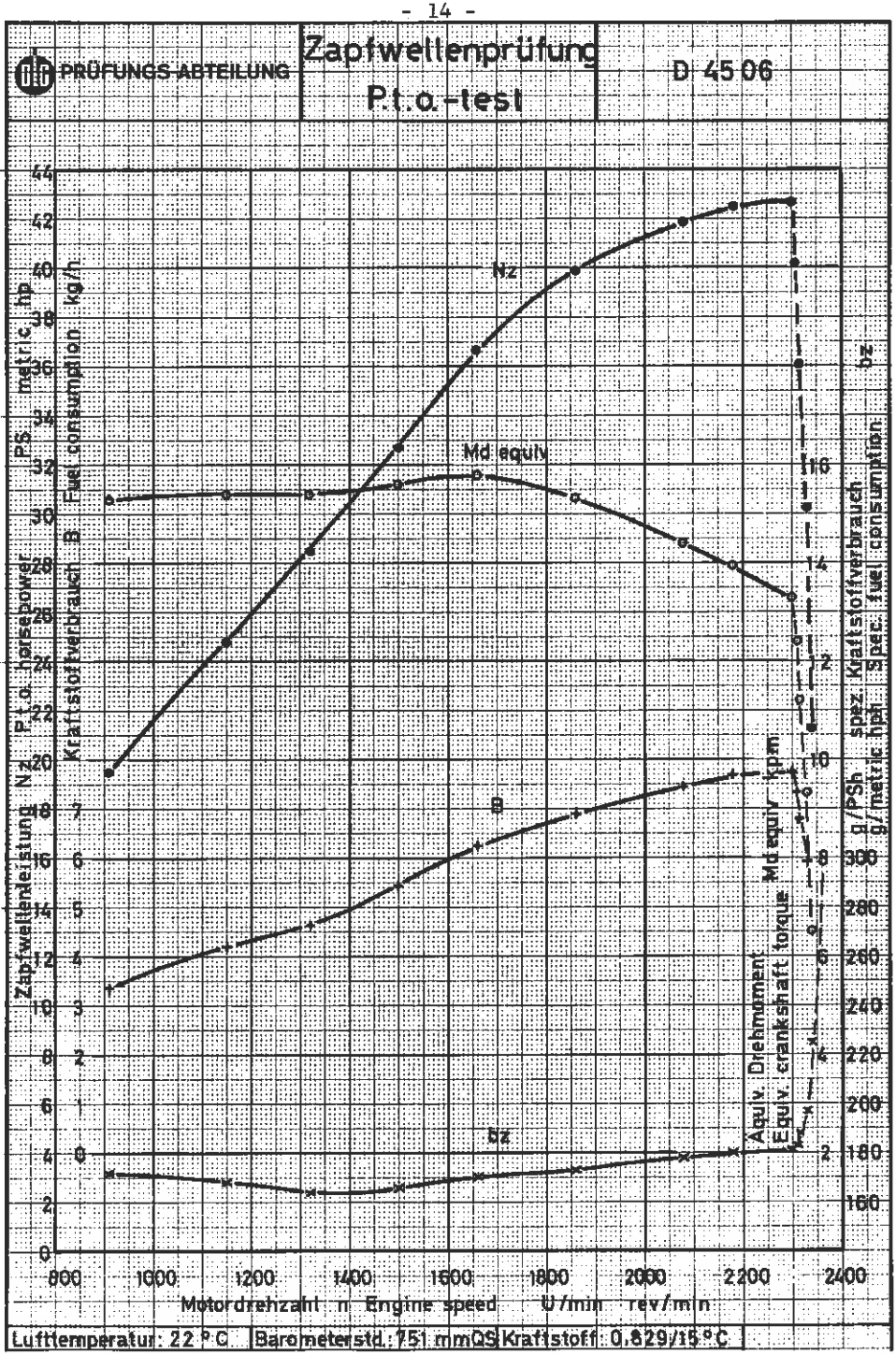
Maximum power

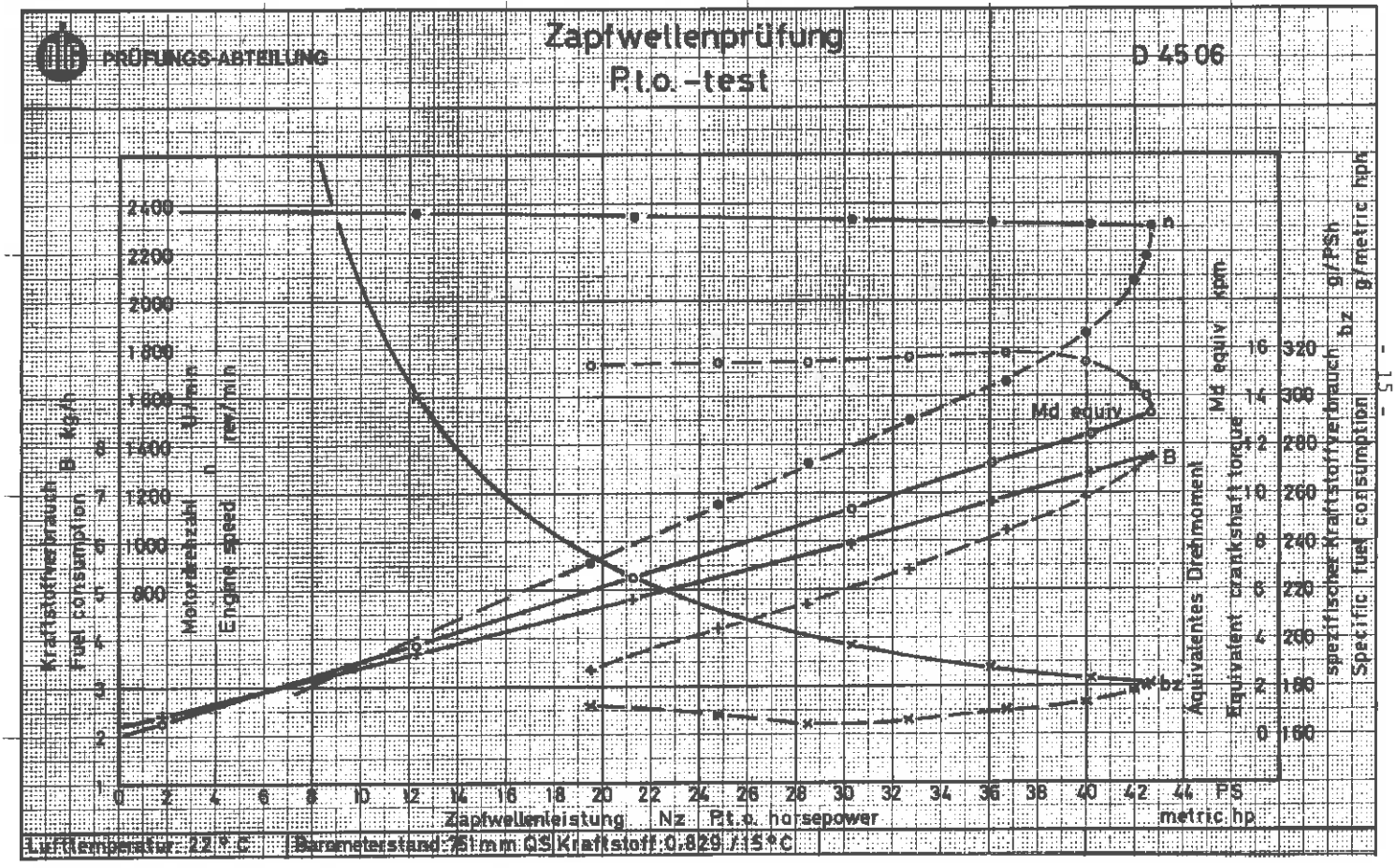
Horse-power PS	Speed engine rev/min	Speed p.t.o. rev/min	Fuel consumption total l/h	Fuel consumption specific g/PSh	Specific energy PSh/l
At maximum power 2-hour test					
42,7	2300	598	9,35	181	4,57
At standard p.t.o. speed (540 rev/min)					
41,9	2077	540	8,94	177	4,69
At the speed recommended for drawbar work					
42,7	2300	598	9,35	181	4,57
Part loads					
(i) 85% of torque at maximum power					
36,7	2321	604	8,25	186	4,45
(ii) unloaded					
-	2383	620	3,01	-	-
(iii) 50% of the load defined in (i)					
18,6	2346	610	5,38	240	3,46
(iv) maximum power					
42,7	2300	598	9,35	181	4,57
(v) 25% of the load defined in (i)					
9,34	2364	615	4,10	364	2,28
(vi) 75% of the load defined in (i)					
27,7	2334	607	6,84	205	4,05

No load maximum engine speed: 2383 rev/min
Equivalent crankshaft torque at maximum power: 13,3 kpm
Maximum equivalent crankshaft torque: 15,8 kpm at 1660 rev/min of the engine

Mean atmospheric conditions:
- temperature 22°C
- pressure 751 mm Hg
- relative humidity 75%

Maximum temperatures:
- coolant not recorded
- engine oil 99°C
- fuel 26°C


PRÜFUNGS-ABTEILUNG
Zapfwellenprüfung
P.t.o.-test
D 45 06
Nz
Md equiv
B
bz
P.t.o. horsepower Nz metric hp PS
Fuel consumption B kg/h
Kraftstoffverbrauch
Zapfwellenleistung
Equiv. crankshaft torque Md equiv kpm
Aequiv. Drehmoment
spez. Kraftstoffverbrauch bz
spec. fuel consumption
g/PSh
g/metric hph
Motordrehzahl n Engine speed U/min rev/min
Lufttemperatur: 22 °C
Barometerstd.: 751 mmQS
Kraftstoff 0,829/15 °C


PRÜFUNGS-ABTEILUNG
Zapfwellenprüfung
P.t.o.-test
D 45 06
Kraftstoffverbrauch B kg/h
Fuel consumption
Motordrehzahl n U/min
Engine speed
Md equiv
Aquivalentes Drehmoment Md equiv kpm
Equivalent crankshaft torque
spezifischer Kraftstoffverbrauch bz g/PSh
Specific fuel consumption g/metric hph
Zapfwellenleistung Nz P.t.o. horsepower
PS metric hp
B
bz
Lufttemperatur 22 °C
Barometerstand 751 mm QS Kraftstoff 0,829 / 15 °C

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(2) DRAWBAR PERFORMANCE

Date of test: 15th, 22nd and 26th June, 1972
Type of track: concrete

Gear No. and Group	Speed km/h	Horse-power PS	Drawbar pull kp	Engine speed rev/min	Slip of wheels %	Specific energy PSh/l
(i) MAXIMUM POWER with ballast height of drawbar above ground 500 mm						
1 slow	1,82	21,9	3250	2327	15,0	2,98
2 slow	2,89	32,4	3030	2300	14,0	3,44
3 slow	4,47	34,8	2100	2300	9,3	3,71
1 fast	5,86	36,2	1670	2304	6,9	3,85
4 slow	7,85	36,4	1250	2302	5,6	3,86
2 fast	9,57	36,1	1020	2298	4,4	3,86
3 fast	14,16	35,6	680	2300	3,5	3,80
(ii) FIVE-Hour-TEST at 75% of pull at maximum power in 1st gear of fast group						
1 fast	6,04	27,9	1250	2330	5,4	3,60
(iii) FIVE-HOUR-TEST at pull corresponding to 15% wheel slip in test (i)						
1 slow	-	-	3250	2327	-	-
(v) MAXIMUM POWER without ballast height of drawbar above ground 500 mm						
2 slow	2,90	22,1	2060	2329	15,0	3,12
3 slow	4,20	31,9	2050	2306	15,0	3,47
1 fast	5,63	35,0	1680	2300	11,1	3,73
4 slow	7,65	35,7	1260	2300	7,8	3,77
2 fast	9,39	36,9	1060	2300	6,4	3,90
3 fast	14,00	36,3	700	2300	4,4	3,85

Total oil consumption during ten hours duration of tests (ii) and (iii): 72 g/h

Test (iii) was carried out with additional ballast, the results for power, slip, speed and fuel consumption have no practical significance

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Specific fuel consumpt. g/PSh	Temperatures Fuel °C	Coolant °C	Engine oil °C	Atmospheric conditions Temperature °C	Relative humidity %	Pressure mm Hg
277	25	-	84	20	70	753
238	26	-	82	25	68	753
221	26	-	82	25	63	752
214	28	-	88	25	62	750
212	26	-	93	25	62	751
212	26	-	93	25	62	751
216	27	-	88	25	60	751
229	28	-	88	25	60	750
-	24	-	90	25	65	752
263	28	-	85	24	63	751
236	28	-	88	24	60	751
220	28	-	85	24	61	751
218	22	-	84	18	93	751
211	22	-	82	19	88	749
214	23	-	83	19	90	749

(3) TURNING SPACE AND TURNING CIRCLE

Wheel equipment front: 7,50-16 AS Front, 6 ply
rear: 14,9/13-28 AS, 6 ply

Track of wheels front: 1390 mm
rear: 1320 mm

	With brakes		Without brakes	
	left-hand m	right-hand m	left-hand m	right-hand m
Radius of turning space	3,46	3,50	3,85	3,87
Radius of turning circle	3,19	3,18	3,30	3,30

(4) LOCATION OF CENTRE OF GRAVITY

	mm
Height above ground	712
Distance forward from the vertical plane containing the axis of the rear wheels	727
Distance of the median plane of the tractor	0

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(5) BRAKING PERFORMANCE

A) FOOT BRAKE

Date of tests: 20th June, 1972
Type of track: Concrete
Type of decelerometer: MOTO METER-Bremsverzögerungs- und Pedalkraftschreiber

Weight of ballasted tractor: 3500 kp with driver

Cold brakes

		with ballast	without ballast
Travelling speed	km/h	25	25
Deceleration	m/s^2	4,4	4,2
Stopping distance	m	7,0	6,8
Force on pedal	kp	74	35
Force on pedal to achieve a deceleration of 2,5 m/s^2	kp	38	23

Brake fade characteristics (hot tests)

			with ballast	without ballast
Deceleration	hot/cold	%	100	96
Stopping distance	cold/hot	%	100	92
Force on pedal	cold/hot	%	114	87

B) PARK BRAKE

Tractor facing up slope:
Pull on hand brake 9 kp, tractor does not roll

Tractor facing down slope:
Pull on hand brake 9 kp, tractor does not roll

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(6) AMBIENT NOISE EMITTED BY THE TRACTOR

Date of test: May, 19th, 1972
Type of track: concrete
Type of sound level meter: Brüel and Kjaer type 2203

Results of test

Gear: 4th fast
Travelling speed before acceleration: 18,8 km/h
Sound level: 87 dBA

(7) NOISE AT THE DRIVER'S EAR LEVEL

Date of tests: June, 15th, 1972
Type of track: concrete
Type of sound level meter: Brüel and Kjaer type 2203
Type of frequency analyser: Brüel and Kjaer type 1613 (fitted with octave filter)

No cab or frame fitted on tractor

Results of tests

Gear	Drawbar pull at which the tractor develops the maximum sound level kp	Travelling speed nominal km/h	Travelling speed effective km/h	Sound level dBA	Sone
1 slow	2060	2,14	1,93	89	
2 slow	2020	3,39	2,70	88	
3 slow	2060	4,90	4,25	91	
1 fast *)	1660	6,36	5,60	91	80
4 slow	1240	8,36	7,59	92	77
2 fast	1030	10,10	9,31	93	82
3 fast	680	14,50	13,72	94	85

*) The 1st fast gear corresponds to the travelling speed nearest to 7,25 km/h

(8) POWER LIFT AND HYDRAULIC PUMP PERFORMANCE

Date of tests: May, 20th, 1972

POWER LIFT

	Height above ground in down position: hitch points mm	Height above ground in down position: test frame mm	Vertical movement mm	Maximum force excerted throughout the full lift range kp	Oil pressure kp/cm²	Lifting force when front of tractor lifts kp
Linkage giving maximum mechanical advantage						
At hitch points	400	-	565	1455	176	*)
On the frame	158	180	630	1170	176	1090
Linkage giving minimum mechanical advantage						
At hitch points	158	-	637	1305	176	*)
On the frame	400	400	637	1055	176	1090

PUMP CHARACTERISTICS

(i) opening pressure of relief valve: 185 kp/cm²
sustained pressure by the open relief valve: 176 kp/cm²

(ii) pump delivery rate at minimum pressure and rated engine speed: 28,2 l/min

(iii) pump delivery rate: 27,3 l/min
delivery pressure: 170 kp/cm²

power: 10,3 PS

*) greater than maximum lifting force