FINNISH RESEARCH INSTITUTE
OF ENGINEERING IN AGRICULTURE
AND FORESTRY
(VAKOLA)

Testing, research and development of the machines used in agriculture, gardening, forestry, dairy, household work and home industries

Address: SF-03450 Oikkala, Finland

TEST BULLETIN: O.E.C.D. No. 802

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



VALMET 65 Id DIESEL TRACTOR

Manufactured by: Valmet DO Brasil, Magi das Cruzes (SP), Brazil

This report has been approved by the O.E.C.D. Coordinating Centre (CEMAGREF France) as being in accordance with the O.E.C.D. Standard Code for the Official Testing of Agricultural Tractors

Date of approval: 1981-03-12

Serial No. 802

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This bulletin is based on engineering tests in accordance with the O.E.C.D. Standard Code for the Official Testing of Agricultural Ttractors. It does not contain an evaluation of the performance of the tractor on practical farm work.

Tractor manufacturer:	Valmet Do Brasil Mogi das Cruzes-SP Brasil
Submitted for the test by:	Valmet Oy Jyväskylä Finland
Selected by:	The manufacturer with the agreement of the institute
Place of running-in:	Helsinki
Duration of running-in:	33 h

SPECIFICATION OF TRACTOR

Tractor

Make:	Valmet Do Brasil
Model:	65 id
Type:	Wheeled tractor, rear wheel driven, unit construction
Serial No:	065.4.4560

Engine

Make:	MWM Motores Diesel Ltda
Model:	D 225-3 TV
Type:	4-stroke direct injection diesel engine, water cooled
Serial No:	D 225 03.48619
Cylinders:	3 cylinders, vertical, in line, bore 100 mm, stroke 120 mm, displacement 2829 cm^3, compression ratio 18:1, wet replaceable cylinder liners
Valves	overhead

Fuel system

Bosch type FP/KS-22 AD 6/4 piston type fuel feed pump, one paper prefilter CAV type SSV-5836 A 120 A; one double paper filter Bosch type FJ/DF 5F5/306, Bosch in-line injection pump type PES 3A80D 320/RS serial no 922 9981, manufacturer's production setting 9,5 kg/h at 2300 rpm rated engine speed and at specific gravity 0,830 g/cm^3 at 20 °C, DLL 150 S 393 multihole injector nozzles, injector setting 17,7 + 0,4 MPa (nominal), injection timing 27 °C before T.D.C., capacity of fuel tank 41 l.

Governor — Bosch type EP/RV, mechanical governed range of engine speed 600...2480 rpm, rated engine speed 2300 rpm.

Air cleaner — MANN oil bath type with centrifugal pre-cleaner, oil capacity 0,8 litres.

Lubrication system — Forced feed from gear type pump with metal strainer in sump, full flow replaceable element filter MANN W 940/18. total oil capacity 7,5 l, recommended oil change period 120 h, recommended type of oil SAE 30 (MIL-L-2104 C), API-CD

Cooling system — Water cooling, pressurized at 39-49 kPa, impeller assisted with a 415 mm diameter belt driven 6-blade fan, thermostat for temperature control
cooling water capacity 11,5 l.

Starting system — Electrical
Bosch type JD 12 V-1, 8 CV solenoid engaged starter motor

Electrical system — 12 V
negative earth
two 6 V battery units connected in series with capacity of 100 Ah (SAE 20 hours)
alternator Bosch type K1 14 V 23 A 20 (320 W)

Transmission

Clutch: — Amortex dry single plate 280 mm diameter, pedal operated

Gearbox: — Own make
3 forward and 1 reverse speed gear box + a reduction gear box; total 6 forward and 2 reverse speeds, group gear and 2nd and 3rd gear synchronized

Total ratios and speeds:

Group	Gear	Number of engine revolutions for one revolution of driving wheel	Nominal travelling speed at 2300 rpm rated speed of engine km/h
Slow	Forward		
	1	163,52	3,4
	2	100,45	5,5
	3	47,98	11,5
	Reverse		
	R	114,46	4,8
Fast	Forward		
	1	64,00	8,6
	2	39,32	14,0
	3	18,78	29,3
	Reverse		
	R	44,80	12,3

Rear axle and final drive: — Own make
level gear drive with crown wheel and pinion
pedal operated differential lock with automatic unlocking device to avoid overloading
final drive with spur gears located at the end of the different half shafts

Oil capacities: — Gearbox and differential 15 l
final drives 6,0 l each
recommended type of oil SAE 140 (MIL-L-2105)
recommended oil change period 720 h.

Power take-off:
At rear tractor
in vertical centre plane
647 mm above ground, distance from rear axle 239 mm
6 splines 35 mm diameter (ISO)
speed 540 rpm at 1720 rpm engine speed
722 rpm at 2300 rpm engine speed
operated with transmission clutch
rotation clockwise viewed from the rear

Belt pulley:
Optional
not fitted for test
p.t.o. driven giving 14,72 m/s (1444 rpm) linear speed
at 2300 rpm rated engine speed
direction of rotation optional

Power lift

Hydraulic system:
Own make with gear type pump driven by the cam shaft
oil supply to ram cylinder and two external tapings
draught and position controls and adjustable draught response and speed to drop implement
oil capacity 11,5 l
recommended type of oil SAE 30, API SD-CC

Implement linkage:
Category 2 three point linkage (ISO 730/1)

Pull attachment

Drawbar:
Swinging drawbar
height ground 408 mm
distance from rear axle 536, 643,750 and 857 mm
239 mm under pto and 326, 433, 540 and 647 mm behind it
lateral adjustment 385 mm
distance of pivot point 76 mm rear of the rear axle
coupling pindia 32 mm

Steering:
Own make
worm and nut type with double drag links

Brakes

Service brake:
Own make
mechanically operated dry disc brakes acting on differential half shafts
two pedals
independent operated for steering braking or combined operated for service braking

Parking brake:
Hand level with ratchet operating both service brakes for parking

Wheels

Steering wheels:
Two 7.50 - 16.6 pr types in front
maximum permissible load on each tyre 7,6 kN at 274 kPa pressure
track width from 1448 mm to 1748 mm in 100 mm steps and from 1568 mm to 1868 mm in 100 steps
changed by extending telescopic front axle and by reversing wheel centres

Driving wheels: Two 14.9 - 28 6 pr tyres maximum permissible load on each tyre 16 kN at 137 kPa pressure track width 1426 - 1530 - 1640 - 1738 - 1834 - 1954 mm changed by offset lug type rims and reversing wheel centres.

Wheel base: 2078 mm

Lighting

	Height above ground of centre mm	Diameter mm	Distance from outside edge of tractor to centre mm
Head lights	1065	120	620
Rear light	1545	48	235
Reflectiors	1084	52	560

Unrestricted beam angle of headlight in plan view 108 °C

Number of grease points 13

Overall dimensions

	Lenght m	Width m		Heights m	
		max .	min.	With exhaust	Without exhaust
With ballast	3,47	2,99	2,46	2,20	1,74
Without ballast	3,2	2,34	1,92	2,21	1,75

Seat Teperman de estotamentos CIA upholstered cushion and backrest, spring with hydraulic damber, adjustable for 10...130 kg driver's weight, range of adjustment 47 mm fore and after

CONDITIONS DURING TEST

Masses

Tractor without driver but with tanks full

	Front kg	Rear kg	Total kg
Without ballast	745	1375	2120
With ballast	1110	2350	3460

Ballast

	No of weights	Total mass kg	Water kg
Front	6	280	-
Rear	14	665	395

Track setting — During test 1530 mm

Fuels and lubricants used in tests

Fuel: Diesel oil 0,830 specific gravity at 15 °C

Engine oil: Castrol CRD ROW/30

Transmission oil: Castrol 80-90 EP

Hydraulic oil: Castrol CRB 5W/20

(1) COMPULSORY TESTS
MAIN POWER TAKE-OFF PERFORMANCE

Date and location of tests:
29th january 1980 , HELSINKI
Type of dynamometer: Schenk U1-30

Power	Speed		Fuel consumption		Specific energy
	Engine rev/min	p.t.o. rev/min	hourly l/h	specific g/kWh	kWh/l
Maximum power, 2-hour test					
37,5	2266	711	11,4	253	3,3
The speed recommended by the manufacturer for drawbar work					
37,5	2266	711	11,4	253	3,3
Part loads, at rated engine speed					
(i) 85 % of the torque obtained at maximum power					
32,6	2318	728	9,7	248	3,4
(ii) unloaded					
-	2432	763	3,1	-	-
(iii) 50 % of the torque defined in (i)					
16,7	2371	744	5,8	291	2,9
(iv) the torque corresponding to maximum power					
37,5	2266	711	11,4	253	3,3
(v) 25 % of the torque defined in (i)					
8,4	2400	753	4,1	405	4,1
(vi) 75 % of the torque defined in (i)					
24,8	2350	738	7,5	252	7,5

Power	Speed		Fuel consumption		Specific energy
	Engine	p.t.o.	hourly	specific	
kW	rev/min	rev/min	l/h	g/kWh	kWh/l
Part loads, standard speed of the p.t.o.					
(i) 85 % of the torque obtained at maximum power					
28,9	1787	561	8,0	230	3,6
(ii) unloaded					
-	1880	590	2,0	-	-
(iii) 50 % of the torque defined in (i)					
14,8	1829	574	4,6	261	3,2
(iv) the torque corresponding to maximum power available					
32,9	1720	540	9,6	244	3,4
(v) 25 % of the torque defined in (i)					
7,5	1865	585	3,1	348	2,4
(vi) 75 % of the torque defined in (i)					
21,9	1804	566	6,1	231	3,6

Standard specific fuel consumption (g/kWh) : 248/291/230/261

No load maximum engine speed: 2432 rev/min
Torque (x) at maximum power: 158 Nm
Maximum torque (x) : 184 Nm at 1389 rev/min of the engine.
Mean atmospheric conditions : temperature 17 °C
pressure 1012 mbar
relative humidity 68 %

Maximum temperatures: coolant 88 °C
engine oil 112 °C
fuel 40 °C
engine air intake 27 °C

(x) The torque is the equivalent crankshaft torque.

2. DRAWBAR PERFORMANCE

Date of tests: Vihti 1979-10-22 and 1980-06-02...-05
Type of track: tarmacadam
Height of drawbar above ground: 408 mm

Tyre inflation pressure: rear 100 kPa
front180 kPa

Gear	Speed km/h	Power kW	Drawbar pull kN	Engine speed r/min	Slip %	Specific consumption g/kWh	Specific energy kWh/l	Temperature Fuel °C	Coolant °C	Engine oil °C	Atmospheric conditions Temperature °C	Relative humidity %	Pressure mbar
(i) Maximum power (unballasted)													
1 (L1)	3,0	10,5	12,6	2398	15,0	-	-	14	82	78	+2	44	1010
2 (L2)	4,8	17,4	13,0	2373	14,7	-	-	14	82	78	+2	44	1010
3 (H1)	7,4	26,5	12,8	2307	13,7	-	-	15	82	78	+2	44	1010
4 (L3)	10,3	28,7	10,0	2219	6,9	-	-	14	81	78	+2	44	1010
5 (H2)	13,6	28,0	7,4	2302	2,5	-	-	15	83	78	+2	44	1010
(ii) Maximum power (ballasted)													
1 (L1)	2,9	17,0	21,0	2356	15,0	345	2,39	30	85	80	+25	51	970
2 (L2)	4,6	26,4	20,5	2295	14,2	325	2,54	32	84	82	+25	51	970
3 (H1)	7,9	28,9	13,2	2313	11,6	333	2,48	31	84	82	+25	51	970
4 (L3)	10,7	29,8	10,0	2275	6,0	309	2,67	33	83	81	+25	51	970
5 (H2)	12,9	28,1	7,8	2200	2,5	320	2,58	32	84	84	+25	51	970
(iii) Five-hour-test at 75% of pull at maximum power													
3 (H1)	8,3	22,7	9,9	2332	8,3	312	2,64	34	85	105	+25	56	980
(iv) Five-hour-test at pull corresponding to 15% wheel slip in test (i) (additional ballast)													
2 (L2)	4,8	27,8	21,0	-	-	-	-	35	86	107	+24	24	970

Oil consumption during ten hours duration of tests (iii) and (iv) 15 g/h.

(3) TURNING SPACE AND TURNING CIRCLE

Details of wheel equipment : As in specification without ballast

Track : front 1548 mm
rear 1530 mm

	With brakes		Without brakes	
	left-hand m	right-hand m	left-hand m	right-hand m
Radius of turning space	3,16	3,15	3,63	3,63
Radius of turning circle	3,05	3,04	3,52	3,52

(4) LOCATION OF CENTRE OF GRAVITY

	mm
Height above ground	760
Distance forward from the vertical plane containing the axis of the rear wheels	730
Distance from the medimum plane	0

(5) BRAKING

Date of tests: 1980-11-24

Tractor masses during brake tests: as in specification

Type 0 (ordinary cold service braking device performance) test

Speed before application of brakes : 31,8 km/h

Ballasted	Braking device control force, N	350	430	510	580	
	Mean deceleration, m/s^2	2,0	2,3	2,6	2,8	
Unballasted	Braking device control force, N	280	330	400	490	600
	Mean deceleration, m/s^2	2,3	2,8	3,2	3,4	3,5

Type 1 (fade) test

Braking device control force, N	300	390	460	580
Mean deceleration, m/s^2	1,9	2,4	2,6	2,9

Maximum deviation from its original course: 0 m

Abnormal vibration: none

The brake were heated by: towing

Parking braking device test

	18 % slope		12 % slope with trailer of 2,1 tonnes	
	Up	Down	Up	Down
Braking device control force, N	300	340	260	350

(6) MEASUREMENT OF EXTERNAL NOISE LEVEL

Date of tests: 1979-10-08
Type of sound level meters: Brüel & Kjaer 2209
Type of track: tarmacadam

Results of test

Gear: 6 (H3)
Travelling speed before acceleration: 24 km/h
Sound level: 92 dB(A)

(7) NOISE MEASUREMENT AT THE DRIVER'S EAR

Date of test: 1979-10-08
Type of sound level meter: Brüel & Kjaer 2209
Type of track: tarmacadam
Cab fitted: No

Results of test:

Gear	Drawbar pull at which the tractor developes the maximum sound level kN	Measured travelling speed km/h	Sound level dB(A)
4. (H1)x	5,8	8,0	99,5
4. (H1)x	light load	9,0	98,0
top gear	light load	30,6	99,0

x The 4. gear corresponds to the nominal travelling speed nearest to 7,5 km/h.

(8) POWER LIFT AND HYDRAULIC PUMP PERFORMANCE

Date and location of tests: Vihti 1980-11-26

Power lift

	Height of lower hitch point above ground in down position	Vertical movement	Maximum force exerted through full range	Corresponding pressure of hydraulic fluid	Moment about rear axle	Max.tilt angle of mast over range of lift
	mm	mm	kN	MPa	kNm	degrees
At hitch points	175	770	11,2	11,9	9,4	-
On the frame	175	770	8,9	11,9	13,0	7

Temperature of hydraulic fluid at start of test 60 °C

Hydraulic pump performance

Opening pressure of the relief valve	13,2 MPa
Substained pressure with relief valve open	13,7 MPa
Pump delivery rate at minimum pressure	30,0 l/min
Maximum hydraulic power	5,9 kW
Pressure at maximum power	12,3 MPa
Temperature of hydraulic fluid	60 °C

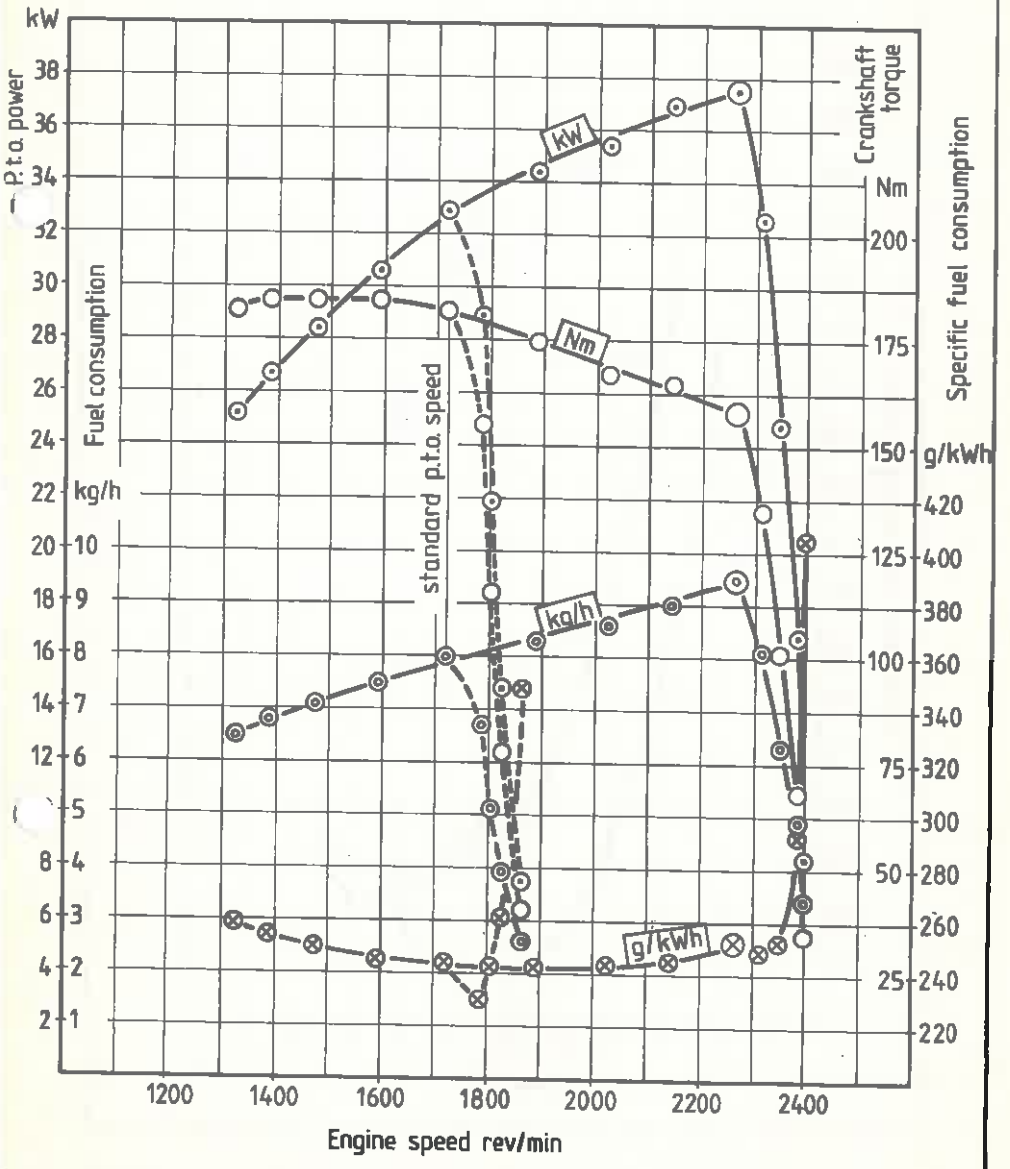
LINKAGE GEOMETRY

when connected to the standard frame

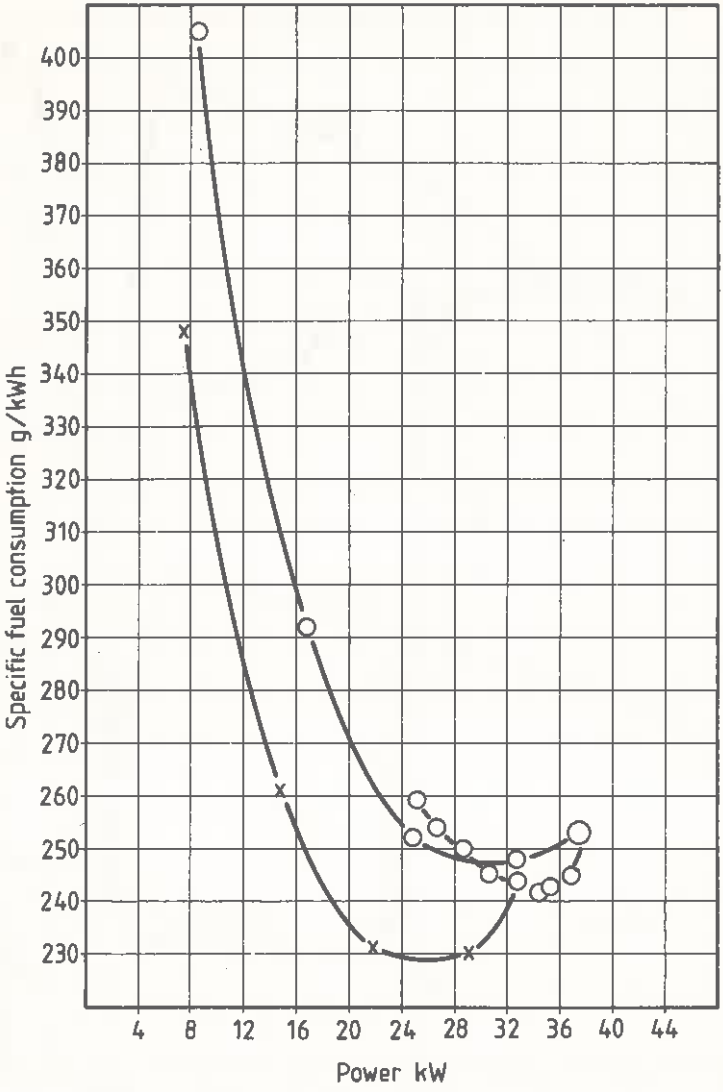
Projected length in side view:	
Lower links	860 mm
Lift arms	235 mm
Lift rods	588...710 mm
Top link	650...902 mm
Distance of lift rod connection point from pivot point of lower link	405[1], 455, 505 mm
The following dimensions are given relative to the rear wheel centre line, situated 682 mm above the ground level	
Lower link pivot point	3 mm behind, 162 mm below
Top link pivot point	140 mm behind, 119, 162, 205[1] mm above
Lift arm pivot point	137 mm forward, 307 mm above
Maximum and minimum height of lower link hitch points	276 mm above, 695 mm below
Height of lower link hitch points when locked in transport position	Any height within limits given above

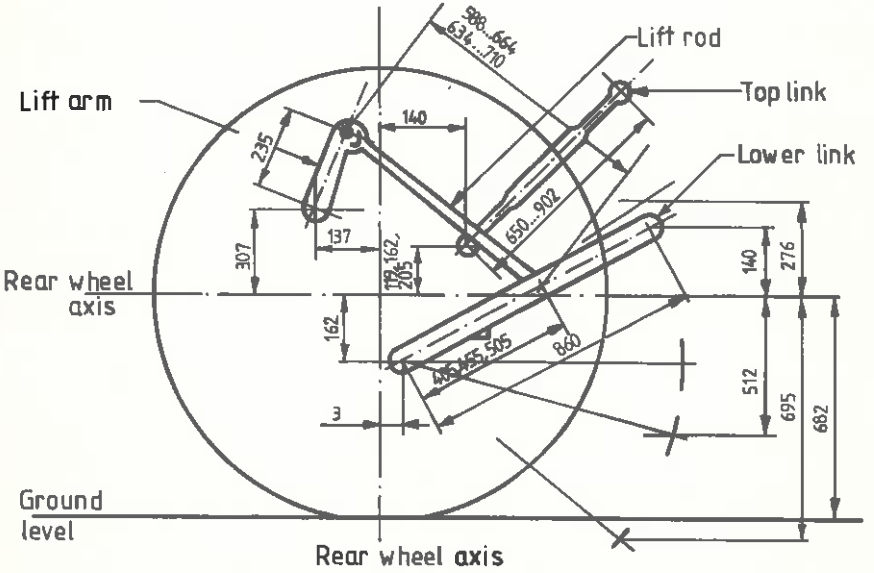
1) During power lift tests

Finnish Research Institute of Engineering in Agriculture and Forestry	Power take-off test	Valmet 65 id diesel tractor



Finnish Research Institute of Engineering in Agriculture and Forestry	Power take-off test	Valmet 65 id diesel tractor




Lift arm
Lift rod
Top link
Lower link
Rear wheel axis
Ground level
Rear wheel axis
588...664
634...710
140
235
307
137
650...902
162
205
118
140
276
162
505
860
512
695
682
3

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