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January 2004

## Nebraska Summary 218A: Buhler Versatile 2145 Diesel 16-Speed

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, [tractortestlab@unl.edu](mailto:tractortestlab@unl.edu)

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# SUMMARY OF OECD TEST 1649/1-NEBRASKA SUMMARY 218A

## BUHLER VERSATILE 2145 DIESEL

### 16 SPEED

#### POWER TAKE-OFF PERFORMANCE

Power HP (kW)	Crank shaft speed rpm	Gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Mean Atmospheric Conditions
MAXIMUM POWER AND FUEL CONSUMPTION					
Rated Engine Speed—(PTO speed—1103 rpm)					
147.6 (110.1)	2100	9.05 (34.27)	0.436 (0.265)	16.29 (3.21)	
Standard Power Take-off Speed (1000 rpm)					
163.7 (122.1)	1903	9.24 (34.96)	0.401 (0.244)	17.72 (3.49)	
Maximum Power (2 hours)					
167.6 (125.0)	1800	9.15 (34.65)	0.388 (0.236)	18.32 (3.61)	

#### VARYING POWER AND FUEL CONSUMPTION

147.6 (110.1)	2100	9.05 (34.27)	0.436 (0.265)	16.29 (3.21)	Air temperature
129.5 (96.6)	2168	8.32 (31.49)	0.457 (0.278)	15.58 (3.07)	68°F (20°C)
98.8 (73.7)	2203	6.80 (25.75)	0.490 (0.298)	14.52 (2.86)	Relative humidity
66.9 (49.9)	2240	5.26 (19.91)	0.558 (0.340)	12.72 (2.51)	64%
33.9 (25.3)	2272	3.99 (15.09)	0.835 (0.508)	8.51 (1.68)	Barometer
4.8 (3.6)	2297	2.77 (10.50)	4.120 (2.506)	1.73 (0.34)	28.78" Hg (97.46 kPa)

Maximum Torque - 550.0 lb.-ft. (745.7 Nm) at 1416 rpm  
Maximum Torque Rise - 48.9%  
Torque rise at 1700 engine rpm - 36%

#### DRAWBAR PERFORMANCE (Unballasted - Front Drive Engaged)

#### FUEL CONSUMPTION CHARACTERISTICS

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank- shaft speed rpm	Slip %	Fuel Consumption lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Temp.°F (°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
Maximum Power—9th Gear									
132.1 (98.5)	8415 (37.44)	5.89 (9.47)	2102	2.6	0.489 (0.298)	14.52 (2.86)	187 (86)	74 (23)	29.30 (99.23)
75% of Pull at Maximum Power—9th Gear									
103.9 (77.5)	6315 (28.08)	6.17 (9.93)	2187	1.8	0.531 (0.323)	13.40 (2.64)	187 (86)	74 (23)	29.30 (99.23)
50% of Pull at Maximum Power—9th Gear									
71.1 (53.0)	4205 (18.70)	6.34 (10.20)	2230	1.2	0.615 (0.374)	11.57 (2.28)	184 (84)	74 (23)	29.30 (99.23)
75% of Pull at Reduced Engine Speed—10th Gear									
103.4 (77.1)	6305 (28.05)	6.15 (9.90)	1866	1.8	0.472 (0.287)	15.08 (2.97)	185 (85)	77 (25)	29.27 (99.12)
50% of Pull at Reduced Engine Speed—10th Gear									
70.9 (52.9)	4195 (18.67)	6.34 (10.20)	1909	1.1	0.533 (0.324)	13.35 (2.63)	182 (83)	77 (25)	29.27 (99.12)

**Location of Test:** Prairie Agricultural Machinery Institute (PAMI), Portage La Prairie, Manitoba, Canada

**Dates of Test:** July - August 1996.

**Manufacturer:** Buhler Versatile Inc., 1260 Clarence Ave., Winnipeg, Manitoba, Canada R3C 4E8

**FUEL and OIL:** Fuel No. 2 Diesel **Specific gravity converted to 60°/60°F (15°/15°C)** 0.8543 **Fuel weight** 7.113 lbs/gal (0.8525 kg/l) **Oil SAE** 15W40 **API service classification** CF-4 **Transmission and hydraulic lubricant** ESN-M2C134 fluid **Front axle lubricant** ESN-M2C134 fluid

**ENGINE:** Make New Holland Diesel **Type** six cylinder vertical with turbocharger and air to air intercooler **Serial No.** VT518827 **Crankshaft** lengthwise **Rated engine speed** 2100 **Bore and stroke** 4.40" x 5.00" (111.8 mm x 127.0 mm) **Compression ratio** 17.5 to 1 **Displacement** 456 cu in (7480 ml) **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements and aspirator **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** one cartridge **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** thermostat and variable speed fan

**CHASSIS:** **Type** front wheel assist **Serial No.** D408516 **Tread width** rear 60.0" (1524 mm) to 124.0" (3150 mm) front 60.0" (1524 mm) to 88.0" (2235 mm) **Wheelbase** 118.3" (3005 mm) **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with full range operator controlled powershift **Nominal travel speeds mph (km/h)** first 1.65 (2.66) second 1.96 (3.15) third 2.29 (3.68) fourth 2.62 (4.22) fifth 3.10 (4.99) sixth 3.63 (5.84) seventh 4.27 (6.87) eighth 4.99 (8.03) ninth 5.90 (9.49) tenth 6.90 (11.11) eleventh 7.90 (12.72) twelfth 9.34 (15.03) thirteenth 10.93 (17.59) fourteenth 12.87 (20.71) fifteenth 15.21 (24.47) sixteenth 17.79 (28.63) reverse 2.24 (3.60), 2.64 (4.25), 3.09 (4.97), 3.54 (5.70), 4.18 (6.73), 4.90 (7.88), 5.76 (9.27), 6.80 (10.95), 7.97 (12.82) **Clutch** multiple wet disc electro-hydraulically operated by foot pedal **Brakes** multiple wet disc hydraulically actuated by two foot pedals that can be locked together **Steering** hydrostatic **Power take-off** 540 rpm at 1878 engine rpm or 1000 rpm at 1903 engine rpm **Unladen tractor mass** 16805 lb (7622 kg)

**DRAWBAR PERFORMANCE**  
**(Unballasted - Front Drive Engaged)**  
**MAXIMUM POWER IN SELECTED GEARS**

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank- shaft speed rpm	Slip %	Fuel Consumption lb/hp.hr (kg/kW.h)	Consumption Hp.hr/gal (kW.h/l)	Temp. °F(°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
129.4 (96.5)	17385 (77.34)	2.79 (4.49)	1858	15.0	6th Gear 0.515 (0.313)	13.83 (2.73)	185 (85)	72 (22)	29.16 (98.75)
139.3 (103.9)	15234 (67.76)	3.43 (5.52)	1801	8.3	7th Gear 0.472 (0.287)	15.10 (2.98)	186 (86)	75 (24)	29.29 (99.20)
144.7 (107.9)	13055 (58.06)	4.16 (6.69)	1802	6.0	8th Gear 0.459 (0.279)	15.53 (3.06)	186 (86)	75 (24)	29.30 (99.22)
148.9 (111.0)	11215 (49.88)	4.98 (8.01)	1800	3.8	9th Gear 0.444 (0.270)	16.01 (3.15)	185 (85)	74 (23)	29.30 (99.23)
146.0 (108.9)	9315 (41.45)	5.68 (9.46)	1801	2.8	10th Gear 0.449 (0.273)	15.84 (3.12)	187 (86)	71 (22)	29.31 (99.25)

**REPAIRS AND ADJUSTMENTS:** No repairs or adjustments

**NOTE:** The data on this summary was obtained from OECD report 1649/1 conducted on the New Holland 8670 Diesel.

**REMARKS:** All test results were determined from observed data obtained in accordance with official OECD test procedures. The optional hydraulic flow rate claim of 55.0 GPM (208 lpm) was not tested for verification. The performance figures on this summary were taken from a test conducted under the OECD Code II test procedure.

We, the undersigned, certify that this is a true summary of data from OECD Report No. **1649/1**, Nebraska Summary 218A, September 1, 2004.

Leonard L. Bashford  
Director

M.F. Kocher  
V.I. Adamchuk  
W.P. Campbell  
Board of Tractor Test Engineers

TRACTOR SOUND LEVEL WITH CAB	dB(A)
At 75% load in 10th gear	75.0
Bystander	--

**TIRES, BALLAST AND WEIGHT**

	With Ballast	Without Ballast
<b>Rear Tires</b> -No., size, ply & psi (kPa)	Four 20.8R38;**, 8 (55)	Two 20.8R38;**, 18 (124)
<b>Ballast</b> - Duals (total)	1735 lb (788 kg)	None
- Cast Iron (total)	765 lb (347 kg)	None
<b>Front Tires</b> -No., size, ply & psi (kPa)	Two 14.9R28;**, 20 (138)	Two 14.9R28;**, 16 (110)
<b>Ballast</b> - Liquid (total)	None	None
- Cast Iron (total)	825 lb (374 kg)	None
<b>Height of Drawbar</b>	19.8 in (504 mm)	20.1 in (510 mm)
<b>Static Weight with operator</b> - Rear	13200 lb (5988 kg)	10990 lb (4984 kg)
- Front	7095 lb (3218 kg)	5980 lb (2713 kg)
- Total	20295 lb (9206 kg)	16970 lb (7697 kg)

**DRAWBAR PERFORMANCE**  
**(Ballasted - Front Drive Engaged)**  
**FUEL CONSUMPTION CHARACTERISTICS**

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank- shaft speed rpm	Slip %	Fuel Consumption lb/hp.hr (kg/kW.h)	Consumption Hp.hr/gal (kW.h/l)	Temp.°F (°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
<b>Maximum Power—9th Gear</b>									
130.1 (97.0)	8270 (36.78)	5.90 (9.49)	2101	1.6	0.500 (0.304)	14.24 (2.81)	187 (86)	81 (27)	29.00 (98.19)
<b>75% of Pull at Maximum Power—9th Gear</b>									
101.4 (75.6)	6205 (27.60)	6.13 (9.86)	2176	1.3	0.546 (0.332)	13.05 (2.57)	187 (86)	81 (27)	28.99 (98.16)
<b>50% of Pull at Maximum Power—9th Gear</b>									
69.1 (51.5)	4130 (18.38)	6.27 (10.09)	2218	0.8	0.626 (0.381)	11.37 (2.24)	185 (85)	81 (27)	28.99 (98.16)
<b>75% of Pull at Reduced Engine Speed—10th Gear</b>									
101.1 (75.4)	6200 (27.57)	6.12 (9.85)	1858	1.1	0.475 (0.289)	14.97 (2.95)	187 (86)	81 (27)	28.99 (98.16)
<b>50% of Pull at Reduced Engine Speed—10th Gear</b>									
69.4 (51.8)	4145 (18.43)	6.28 (10.11)	1898	0.7	0.538 (0.327)	13.25 (2.61)	183 (84)	81 (27)	28.99 (98.16)
<b>MAXIMUM POWER IN SELECTED GEARS</b>									
<b>4th Gear</b>									
120.7 (90.0)	21495 (95.62)	2.11 (3.39)	1958	15.0	0.542 (0.330)	13.12 (2.59)	187 (86)	79 (26)	29.02 (98.29)
<b>5th Gear</b>									
129.5 (96.6)	20840 (92.69)	2.33 (3.75)	1801	13.5	0.508 (0.309)	14.01 (2.76)	185 (85)	79 (26)	29.02 (98.29)
<b>6th Gear</b>									
142.0 (105.9)	17810 (79.22)	2.99 (4.81)	1800	5.3	0.467 (0.284)	15.23 (3.00)	187 (86)	81 (27)	29.00 (98.19)
<b>7th Gear</b>									
145.2 (108.3)	15210 (67.66)	3.58 (5.76)	1799	3.5	0.454 (0.276)	15.68 (3.09)	187 (86)	81 (27)	29.00 (98.19)
<b>8th Gear</b>									
147.8 (110.2)	13040 (58.00)	4.25 (6.84)	1799	3.1	0.446 (0.271)	15.99 (3.15)	189 (87)	81 (27)	29.00 (98.19)
<b>9th Gear</b>									
147.9 (110.3)	11045 (49.13)	5.02 (8.08)	1800	2.2	0.444 (0.270)	16.01 (3.15)	187 (86)	79 (26)	29.01 (98.25)
<b>10th Gear</b>									
145.1 (108.2)	9235 (41.07)	5.89 (9.48)	1798	1.7	0.452 (0.275)	15.73 (3.10)	187 (86)	79 (26)	29.01 (98.25)

## THREE POINT HITCH PERFORMANCE (OECD Static Test)

CATEGORY: II

Quick Attach: None

Maximum Force Exerted

Through Whole Range: 11285 lbs (50.2 kN) (4" lift cylinders)

i) Opening pressure of relief valve: NA

Sustained pressure of the open relief valve: 2770 psi (191 bar)

ii) Pump delivery rate at minimum pressure: 33.2 GPM (125.6 l/min)

iii) Pump delivery rate at maximum

hydraulic power: 30.7 GPM (116.2 l/min)

Delivery pressure: 2350 psi (162 bar)

Power: 42.1 HP (31.4 kW)

## THREE POINT HITCH PERFORMANCE

Observed Maximum Pressure psi.(bar)	2770 (191)
Location:	lift cylinder
Hydraulic oil temperature: °F (°C)	150 (65)
Location:	hydraulic sump
Category:	III
Quick attach:	none

### SAE Static Test—System pressure 2500 psi (172 Bar) (4" lift cylinders)

Hitch point distance to ground level in. (mm)	8.0 (203)	13.4 (340)	21.3 (540)	29.1 (740)	34.5 (877)
Lift force on frame lb	14010	14420	14920	14840	13320
" " " " " (kN)	(62.3)	(64.2)	(66.3)	(66.0)	(59.2)

### ASAE Static Test—System pressure 2700 psi (186 Bar) (4" lift cylinders)

Hitch point distance to ground level in. (mm)	8.0 (203)	13.4 (340)	21.3 (540)	29.1 (740)	34.5 (877)
Lift force on frame lb	15170	15610	16150	16070	14420
" " " " " (kN)	(67.5)	(69.4)	(71.9)	(71.5)	(64.2)

## HITCH DIMENSIONS AS TESTED—NO LOAD

	OECD test		SAE test	
	inch	mm	inch	mm
A	30.3	769	30.2	766
B	15.0	380	15.0	380
C	17.4	443	17.4	443
D	15.6	395	15.6	395
E	7.9	200	7.9	200
F	12.4	315	12.4	315
G	33.7	855	33.7	855
H	2.4	62	2.4	62
I	19.9	505	19.9	505
J	21.3	540	21.3	540
K	18.3	465	18.3	465
L	48.8	1240	48.8	1240
M	25.6	650	25.6	650
N	36.0	915	36.0	915
O	9.1	230	8.0	203
P	48.2	1225	43.3	1100
Q	39.0	990	37.3	947
R	33.0	837	33.5	850

