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VALTION MAATALOUSTEKNOLOGIAN TUTKIMUSLAITOS
STATE RESEARCH INSTITUTE OF ENGINEERING IN AGRICULTURE AND FORESTRY

TEST BULLETIN: O.E.C.D. No. 1352 RESTRICTED CODE

Report on Test in Accordance with O.E.C.D. Restricted Standard Code
for the Official Testing of Agricultural Tractors



VALMET 6300 (4WD)

Manufactured by: Valmet Tractors Inc.
SF-44200 Suolahti, Finland

Date of approval: 29th January 1992
Serial No. 1352 RESTRICTED CODE

This bulletin is based on engineering tests in accordance with the OECD Restricted Standard Code for the Official Testing of Agricultural Tractors Performance. It does not contain an evaluation of the performance of the tractor on practical farm work.

This report has been approved by the OECD Co-ordinating Centre (CEMAGREF France) as being in accordance with the OECD Restricted Standard Code for the Official Testing of Agricultural Tractors.

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Tractor manufacturer's name and address	Valmet Tractors Inc. SF-44200 Suolahti, Finland
Location of tractor assembly	Suolahti, Finland
Submitted for test by	The manufacturer
Selected for test by	The manufacturer
Place of running-in	Valmet Corporation, Tourula
Duration of running-in	220 h
Location of test	VAKOLA, Finland

I SPECIFICATIONS OF TRACTOR

TRACTOR

Make/Model/Type	Valmet/6300/Four wheel drive, unit construction
Number of driving wheels	4
Serial number	651856
First serial number	651856

ENGINE

Make/Model/Type	Valmet/420 DS/water cooled, direct injection diesel engine, turbocharged
Serial number	95962

Cylinders

Number	4
Disposition	Vertical, in line
Bore/Stroke	108 mm/120 mm
Capacity	4400 cm^3
Compression ratio	16,5:1
Arrangement of valves	Overhead
Cylinder liners	Wet

Supercharging

Make/Model	Schwitzer/S1B
Pressure	0,11 MPa

Fuel system

Fuel feed system	Mechanical piston type feed pump
Fuel filters	Bosch (paper)
Capacity of fuel tank	155 dm^3
Injection pump	Bosch PES 4A, in line
Serial number of injection pump	6227361

Manufacturer's production setting of injection pump	78 mm^3/stroke at rated engine speed and full load x)
Flow rating at rated engine speed and full load	16,1 dm^3/h
Timing	19° before TDC
Injectors	Stanadyne NBS 770620, multihole
Injection pressure	23 MPa

Governor

Make/Model/Type	Bosch RSV/centrifugal
Governed range of engine speed	From 750 to 2450 rev/min
Rated engine speed	2225 rev/min

Air cleaner

Pre-cleaner	
Make/Model/Type	Valmet/cyclon type
Location of air intake	Above engine hood
Main cleaner	
Make/Model/Type	Valmet/dry cleaner with safety element
Location of air intake	Above engine hood
Maintenance indicator	Electrical

Lubrication system

Type of pump	Gear pump
Type of filters	One full flow oil filter with replaceable paper element
Number	1

Cooling system

Type of coolant	Anti-freeze
Type of pump	Centrifugal
Number of fan blades	6
Fan diameter	483 mm
Coolant capacity	15,5 dm^3
Type of temperature control	Thermostat
Superpressure system	50 kPa

Starting system

Make/Model/Type	Magnetti Marelli/electrical solenoid starting motor
Starter motor power rating	3 kW

x) The given figure is based on fuel pump bench test according to ISO 4010, for actual fuel consumption see the test results, main power take-off test

Cold starting aid	Thermostart, automatic fuel exess and injection delay
Safety device	Only operable when clutch pedal is pressed
Electrical system	
Voltage	12 V
Generator	
Make/Model/Type	Magnetti Marelli/A127-65
Power	870 W
Battery	
Number	1
Rating	158 Ah at 20 hours
Exhaust system	
Make/Model/Type	Valmet/Ebersprächer/muffler, expansion chamber type
Location	Vertical on the right hand side, debouch 2780 mm above ground
TRANSMISSION	
Clutch (travel alone)	
Make/Model/Type	Vaith turbo 390 TD VA, turbin clutch and Fichtel & Sachs 330 WGSZX/dry
Number of plates	1
Diameter of plates	330 mm
Method of operation	Mechanical
Gear box	
Make/Model/Type	Valmet/GL 300/constant mesh fully synchronized with shuttle gear
Arrangement	Synchromesh gear box with 4 speeds, synchromesh group gear with 3 forward ranges (LL with dog clutch, M and H), 1 directional shift gear (reverse range)
Number of gears	12 forward, 12 reverse
Available options	Quick-shift gear, 24 forward, 24 reverse
Rear axle and final drives	
Make/Model/Type	Valmet/crown wheel and pinion differential, planetary final drives
Differential lock	
Type	Multidisc
Method of engagement	Electrohydraulically by a press button
Method of disengagement	Electrohydraulically by a press button

Front axle and final drives

Make/Model/Type	Sige/CS 17 SD 01 crown wheel and pinion differential
Differential lock	
Type	Limit slip
Method of engagement	Automatic
Method of disengagement	Automatic

Total ratios and travelling speeds

Gear no	Group or range	Number of engine revolutions for one revolution of the driving wheels		Nominal travelling speed (*) at rated engine speed of 2225 rev/min km/h	
		forward	reverse	forward	reverse
1	LL	619.583	604.593	1.0	1.1
2	LL	434.586	424.072	1.5	1.5
3	LL	309.265	301.783	2.1	2.1
4	LL	218.756	213.464	3.0	3.0
1	M	146.501	142.96	4.4	4.5
2	M	102.758	100.27	6.3	6.4
3	M	73.126	71.36	8.8	9.0
4	M	51.725	50.47	12.5	12.8
1	H	46.953	45.82	13.8	14.1
2	H	32.933	32.14	19.6	20.1
3	H	23.436	22.87	27.5	28.2
4	H	16.578	16.18	38.9	39.9

(*) Calculated with a tyre dynamic radius index of 770 mm (ISO 4251/1-1984)

Number of revolutions of front wheels for one revolution of rear wheels	1.3806

POWER TAKE-OFF

Main power take-off

Type	Independent
Method of engagement	Hand lever operated electrohydraulical wet multiplate clutch together with a collar shifter
Number of shafts	1
Method of changing power take-off shaft ends	Changeable shaft and speed changing happens with a collar shifter

Power take-off proportional to engine speed

540 rev/min

Location	At the rear of the tractor

Diameter of power take-off shaft end	34,8 mm
Number of splines	6, in conformity with ISO 500/1979
Height above ground	740 mm
Distance from the median plane of the tractor	0 mm
Distance behind rear-wheel axis	424 mm
PTO speed at rated engine speed (2225 rev/min)	641 rev/min
Engine speed at standard PTO speed 540 rev/min	1874 rev/min
Ratio of rotation speeds (engine speed/PTO speed)	3,471
Power restriction and maximum torque	None
Direction of rotation (viewed from behind tractor)	Clockwise
1000 rev/min	
Location	At the rear of the tractor
Diameter of power take-off shaft end	34,8 mm
Number of splines	6, in conformity with ISO 500/1979, additional: 21, in conformity with ISO 500/1979
Height above ground	740 mm
Distance from the median plane of the tractor	0 mm
Distance behind rear-wheel axis	424 mm
PTO speed at rated engine speed (2225 rev/min)	1070 rev/min
Engine speed at standard PTO speed 1000 rev/min	2080 rev/min
Ratio of rotation speeds (engine speed/PTO speed)	2,080
Direction of rotation	Clockwise
Power take-off proportional to ground speed	
PTO shaft	Optional together with 540 and 1000
Travelling distance for one revolution of power take-off shaft	155,8 mm x)
Number of power take-off shaft revolutions for one revolution of (rear) driving wheels	31,06 x)

x) The proportional to ground speed power take off is not connected to pto speeds 540 or 1000, but is independent from those, lever in a third position

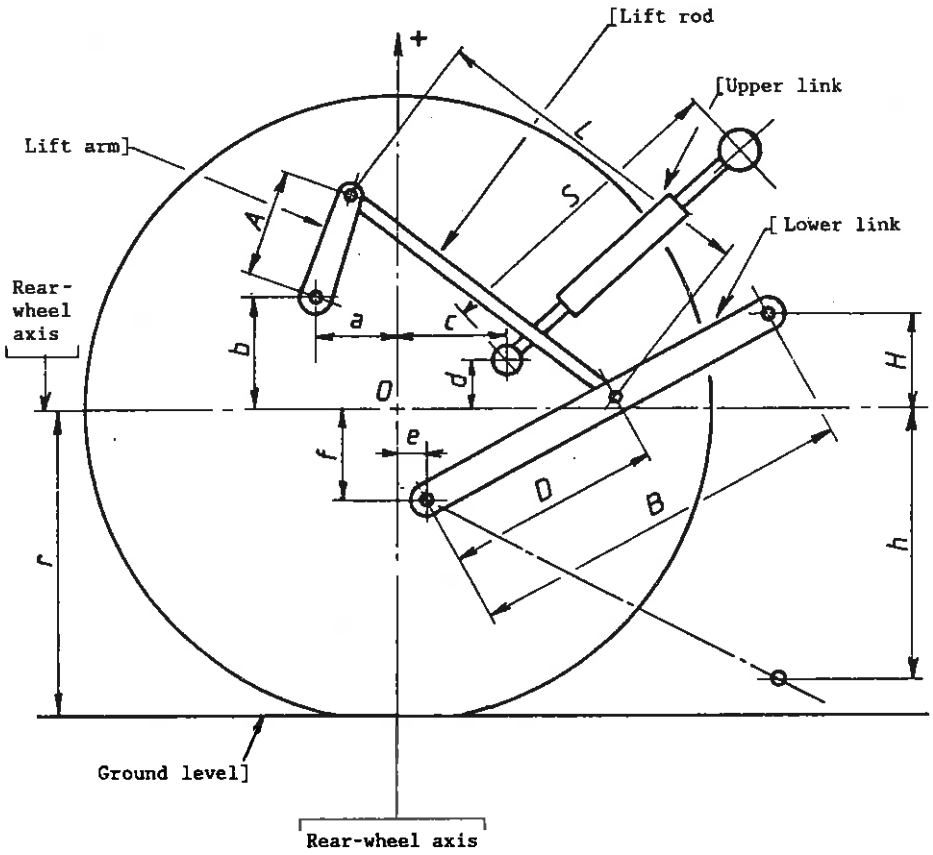
Direction of rotation with forward gear engaged	Clockwise

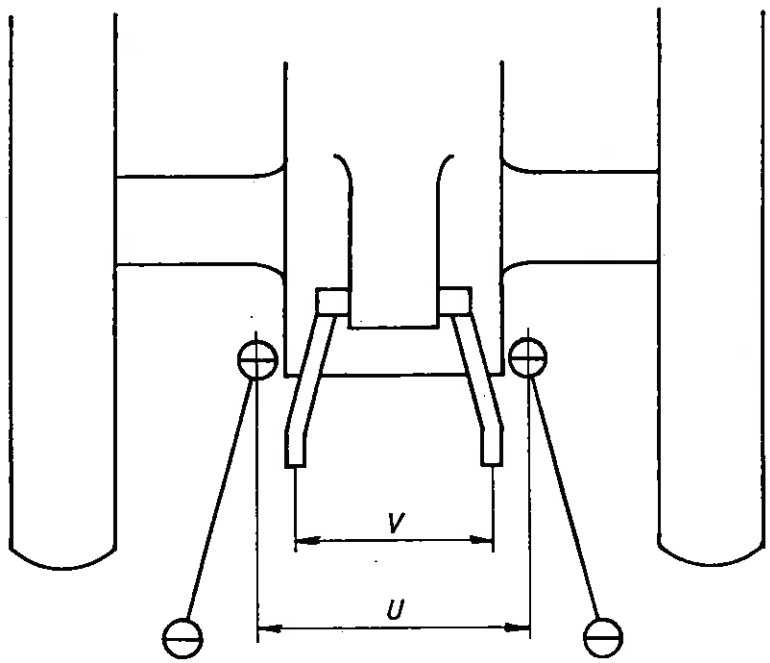
POWER LIFT

Make/Model/Type	Valmet/50 kN
Type of hydraulic system	Open centre
Type and number of cylinders	Two single acting
Type of linkage lock for transport	Electric
Relief valve pressure setting	18 + 0.8 MPa
Opening pressure of cylinder safety valve	20 MPa
Lift pump type	Gear pump
Transmission between pump and engine	Gears
Type and number of filters	Suction strainer and pressure filter
Site of oil reservoir	In the gearbox
Type, number and location of tapping points	Push-pull, 4 at the rear of the tractor
Maximum volume of oil available to external cylinders	15 dm^3, 30 dm^3 with extra filling

Three point linkage

Category	2, in conformity with ISO 730/1-1977
Category adapter	None


Lift rod
Upper link
Lift arm
Lower link
Rear-wheel axis
+
A
S
L
a
b
c
d
e
f
O
D
B
H
h
r
Ground level
Rear-wheel axis


V
U

		Dimension or range mm	Settings used in test mm
Length of lift arms	(A)	350	350
Length of lower links	(B)	920	920
Distance of lift arm pivot point from rear-wheel axis : horizontally	(a)	-111	-111
: vertically	(b)	287	287
Horizontal distance between the 2 lower link point	(u)	615	615
Horizontal distance between the 2 lift arm end points	(v)	600	600
Length of upper link	(S)	from 580 to 795	675
Distance of upper link pivot point from rear wheel axis			
: horizontally	(c)	450, 440, 430	440
: vertically	(d)	165, 240, 315	240
Distance of lower link pivot point from rear wheel axis			
: horizontally	(e)	189	189
: vertically	(f)	256	256
Distance of lower link pivot points to lift rod pivot points on lower links	(D)	348, 389, 445	445
Length of lift rods	(L)	from 560 to 715	640
Height of lower hitch points relative to the rear-wheel axis			
: in low position	(h)	from 370 to 725	570
: in high position	(H)	from -2 to 395	145
Height above ground of lower hitch points when locked in transport position (*)		45 - 1165	

(*) Assuming r = 770 mm tyre dynamic radius index of ISO 4251/1-1984.

Table 1.1 Dimensions of linkage geometry

TRAILER HITCH

Type	Hitch-hook
Hook diameter	47 mm
Height above ground	512 mm
Distance of hitch point from rear-wheel axis, horizontally	466 mm
Distance of hitch point from power take-off shaft end:	
- vertically	228 mm
- horizontally	42 mm
Maximum vertical permissible load	53 kN

STEERING

Make/Model/Type	Danfoss/Orbitrol OSBC 125 LS/hydrostatic

Method of operation	Independent hydraulic circuit for steering
Cylinders	Single central cylinder acting on both steering arms
Working pressure	14 + 1 MPa

BRAKES

Service brake

Make/Model/Type	Valmet/oil immersed disc brakes
Method of operation	Two pedals hydraulically actuated independent or combined operation
Trailer braking take-off	Additional (not on tested tractor)

Parking brake

Type	Mechanical, coupled to both service brakes
Method of operation	Hand lever with ratchnet

WHEELS

Number	
- front	Two driving and steering wheels
- rear	Two driving wheels
Wheelbase	2330 mm

Track width adjustment:

	Minimum mm	Maximum mm	Adjustment method
Front	1520	1975	Offset lug rims and reversing wheel centres
Rear	1505	2105	

PROTECTIVE STRUCTURE

Make/Model/Type	T 888/2
Manufacturer's name and address	Valmet Tractors Inc. SF-44200 Suolahti, Finland
Protective device	Protective cab, not tiltable
OECD approval number	CSS 0164/2

DRIVER'S SEAT

Make/Model/Type	Grammer DS 85 H/90 A
Type of suspension	Mechanical spiral spring
Type of damping	Hydraulic damper
Range of adjustment	
- longitudinal	200 mm
- vertical	60 mm

MISCELLANEOUS

Additional seat
- location — To the left of the driver
- number of places — 1

LIGHTNING

	Height above ground of centre mm	Size mm	Distance from outside edge of lights to median plane of tractor mm
Headlights	1155	100 x 160	230
Sidelights	1760	60 x 80	682
Rearlights	1730	60 x 80	795
Reflector	1520 750 680	40 x 180 ø 75 40 x 180	875 500 685

II. TEST CONDITIONS

Overall dimensions

Length mm	Width		Height at top of	
	Minimum mm	Maximum mm	Protective structure mm	Exhaust silencer mm
4425	2010	2610	2715	2780

Ground clearance — 435 mm

Clearance limiting part — Hitch-hook

Tractor mass
(with cab and tanks full)

	Without driver kg	With driver kg
Front	1730	1740
Rear	2340	2405
Total	4070	4145

Tyres and track width specifications

	Front	Rear
Tyres:		
- dimensions	14.9 R 24	18.4 R 34
- load index	126	144
- type	radial	radial
- maximum load (tyre manufacturer's)	17.0 kN	28.0 kN
- inflation pressure (tyre manufacturer's)	160 kPa	160 kPa
- dynamic radius index	590 mm	770 mm
Chosen track width	1780 mm	1720 mm

Oils and lubrication (Capacity and change interval)

	Capacity dm^3	Oil change h	Filter change h
Engine	16	200	200
Gear box *)	43	800	400
Front axle	8	800	-
Final drive (front axle)	2 x 1	800	-
Turbinclutch	7.6	5000	-

*) Includes rear axle, final drive (rear), hydraulic system and steering

	Recommended	Used during test
Engine oil - Type - Viscosity - Classification	 10W/30 +30-20°C 5W/20 -10..-30°C API CD	Neste Delta Tractor Super 10 W/30 API GL 5
Transmission oils - Type - Viscosity - Classification	 10W/30, 5W/30 5W/20 -10..-30°C API - GL 4(STOU)	Neste Delta Tractor Super 10 W/30 API GL 5
Front axle - Type - Viscosity - Classification	 80W/90 API GL-5 (EP)	Texaco Hypoid 80 W/90 EP
Turbinclutch	10W/30 API CD	

Grease: Universal grease

Number of lubrication points: 32

Fuel

Type: Dieseloil, in conformity with national standards

Density at 15 °C: PTO test 846 g/dm^3
Drawbar power test 833 g/dm^3

REPAIRS: None

REMARKS: None

III. TEST RESULTS

COMPULSORY TEST RESULTS

1. MAIN POWER TAKE-OFF

- Date and location of tests 5.9.1991 VAKOLA
- Type of dynamometer Schenk W 400

Power	Speed		Fuel consumption			Specific energy
	Engine	P.T.O.	Hourly		Specific	
kW	rev/min		kg/h	l/h	g/kWh	kWh/l
1.1 MAXIMUM POWER - TWO-HOUR TEST						
58.0	1915	921	13.1	15.5	226	3.74
1.2 POWER AT RATED ENGINE SPEED						
57.9	2225	1070	14.0	16.5	241	3.50
1.3 STANDARD POWER TAKE-OFF SPEED (1000 REV/MIN)						
57.3	2079	1000	13.2	15.7	231	3.66
1.4 PART LOADS 1.4.1 The torque corresponding to maximum power at rated engine speed						
57.9	2225	1070	14.0	16.5	241	3.50
1.4.2 85 % of torque obtained in 1.4.1						
50.7	2291	1102	12.9	15.3	255	3.31
1.4.3 75 % of torque defined in 1.4.2						
38.4	2316	1114	10.8	12.8	282	3.00
1.4.4 50 % of torque defined in 1.4.2						
26.0	2345	1128	8.9	10.5	342	2.47
1.4.5 25 % of torque defined in 1.4.2						
13.2	2389	1149	6.5	7.7	488	1.73
1.4.6 Unloaded						
0	2418	1163	4.3	5.1	-	-
1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED (1000 REV/MIN) 1.5.1 The torque corresponding to maximum power						
57.3	2079	1000	13.2	15.7	231	3.66
1.5.2 85 % of torque obtained in 1.5.1						
50.1	2137	1028	12.2	14.4	244	3.47
1.5.3 75 % of torque defined in 1.5.2						
37.8	2152	1035	10.0	11.8	264	3.20
1.5.4 50 % of torque defined in 1.5.2						
25.5	2181	1049	8.0	9.5	315	2.68
1.5.5 25 % of torque defined in 1.5.2						
13.0	2220	1068	5.8	6.9	449	1.88
1.5.6 Unloaded						
0	2254	1084	3.6	4.2	-	-

- No load maximum engine speed	2418 rev/min
- Torque[1)] at rated engine speed	249 Nm
- Torque[1)] at maximum power	289 Nm
- Maximum torque[1)]	313 Nm
at engine speed	1351 rev/min
- Mean atmospheric conditions	
- Temperature	24 °C
- Pressure	100.1 kPa
- Relative humidity	35 %
- Maximum temperatures	
- Coolant	75 °C
- Engine oil	112 °C
- Fuel	44 °C
- Engine air intake	30 °C

[1)] Equivalent crankshaft torque

2. HYDRAULIC POWER AND LIFTING FORCE

2.1 Hydraulic power test

Date of tests	29.8.1991
Sustained pressure with relief valve open	21.6 MPa
Pump delivery rate at minimum pressure	69.5 l/min

	Flow rate l/min	Pressure MPa	Power kW
Flow rate corresponding to a hydraulic pressure equivalent to 90 % of the actual relief valve pressure setting and corresponding hydraulic power	39.3	19.4	12.7
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	66.6	17.0	18.9

Tapping point used for test: External tapping

2.2 Power lift test

	At the hitch point	On the frame
Height of lower hitch points above ground in down position	200 mm	200 mm
Vertical movement	685 mm	640 mm
Maximum corrected force exerted through full range	41.1 kN	28.1 kN
Corresponding pressure of hydraulic fluid	17.0 MPa	17.0 MPa
Moment about rear-wheel axis	45.6 kNm	48.3 kNm
Maximum tilt angle of mast from vertical		15 degrees

Lifting heights relative to the horizontal plane including the lower link pivot points									
mm	-314	-269	-200	-100	0	100	200	300	371
Lifting forces (the values measured are corrected to correspond to a hydraulic pressure equivalent to 90 % of the actual relief valve pressure setting or to maximum power delivered by the hydraulic system, whichever is lower)									
At the hitch points kN	43.5		43.2	43.0	42.7	42.5	42.3	42.0	41.1
Corresponding pressure: 17.0 MPa									
At the frame kN		40.6	39.6	38.0	36.3	34.6	32.7	30.3	28.1
Corresponding pressure: 17.0 MPa									

3. DRAWBAR POWER AND FUEL CONSUMPTION

Date of tests 21.-23.8.1991

Type of track Tarmacadam

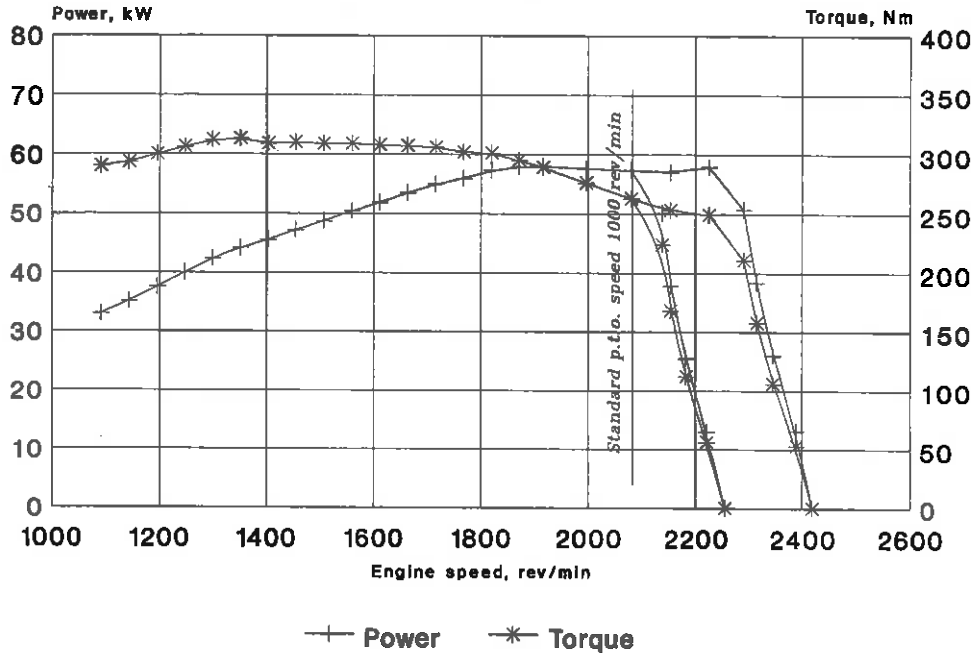
		Tyre inflation presssure	
	Height of drawbar above ground	Front	Rear
Unballasted	520 mm	100 kPa	100 kPa

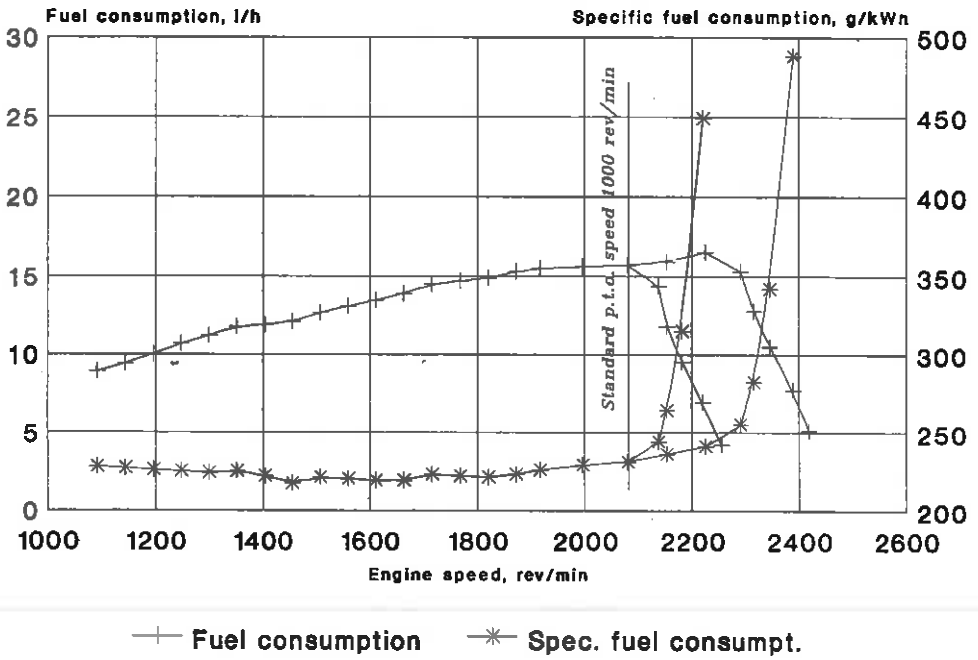
Gear and range	Power	Drawbar pull	Speed	Engine speed	Slip of wheels or track	Specific fuel consumption	Specific energy	Temperature			Atmospheric conditions		
								Fuel	Coolant	Engine Oil	Tempera-ture	Relative humidity	Pressure
	kW	kN	km/h	rev/min	%	g/kWh	kWh/l	°C	°C	°C	°C	%	kPa
3.1 MAXIMUM POWER IN TESTED GEARS													
LL3	18.9	34.8	2.0	2339	14.6	462	1.80	24	73	87	1	62	100.7
LL4	26.2	34.3	2.7	2309	14.6	425	1.96	26	71	91	2	62	100.7
M1	38.1	34.3	4.0	2281	14.8	327	2.55	27	70	90	2	62	100.7
M2	45.6	34.4	4.8	1913	14.3	285	2.93	27	67	88	1	62	100.7
M3	47.0	23.4	7.2	1915	7.3	274	3.04	26	66	84	1	62	100.7
M4	46.7	16.1	10.5	1901	4.6	278	3.00	27	70	87	1	62	100.7
H1	47.1	14.4	11.8	1927	4.1	278	3.00	27	66	87	1	62	100.7
H2	44.4	9.5	16.8	1896	1.3	288	2.89	28	68	88	3	62	100.7

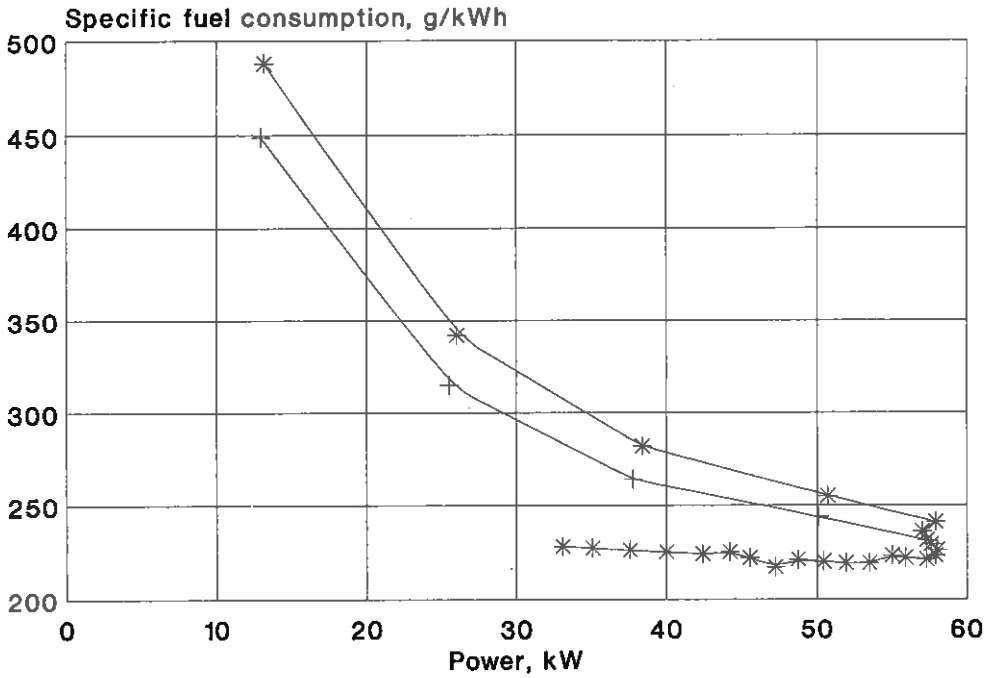
3.2 FUEL CONSUMPTION

Gear and range	Power	Drawbar pull	Speed	Engine speed	Slip of wheels	Specific consumption	Specific energy	Temperature			Atmospheric conditions		
								Fuel	Coolant	Engine Oil	Temperature	Relative humidity	Pressure
	kW	kN	km/h	rev/min	%	g/kWh	kWh/l	°C	°C	°C	°C	%	kPa
3.2.1 In selected gear at maximum power													
H1	47.1	14.4	11.8	1927	4.1	278	3.00	27	66	87	1	62	100.7
3.2.1.1 75 % of pull at maximum power at rated speed													
H1	43.0	10.9	14.2	2279	2.8	311	2.68	29	71	95	0	84	100.8
3.2.1.2 50 % of pull at maximum power at rated speed													
H1	28.9	7.2	14.6	2295	1.4	377	2.21	28	69	99	1	84	100.8
3.2.1.3 Next higher gear at reduced engine speed, same pull and travelling speeds as in 3.2.1.1													
H2	41.4	10.4	14.3	1631	2.5	263	3.16	28	65	91	0	84	100.8
3.2.1.4 Next higher gear at reduced engine speed, same pull and travelling speeds as in 3.2.1.2													
H2	27.8	6.9	14.5	1618	1.3	311	2.68	25	67	85	3	84	100.8

Gear and range	Power	Drawbar pull	Speed	Engine speed	Slip of wheels	Specific consumption	Specific energy	Temperature			Atmospheric conditions		
								Fuel	Coolant	Engine Oil	Temperature	Relative humidity	Pressure
	kW	kN	km/h	rev/min	%	g/kWh	kWh/l	°C	°C	°C	°C	%	kPa
3.2.2 In selected gear nearest to 7.5 km/h													
M3	47.0	23.4	7.2	1915	7.3	274	3.04	26	66	84	1	62	100.7
3.2.2.1 75 % of pull at maximum power at rated speed													
M3	43.4	17.6	8.9	2269	5.2	305	2.73	26	70	87	3	84	100.8
3.2.2.2 50 % of pull at maximum power at rated speed													
M3	30.0	11.6	9.3	2309	2.9	353	2.36	26	73	88	3	84	100.8
3.2.2.3 Next higher gear at reduced engine speed, same pull and travelling speeds as in 3.2.2.1													
M4	41.8	17.2	8.8	1610	5.0	274	3.04	29	66	88	4	84	100.8
3.2.2.4 Next higher gear at reduced engine speed, same pull and travelling speeds as in 3.2.1.2													
M4	29.5	11.7	9.1	1622	3.2	288	2.90	27	69	86	3	84	100.8


Power, kW
Torque, Nm
80
70
60
50
40
30
20
10
0
400
350
300
250
200
150
100
50
0
1000
1200
1400
1600
1800
2000
2200
2400
2600
Engine speed, rev/min
Standard p.t.o. speed 1000 rev/min
Power
Torque


Fuel consumption, l/h
Specific fuel consumption, g/kWh
30
25
20
15
10
5
0
500
450
400
350
300
250
200
1000
1200
1400
1600
1800
2000
2200
2400
2600
Engine speed, rev/min
Standard p.t.o. speed 1000 rev/min
Fuel consumption
Spec. fuel consumpt.



STATE RESEARCH INSTITUTE OF ENGINEERING IN AGRICULTURE AND FORESTRY

Vihti, May 29th 1992

Director Henrik Sarin

Test engineer Ari Lemminkäinen

Valion maatalouskoneiden tutkimuslaitos

PAINORASTERI OY 1992