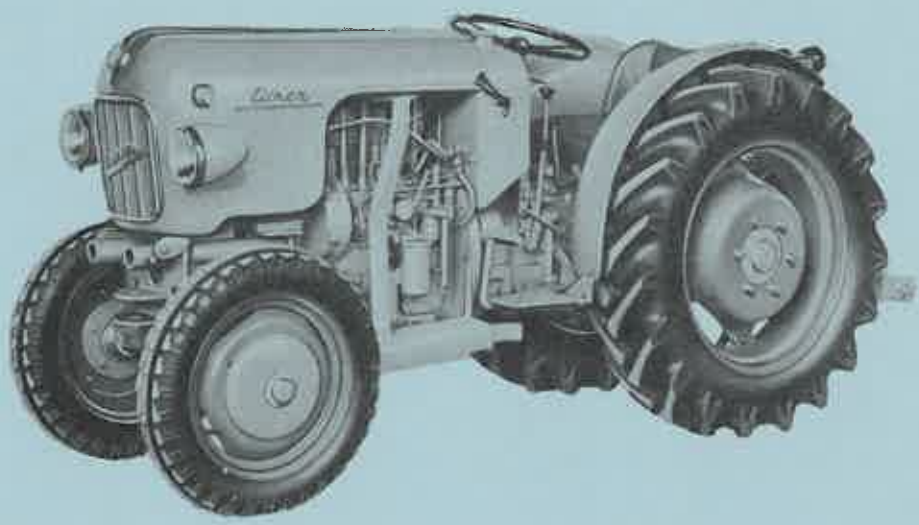
ktorium für Technik in der Landwirtschaft
Schlepper-Prüffeld Darmstadt-Kranichstein

No. 109

REPORT ON TEST IN ACCORDANCE WITH O.E.C.D. TEST CODE
FOR AGRICULTURAL TRACTORS

EICHER PUMA, TYPE ES 200

Manufactured by:
Gebr. Eicher Traktoren und Landmaschinenwerke, Forstern/Obb



Date of test: Augustus 1962
Test No.: 030/O.E.C.D.

This report has been approved by the O.E.C.D. Coordinating Centre (C.N.E.E.M.A.) as being in accordance with the O.E.C.D. Tractor Test Code

Date of Approval: 31 January 1963 *Serial No.:* 030

STICHTING CENTRALE WERKPLAATS
DR. S. L. MANSHOLTLAAN 12 – WAGENINGEN

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This Bulletin is based on engineering tests in accordance with the O.E.C.D. Tractor Code. It does not contain an evaluation of the performance of the tractor on practical farm work.

PART I

SPECIFICATION OF TRACTOR

Tractor:

Make:	Gebr. Eicher Traktoren- und Landmaschinenwerke, Forstern/Obb
Model:	„Puma" ES 200

Engine:

Make:	Eicher, Forstern/Obb. Type ES 200. Direct injection, diesel, No. 66838
Rated output:	30 hp. (engine)
Cylinders:	2 cylinders, vertical in line, 100 mm bore × 125 mm stroke, compression ratio 20,5 : 1 overhead valves
Rated speeds:	For belt work, P.T.O.-work and drawbar-work 2000 rev/min.
Minimum speed:	(For full load work) Not specified
Fuel system:	Fuel: diesel oil, injection pump: Kugelfisher Shäfer Pumpe PSSE 02-22,09-A 1 Injection nozzles: DFO. 33 A-2. Injection timing 21° before T.D.C. Injection pressure 140 + 5 kg/cm². Capacity of fuel tank 20 l
Governor:	Eicher, centrifugal type. Governed range of engine speed 700-2165 rev/min.
Air cleaner:	Oil bath. Oil capacity 0,8 l
Oiling system:	Forced feed from gear type pump Recommanded oil in summer SAE 20, in winter SAE 10. Oil change period 100 h, oil capacity 6 l
Cooling system:	Air cooled, two separated blowers on one shaft, belt driven

Transmission:

Clutch	Fichtel & Sachs, dry clutch
Gearbox:	Z.F. (Zahnradfabrik, Friedrichshafen), sliding gear type, 6 forward speeds and 1 reverse speed. Total transmission oil capacity 14 l Oil change period 1000 h. Recommanded oil viscosity SAE 90
Differential:	Crown wheel and pinion. Differential lock fitted

Gear No.	*Number of Engine revolutions for one revolution of driving wheel*	*Theoretical travelling speed for rated speed of engine - km/h - n = 2000 rev/min*
1st	243,780	1,54
2nd	120,265	3,12
3rd	67,283	5,58
4th	50,764	7,41
5th	32,504	11,57
6th	19,120	19,68
rev.	68,717	5,48

Steering device:	Worm and roller type Gemmer Z.F.
Brakes:	Hand brake fitted Foot brakes, on differential half shafts, independant or combined hand operated

Wheels:

Steering wheels:	Two at front. Tyres Vredestein 4.00-15, 4 ply Track 665-1110 mm
Driving wheels:	Two at rear. Tyres 9.5-24/9-24, 4 ply Vredestein Track 710-1220 mm

Belt pully:

Location:	At rear of the P.T.O.
Diam. × width:	180 × 140 mm
Speed:	1770 r.p.m.
Linear speed:	16,6 m/sec.
Direction of rotation:	Both

Power take off:

Main:	6 spline, 34,9 mm (1³/₈") diam. at rear of tractor
Height above ground:	450 mm (test figure)
Speed:	589 r.p.m. at rated engine speed of 2000 r.p.m.

Power lift: Hydraulic AG 78 a Eicher
Maximum load at end of lower links 900 kg (test figure). Working pressure 180 kg/cm²
Oil capacity 1,75 l. Recommanded oil in summer and winter SAE 20
Oil change period 500 h

Drawbar: Fixed on hydraulically controlled implement linkage. Vertical adjustment from 130 mm to 700 mm (test figure)
Distance from rear axle 700 mm (test figures)

Hitch:

Height above ground:	710 mm (test figure) (max.) 570 mm (test figure) (min.)
Distance from rear axle:	370 mm (test figure)

Electrical equipment:

Voltage:	12
Generator:	Bosch
Battery:	Bayern. Capacity 12 Volt — 84 AH
Starting device:	Bosch

Overall dimensions:

Overall length:	2620 mm
Overall width:	920 with weights
Overall height:	1130 mm
Minimum ground clearance:	280 mm
Wheel base:	1565 mm

Weights:

	Without additional weight - kg	*With maximum additional weight - kg*
On front wheels	450	542
On rear wheels	654	900
Total	1104	1442

Special remarks: The weights are without driver

PART II

LABORATORY TESTS

Compulsory tests:	Power take off test
Date and location of tests:	Aug. 1962, Wageningen
Type of dynamometer:	Water brake 2 R.T. (T.H. Delft)
Fuel:	Diesel oil. Density 0,831/22° C
Oil:	Shell SAE 20

Duration of test - Hours	*Horse power metrie*	*Engine speed r.p.m.*	*Torque - mkg*	*Specific fuel consumption g/epkh*	*Fuel temp. °C*	*Oil temp. °C*	*Coolant temp. °C*	*Air temp. °C*	*Atmospheric pressure mm Hg*
2	29,2	1965	36,1	180	—	—	—	24	767
1	20,0	1330	36,7	175	—	—	—	24	767

Special remarks: None

Varying speed tests:

	Horsepower	Engine speed r.p.m.	Fuel consumption			Temperature			Atmos-condit.	
			kg/h	hph/l	g/hph	oil °C	coolant °C	fuel °C	temp. °C	pressure mm Hg
Rated speed for p.t.o. work . .	28,0	2000	5,0	4,7	180	—	—	—	24	767
P.T.O. 540 r.p.m.	28,0	1836	4,8	4,9	175	—	—	—	—	767
Lowest recorded	14,1	2110	3,1	3,8	220	—	—	—	24	767

Remarks: Engine speed without load is 2170 R.P.M.

PART III

DRAWBAR TESTS ON CONCRETE TRACK

Date of test: Aug. 1962

Type of track: Concrete

Position of governor control lever: Fully open

Type of tyre: Rear: Vredestein 9,5-24/9-24, 4 ply
Front: Vredestein 4,00-15, 4 ply

Fuel: Diesel oil, Density 0,831/22° C

Oil: Shell SAE 20

A. Tests with maximum additional weight

Weight of tractor:

Weight without ballast: Front: 450 kg
Rear: 654 kg

Ballast: Front: 2×47 kg $= 94$ kg

Rear: 2×64 kg $= 128$ kg

Water: 116 kg

Total weight: 1442 kg

Tyre pressure: 1,4 kg/cm²

Height of drawbar above ground: 450 mm

Special remarks: Weights are without driver

Maximum powers and pulls:

Gear no.	Maximum powers							Maximum pulls	
	horse power	corresponding pull - kg	wheelslip - %	speed - km/h	engine temp. °C	air temp. °C	atmos. pressure mm - Hg	pull - kg	remarks
2	9,0	1125	25,3	2,13	—	—	760	1150	wheel slip
3	18,0	1100	21,4	4,40	—	—	760	1100	wheel slip
4	22,7	990	10,0	6,10	—	—	760	1080	engine stall
5	22,4	650	6,2	9,20	—	—	760	680	engine stall

Fuel consumption:

Gear No.	Optimum fuel consumption			Range of pulls over which specific fuel consumption does not exceed optimum consumption by more than 10 % - kg
	specific fuel consumption g/epkh	in hp hour per unit of volume hph/l	corresponding pull kg	
2	270	3,07	1020	850-1150
3	250	3,33	850	600-1070
4	240	3,47	850	550-1070
5	215	3,88	680	550-680

B. Tests without ballast

Weight of tractor without driver:

Weight without ballast:	Front 450 kg Rear 654 kg Total 1104 kg
Tyre pressure:	1,4 kg/cm²
Height of drawbar above ground:	450 mm

Maximum powers and pulls:

Gear No.	Maximum powers							Maximum pulls	
	horse power	corresponding pull - kg	wheelslip - %	speed - km/h	engine temp. °C	air temp. °C	atmos. pressure mm Hg	pull - kg	remarks
2	8,4	830	19,1	2,66	—	—	765	940	wheel slip
3	15,2	880	17,0	4,72	—	—	765	940	wheel slip
4	19,2	830	15,0	6,25	—	—	765	920	wheel slip
5	22,2	600	8,4	10,30	—	—	765	670	engine stall

PART IV

1. **Location of centre of gravity:**

   a. Tractor with tanks filled, with driver (75 kg) without water in tyres and ballast weights — 593 mm forward of rear wheel centre

   b. Tractor with tanks filled, with driver (75 kg) fully ballasted — 550 mm forward of rear wheel centre

2. **Turning space and turning radius:**

Type of wheels: Front 4,00-15
Rear 9-24

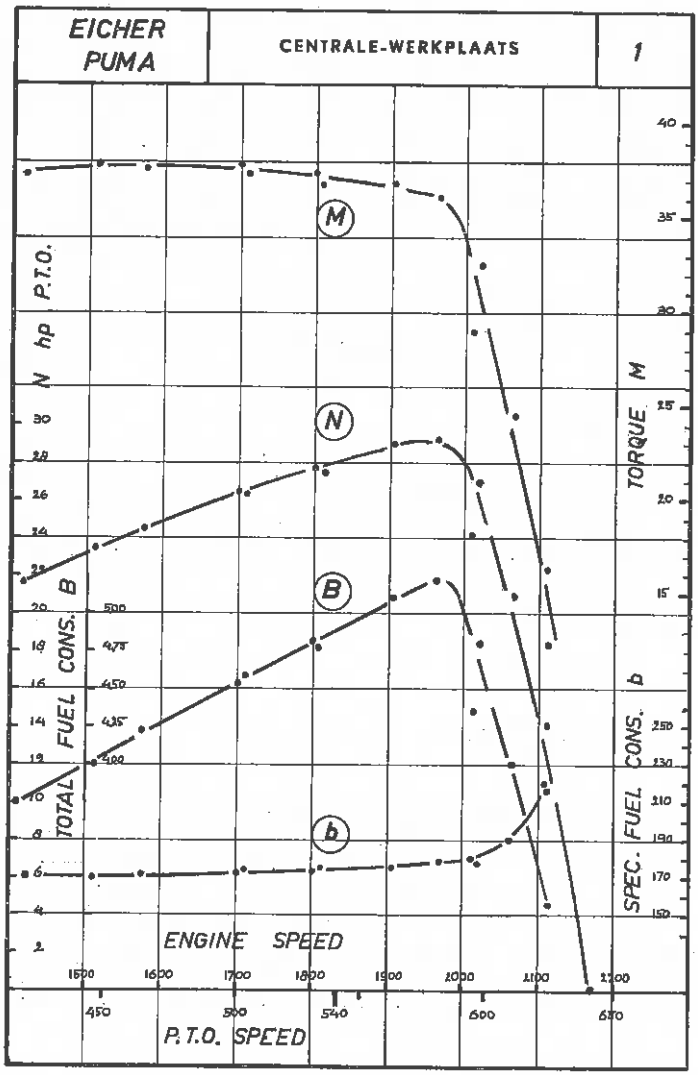
Wheel track: Front 680 mm
Rear 720 mm

Results	With brakes		Without brakes	
	right-hand	left-hand	right-hand	left-hand
Radius of turning space	2630	2500	2880	2680
Turning radius (in mm)	2500	2370	2750	2550

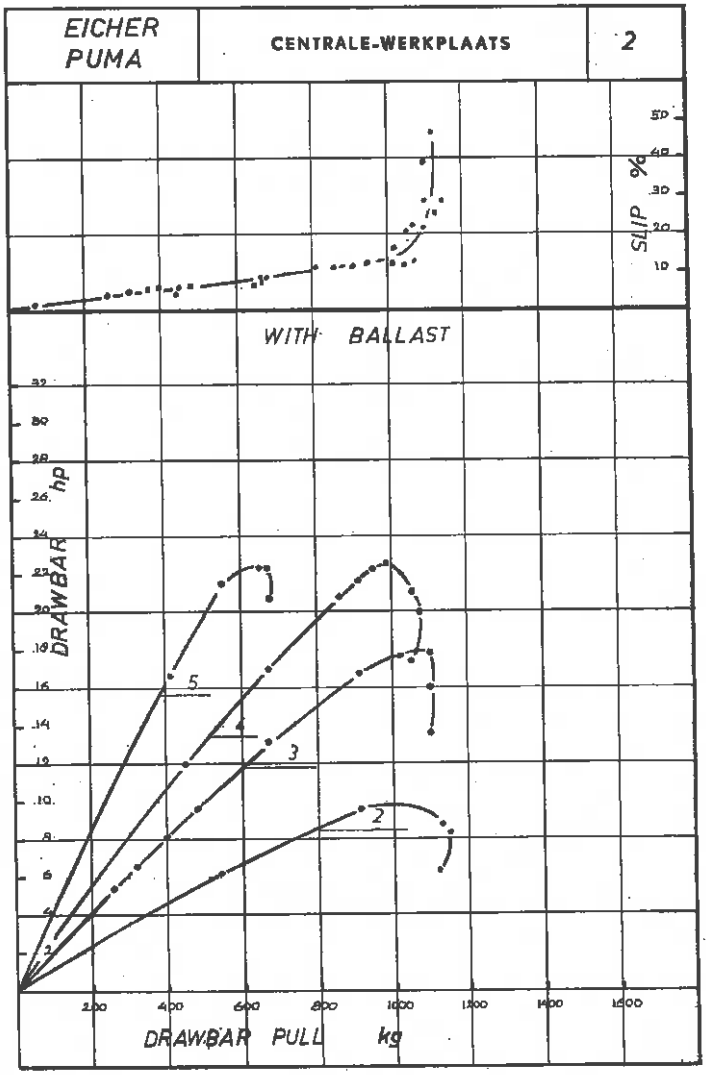
PART V

1. **Repairs and adjustments during test:** None

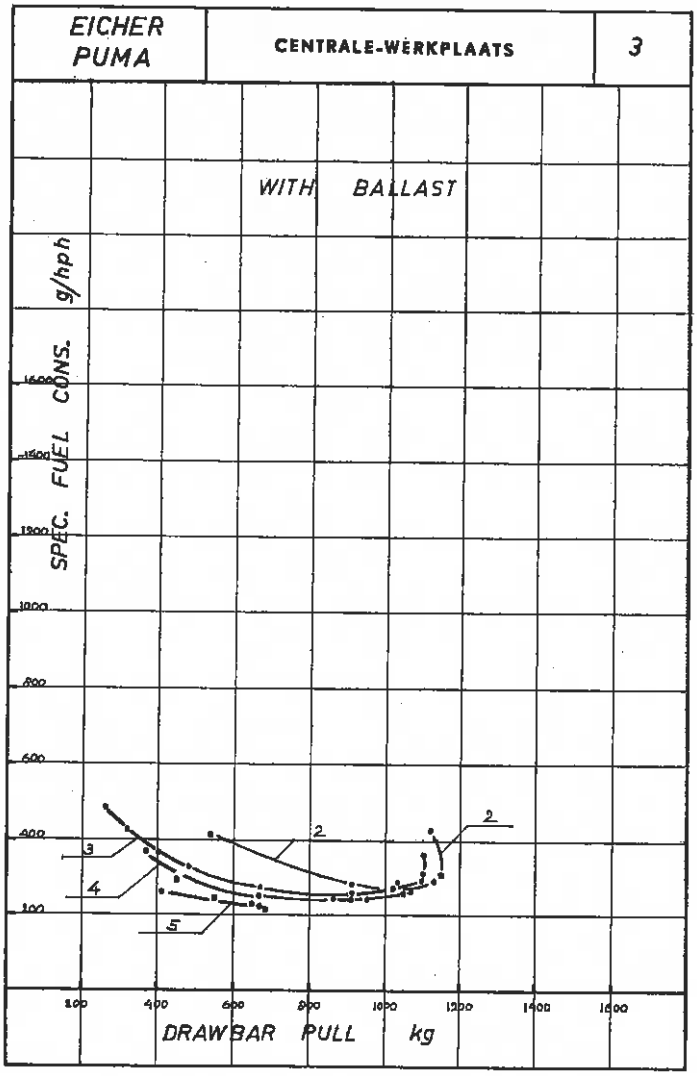
2. **Remarks:** None


EICHER
PUMA
CENTRALE-WERKPLAATS
1
P.T.O.
N hp
TOTAL FUEL CONS. B
SPEC. FUEL CONS. b
TORQUE M
M
N
B
b
ENGINE SPEED
P.T.O. SPEED

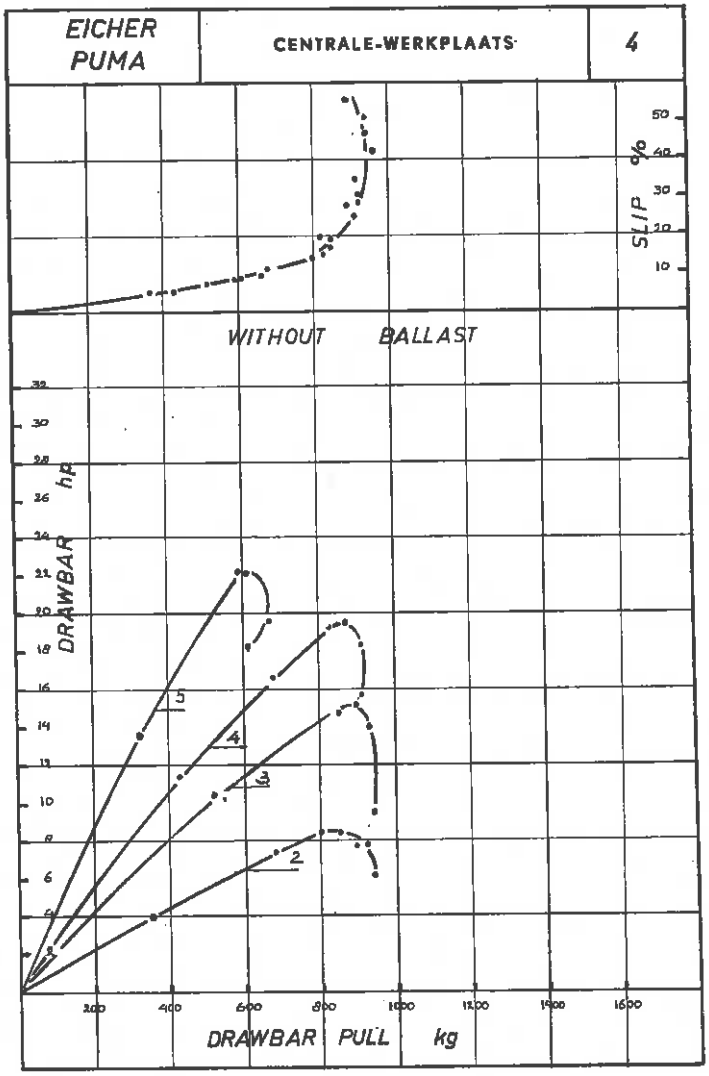
P.T.O. test



Test on concrete track, tractor with ballast (drawbar pull)



Test on concrete track, tractor with ballast (fuel consumption)



Test on concrete track, tractor without ballast (drawbar pull)