O.E.C.D. No.: 409
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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 40 06

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

Date of Tests: June and July 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. 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 Oktober 1972

Serial No.: 409

This tractor D 40 06 has already been subject to an O.E.C.D. tractor test no. 257 in 1968.

Because of changing manufacturer's production setting of the injection pump affecting the tractor's performance, retesting has been necessary.

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PRÜFUNGS-ABTEILUNG
Deutz D 40 06

Test No.: 72-63

Tractor manufacturer:	Klöckner-Humboldt-Deutz AG D-5000 Köln-Deutz
Submitted for test by:	Manufacturer
Selected by:	Manufacturer with agreement by DLG
Place of running-in:	Köln und Groß-Umstadt
Duration of running-in:	Engine appr. 50 hours Tractor appr. 70 hours

SPECIFICATION OF TRACTOR

Tractor

Make:	Klöckner-Humboldt-Deutz AG
Model:	D 40 06
Type:	Four wheel, rear wheel driven agricultural tractor, unit construction
Serial No.:	7870/1461

Engine

Make:	Klöckner-Humboldt-Deutz AG
Model:	F3L 912
Type:	4-stroke Diesel engine with direct injection air cooled
Serial No.:	509 1127
Cylinders:	3 in line; bore 100 mm, stroke 120 mm capacity 2826 cm^3; compression ratio 17 : 1 replaceable single ribbed cylinders overhead valves
Fuel system:	PIERBURG fuel feed pump PE 15 252 BOSCH in-line injection pump PES 3 A 75D 410/ 3 RS1183 manufacturer's production setting 42,5 mm^3 per stroke at rated engine speed and full load 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 fuel tank capacity 70 l
Governor:	BOSCH centrifugal variable speed governor EP/RSV 325-1150 A 8 B 492 DL governed range of engine speed: 650 to 2250 rev/min rated engine speed 2150 rev/min

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Air cleaner:	Mainfilter Own make DEUTZ-SICCOPUR dry paper element filter precleaner incorporated in main filter
Lubrication system:	Forced feed from gear type pump strainer in sump MANN oil filter in full flow replaceable paper cartridge oil capacity 9 l oil changing period 200 till 240 hours recommended oil viscosity winter SAE 10W summer SAE 20W/20 tropics SAE 30
Cooling system:	Air cooling V-belt driven blower
Starting system:	Electrically BOSCH starter JD 12 V 3 PS incandescent spiral in intake tube
Electrical equipment:	12 Volt, negative earth BOSCH three phase generator G1 14 V 18 A 20 1 lead acid battery capacity 88 Ah at 20 hours rating

Transmission

Clutch:	Lamellen und Kupplungsbau GmbH D-7580 Bühl/Baden dry double disc type clutch DT 225/225 N pedal operated
Gear box:	Own make TW 35.1 speed change gear sliding-pinion system with 4 forward and reverse speed group gear with two forward group total 8 forward and 2 reverse speeds

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Rear axle and final drive: Crown wheel and pinion, spur gear transmission
bevel gear type differential
differential lock fitted
pedal operated
self disengaging

Oil capacity: Gear box, rear axle and final drive total 14 l

Oil changing period: 1500 hours

Total ratios and speeds

Group	Gear No	Number of engine revolutions for one revolution of the driving wheel	Theoretical travelling speed at rated engine speed km/h	m/s
slow	1	264,7 : 1	1,96	0,545
	2	197,5 : 1	2,63	0,731
	3	129,2 : 1	4,03	1,118
	4	90,8 : 1	5,73	1,591
fast	1	60,57 : 1	8,59	2,384
	2	45,18 : 1	11,51	3,197
	3	29,56 : 1	17,59	4,886
	4	20,77 : 1	25,03	6,953
reverse	1	197,5 : 1	2,63	0,731
	2	45,2 : 1	11,51	3,197

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Power take-off	Live p.t.o. manually engaged at rear of tractor 605 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) 621 rev/min at rated engine speed standard p.t.o. speed 540 rev/min at 1870 rev/min engine speed may be set by tractormeter direction of rotation clockwise (viewed from tractor rear)
Belt pulley	(not fitted on tractor tested, fig. acc. to manufacturer's specification) at rear of tractor driving device attached to p.t.o. engaged by p.t.o. hand lever 320 mm diameter, 140 mm width 1305 rev/min at rated engine speed linear belt speed 21,9 m/s direction of rotation anticlockwise (viewed from the right hand side of tractor)
Power lift	Own make K 35 DEUTZ-TRANSFERMATIC system hydraulical power lift, unit construction draught control, position control, floating position single acting ram overpressure relief valve for ram adjusted to 210 to 260 kp/cm² BOSCH gear type pump HY/ZFR 1/11 CL (112/1) with hydrostatic steering HY/ZFR 1/14 CL (112/1) directly driven by engine DEUTZ control valve maximum oil pressure 175 kp/cm² 4 oil tappings with supplementary DEUTZ control valves for 2 dual acting remote cylinders available hydraulically acting linkage lock for transport oil capacity 10 l oil changing period 1500 hours

Implement linkage

Three-point linkage, category I
(DIN 9674)
operated by power lift
lifting rods length adjustable
from 520 to 640 mm
lifting range above ground with
lifting rods short from 397 to 974 mm
lifting rods long from 137 to 792 mm

Drawbar

Fitted on clevis of lower links
centre hole and 3 holes on either side
80 mm distance each
all holes 22 mm diameter
height above ground adjustable by power lift
in the range between 137 and 974 mm
depending on lift rods length
with lower links in horizontal position
distance of centre hole:
from rear axle centre 905 mm
from the end of p.t.o.-shaft 495 mm

Pull attachment

Trailer hitch:

Own make
height above ground 675 mm or 740 mm
changeable by reversing hitch
hitch hole 32 mm diameter
distance of hitch hole from rear axle
centre 580 mm permissible supporting
force 1000 kp

Towing hitch:

At front of tractor
height above ground 615 mm

Steering

ZF-Zahnradfabrik Friedrichshafen
D-7990 Friedrichshafen
ZF-Gemmer-steering 73 model GD 28 A
mechanically acting on front wheels
operated by steering wheel
(optional: ZF-hydrostatic steering
74 model 09)

Brakes

Parking brake:	Mechanically acting Simplex-internal shoe type brake acting on a drum on a high speed gear shaft operated by hand lever with ratchet for locking
Foot brake:	Mechanically acting Servo-internal shoe type brake acting on drums on the rear axle shafts pedal operated
Steering brake:	Operated by single parts of the divided foot brake pedal for normal use both parts of pedal are connected by a safty bolt

Wheels

Steering wheels:	Two pneumatics at front 6,50-16 AS Front 6 ply (DIN 7808) maximum permissible weight on each tyre 620 kp at 3,0 kp/cm² inflation pressure when transporting mounted implements 775 kp track width in steps of 100 mm each changeable from 1280 mm to 1880 mm by extending front axle rims 4,50 E x 16
Driving wheels:	Two pneumatics at rear 12,4/11-32 AS 6 ply (DIN 7807) maximum permissible weight on each tyre 1280 kp at 1,5 kp/cm² inflation pressure when transporting mounted implements 1470 kp track width 1219-1319-1441-1541-1634-1734 mm changed by reversing wheel centres and offset lug type rims rims W 11 x 28
Wheel base:	1995 mm

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Weights — Ready for use with full tanks, as tested

		without driver	with driver
Weight of tractor without ballast:	Front	719 kp	726 kp
	Rear	1098 kp	1174 kp
	Total	1817 kp	1900 kp
Front ballast:	3 built-in weights		103 kp
	4 front weights		92 kp
Rear ballast:	10 weights per wheel		875 kp
	water in the tyres		230 kp
Weight of tractor with ballast:	Front	938 kp	950 kp
	Rear	2179 kp	2250 kp
	Total	3117 kp	3200 kp

Seat — Grammer, D-8450 Amberg
DS 20 D
upholstered mould seat with back rest
adjustable spring and shock absorber
height above ground 1200 mm in median position
distance of back rest from centre hole of drawbar from 765 to 990 mm adjustable

Number of grease points (Whole tractor): 14

Overall dimensions

Overall lenght:	3470 mm with three-point linkage
Overall width:	1598 mm at 1319 mm track, without ballast
Overall height:	1700 mm to top of back rest of attendent's seat
Maximum ground clearance:	465 mm in median plane of tractor

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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	890	680
Side lights *)	150 x 55	1335	200
Rear lights **)	150 x 55	1230	210
Reflectors	75 ø	965	105

*) in combination with direction indicator

**) in combination with direction indicator and stop light

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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: 0,823 kg/l
Engine oil:	SHELL-Rotella HD 20
Transmission oil:	SAE 90
Hydralic oil:	ARAL engine oil SAE 20

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COMPULSORY TESTS

(1) MAIN POWER TAKE-OFF PERFORMANCE

Date of tests: June, 6th, 1972
Type of dynamometer: Schenck hydraulic dynamometer U1-40

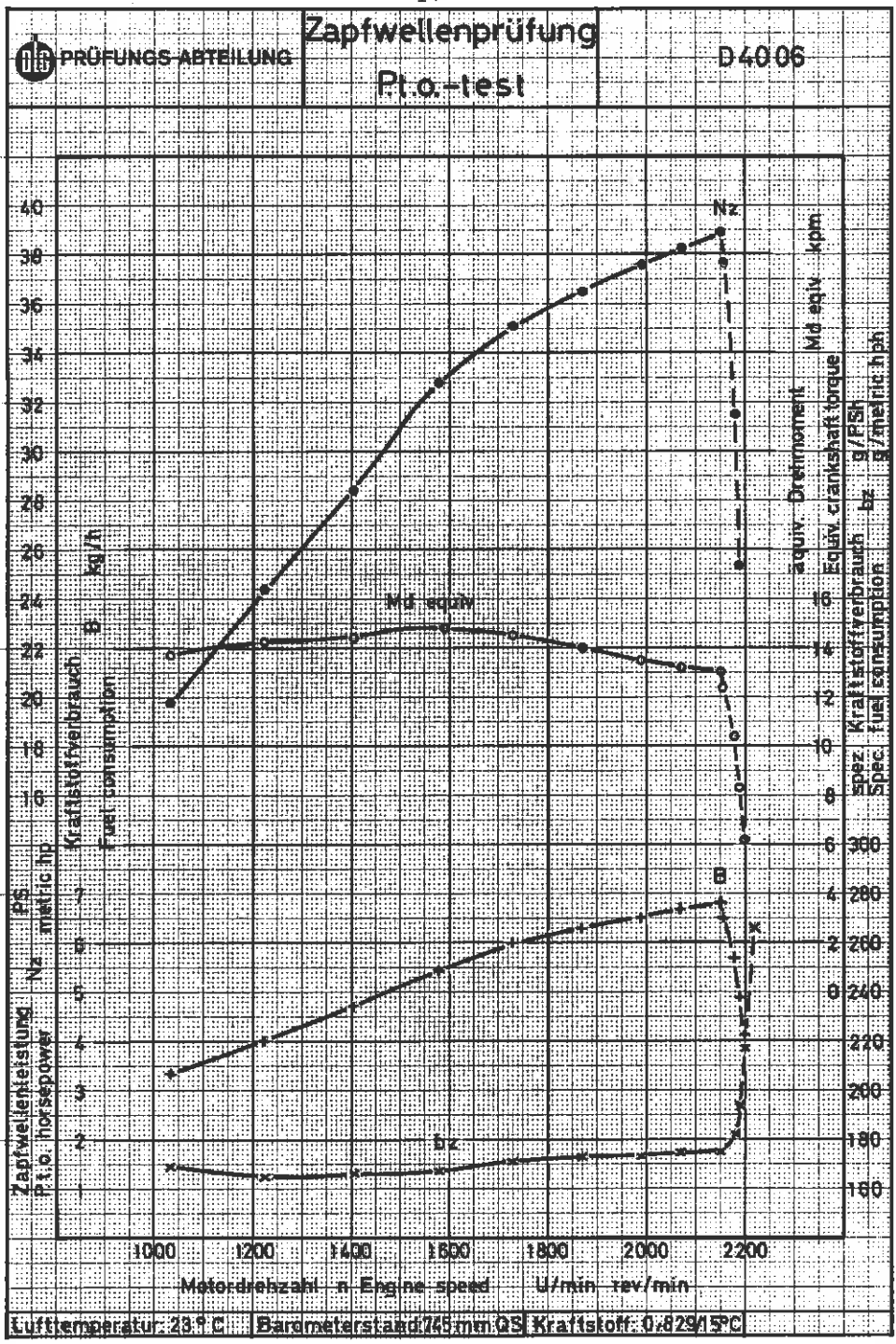
Maximum power

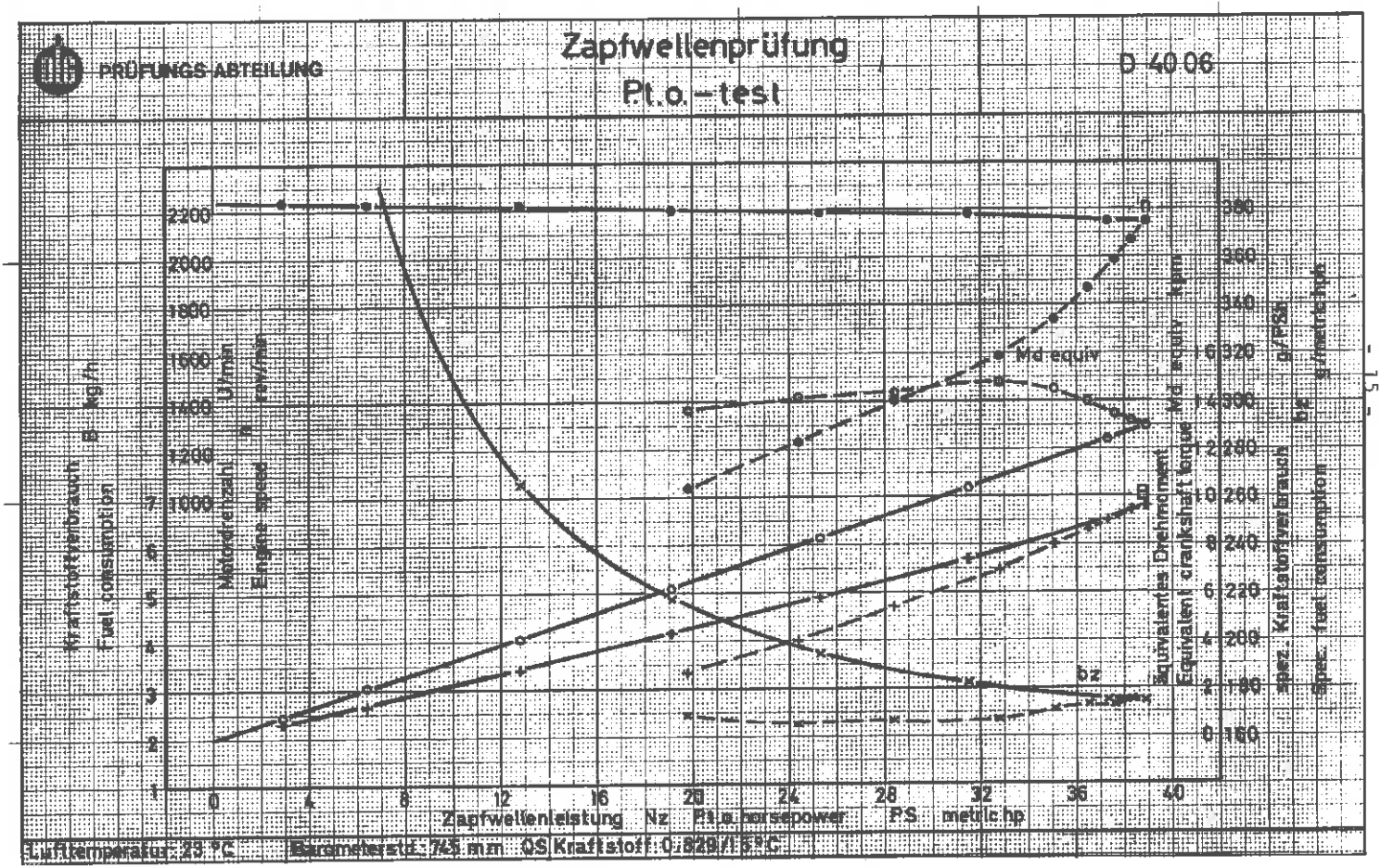
Horse-power PS	Speed engine rev/min	Speed p.t.o. rev/min	Fuel consumption total l/h	Fuel consumption specific g/PSh	Specific energy PSh/l
At maximum power 2-hour test					
38,9	2150	621	8,09	172	4,81
At standard p.t.o. speed (540 rev/min)					
36,7	1870	540	7,48	169	4,91
At the speed recommended for drawbar work					
38,9	2150	621	8,09	172	4,81
Part loads					
(i) 85% of torque at maximum power					
33,2	2161	624	7,07	176	4,70
(ii) unloaded					
-	2238	647	2,53	-	-
(iii) 50% of the load defined in (i)					
16,9	2203	637	4,60	226	3,68
(iv) maximum power					
38,9	2150	621	8,09	172	4,81
(v) 25% of the load defined in (i)					
8,6	2228	644	3,46	334	2,48
(vi) 75% of the load defined in (i)					
25,3	2190	633	5,88	193	4,30

No load maximum engine speed: 2238 rev/min
Equivalent crankshaft torque at maximum power: 12,95 kpm
Maximum equivalent crankshaft torque: 14,8 kpm at 1590 rev/min of the engine

Mean atmospheric conditions:
temperature 23°C
pressure 745 mm Hg
relative humidity 80%

Maximum temperatures:
coolant not recorded
engine oil 92°C
fuel 25°C


PRÜFUNGS-ABTEILUNG
Zapfwellenprüfung
P.t.o.-test
D 4006
Nz
Md equiv
B
bz
Zapfwellenleistung P.t.o. horsepower Nz metric hp PS
Kraftstoffverbrauch B Fuel consumption kg/h
aquiv. Drehmoment Md equiv kpm
Equiv. crankshaft torque
spez. Kraftstoffverbrauch bz spec. fuel consumption g/PSh g/metric hph
1000 1200 1400 1600 1800 2000 2200
Motordrehzahl n Engine speed U/min rev/min
Lufttemperatur: 23 °C
Barometerstand 745 mm QS
Kraftstoff: 0,829/15°C


PRÜFUNGS-ABTEILUNG
Zapfwellenprüfung
Pt.o.-test
D 40 06
Kraftstoffverbrauch B kg/h
Fuel consumption
Motordrehzahl n U/min
Engine speed
Md equiv
Äquivalentes Drehmoment Md equiv Kpm
Equivalent crankshaft torque
spez. Kraftstoffverbrauch b_e g/PSh
spec. fuel consumption
Zapfwellenleistung Nz Pt.o. horsepower PS metric hp
Lufttemperatur 23 °C
Barometerstand 745 mm QS Kraftstoff: 0,829/15°C

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(2) DRAWBAR PERFORMANCE

Date of test: 27th June till 6th July, 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	1,73	19,4	3020	2190	15,0	3,36
2 slow	2,33	26,0	3010	2176	15,0	3,70
3 slow	3,68	32,4	2380	2151	10,3	3,95
4 slow	5,40	33,2	1660	2150	6,9	4,04
1 fast	8,34	33,7	1090	2152	4,1	4,11
2 fast	11,25	33,3	800	2152	3,0	4,06
3 fast	17,48	32,4	500	2148	1,8	3,95
(ii) FIFE-HOUR-TEST at 75% of pull at maximum power in 4th gear of slow group						
4 slow	5,60	25,8	1245	2182	4,8	3,91
(iii) FIFE-HOUR-TEST at pull corresponding to 15% wheel slip in test (i)						
2 slow	-	-	3010	2176	-	-
(v) MAXIMUM POWER without ballast height of drawbar above ground 625 mm						
2 slow	2,35	16,0	1840	2197	15,0	3,11
3 slow	3,54	24,2	1850	2181	15,0	3,63
4 slow	5,05	31,6	1690	2150	13,0	3,85
1 fast	8,11	33,6	1120	2148	6,8	4,10
2 fast	11,02	33,5	820	2150	5,0	4,08
3 fast	17,27	32,6	510	2150	3,0	3,99

Total oil consumption during ten hours duration of tests (ii) and (iii): 23 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
246	22	-	95	20	95	751
224	22	-	96	20	93	751
210	23	-	96	21	90	751
205	23	-	97	21	86	750
201	22	-	96	19	86	750
204	24	-	97	23	86	749
210	24	-	97	23	87	749
212	25	-	95	23	88	752
-	26	-	95	24	90	752
266	25	-	93	22	88	752
229	25	-	93	22	88	752
215	25	-	94	22	78	750
202	24	-	94	24	75	751
203	25	-	95	24	75	751
208	25	-	94	24	74	751

(3) TURNING SPACE AND TURNING CIRCLE

Wheel equipment front: 6,50-16 AS Front, 6 ply
rear: 12,4/11-32 AS, 6 ply

Track of wheels front: 1280 mm
rear: 1319 mm

	With brakes left-hand m	With brakes right-hand m	Without brakes left-hand m	Without brakes right-hand m
Radius of turning space	3,41	3,22	3,80	3,54
Radius of turning circle	3,26	3,07	3,65	3,39

(4) LOCATION OF CENTRE OF GRAVITY

	mm
Height above ground	709
Distance forward from the vertical plane containing the axis of the rear wheels	762
Distance of the median plane of the tractor	0

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(5) BRAKING PERFORMANCE

A) FOOT BRAKE

Date of tests: 8th June, 1972
Type of track: concrete
Type of decelerometer: MOTO METER-Bremsverzögerungs- und Pedalkraftschreiber

Weight of ballasted tractor: 3200 kp with driver

Cold brakes

		with ballast	without ballast
Travelling speed	km/h	25	25
Deceleration	m/s^2	4,0	4,0
Stopping distance	m	7,0	7,0
Force on pedal	kp	62	44
Force on pedal to achieve a deceleration of 2,5 m/s^2	kp	29	25

Brake fade characteristics (hot tests)

			with ballast	without ballast
Deceleration	hot/cold	%	100	100
Stopping distance	cold/hot	%	98	103
Force on pedal	cold/hot	%	104	96

B) PARK BRAKE

Tractor facing up slope:
Pull on hand brake 14 kp, tractor does not roll

Tractor facing down slope:
Pull on hand brake 23 kp, tractor does not roll

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(6) AMBIENT NOISE EMITTED BY THE TRACTOR

Date of test: 7th June, 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: 85 dBA

(7) NOISE AT THE DRIVER'S EAR LEVEL

Date of tests: 19th June, 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	1490	1,96	1,03	89	
2 slow	1420	2,63	1,89	90	
3 slow	1410	4,03	2,89	91	
4 slow	1360	5,73	4,68	93	76
1 fast*	970	8,59	7,51	93	72
2 fast	720	11,51	10,20	93	
3 fast	400	17,59	16,50	91	

*) 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: 7th June, 1972

POWER LIFT

	Height above ground in down position		Vertical movement	Maximum force excerted throughout the full lift range	Oil pressure	Lifting force when front of tractor lifts
	hitch points mm	test frame mm	mm	kp	kp/cm²	kp
Linkage giving maximum mechanical advantage						
At hitch points	397	-	577	1490	177	*
On the frame	137	212	587	1295	177	955
Linkage giving minimum mechanical advantage						
At hitch points	137	-	655	1355	177	*
On the frame	397	402	595	1180	177	955

PUMP CHARACTERISTICS

(i) opening pressure of relief valve: 185 kp/cm²
sustained pressure by the open relief valve: 177 kp/cm²

(ii) pump delivery rate at minimum pressure and rated engine speed: 27,5 l/min

(iii) pump delivery rate: 25,7 l/min
delivery pressure: 165 kp/cm²
power: 9,4 PS

*) greater than maximum lifting force