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January 1998

## Test 1749: Caterpillar Challenger 75E Diesel 10-Speed`

Nebraska Tractor Test Lab

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# NEBRASKA OECD TRACTOR TEST 1749—SUMMARY 265

## CATERPILLAR CHALLENGER 75E DIESEL

### 10 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
<b>MAXIMUM POWER AND FUEL CONSUMPTION</b>					
<b>Rated Engine Speed—(PTO speed—1023 rpm)</b>					
300.69 (224.22)	2100	16.58 (62.77)	0.390 (0.237)	18.13 (3.57)	
<b>Standard Power Take-off Speed (1000 rpm)</b>					
309.60 (230.87)	2054	16.96 (64.20)	0.387 (0.236)	18.25 (3.60)	
<b>Maximum Power (2 hours)</b>					
331.09 (246.89)	1900	17.65 (66.83)	0.377 (0.229)	18.75 (3.69)	

#### VARYING POWER AND FUEL CONSUMPTION

300.69 (224.22)	2100	16.58 (62.77)	0.390 (0.237)	18.13 (3.57)	Air temperature
262.24 (195.56)	2157	14.87 (56.27)	0.400 (0.244)	17.64 (3.48)	
203.43 (151.70)	2228	12.57 (47.59)	0.437 (0.266)	16.18 (3.19)	Relative humidity
140.23 (104.57)	2302	10.02 (37.94)	0.505 (0.307)	13.99 (2.76)	
69.37 (51.73)	2302	6.84 (25.89)	0.696 (0.424)	10.14 (2.00)	Barometer
1.07 (0.80)	2302	3.95 (14.95)	26.143 (15.914)	0.27 (0.05)	

Maximum Torque 1055 lb.-ft. (1430 Nm) at 1300 rpm

Maximum Torque Rise 40.5%

Torque rise at 1700 rpm 34%

#### DRAWBAR PERFORMANCE

##### 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)
<b>Maximum Power—3rd Gear</b>									
263.38 (196.40)	20728 (92.20)	4.77 (7.67)	2095	2.20	0.443 (0.270)	15.94 (3.14)	191 (88)	76 (24)	28.63 (96.95)
<b>75% of Pull at Maximum Power—3rd Gear</b>									
208.60 (155.55)	15610 (69.43)	5.01 (8.06)	2187	1.52	0.471 (0.286)	15.01 (2.96)	188 (87)	77 (25)	28.62 (96.92)
<b>50% of Pull at Maximum Power—3rd Gear</b>									
144.93 (108.07)	10406 (46.29)	5.22 (8.41)	2268	0.88	0.552 (0.336)	12.80 (2.52)	187 (86)	79 (26)	28.58 (96.78)
<b>75% of Pull at Reduced Engine Speed—5th Gear</b>									
208.42 (155.42)	15555 (69.19)	5.02 (8.09)	1672	1.46	0.425 (0.259)	16.61 (3.27)	190 (88)	79 (26)	28.59 (96.82)
<b>50% of Pull at Reduced Engine Speed—5th Gear</b>									
144.74 (107.93)	10431 (46.40)	5.20 (8.37)	1723	0.99	0.465 (0.283)	15.19 (2.99)	188 (87)	80 (27)	28.57 (96.75)

**Location of Test:** Nebraska Tractor Test Laboratory, University of Nebraska, Lincoln, Nebraska 68583-0832

**Dates of Test:** May 5-June 2, 1998

**Manufacturer:** Caterpillar Inc., 100 N.E. Adams St., Peoria, IL 61629

**FUEL OIL and TIME:** Fuel No. 2 Diesel Cetane No. 50.6 Specific gravity converted to 60°/60° F (15°/15°C) 0.8483 Fuel weight 7.063 lbs/gal (0.846 kg/l) Oil SAE 15W40 API service classification CG-4, Transmission and final drive lubricant SAE 30W API CD/TO-2 fluid Hydraulic lubricant Caterpillar CXP fluid Total time engine was operated 22.0 hours.

**ENGINE:** Make Caterpillar Diesel Type six cylinder vertical with turbocharger and air to air intercooler Serial No. \*7ZR00546\* Crankshaft lengthwise Rated engine speed 2100 Bore and stroke (as specified) 4.92" x 5.51" (125 mm x 140 mm) Compression ratio 16 to 1 Displacement 629 cu in (10308 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 transmission oil, radiator for hydraulic oil and steering oil Fuel filter one cartridge and water separator Fuel cooler radiator for return fuel Muffler vertical Cooling medium temperature control thermostat.

**ENGINE OPERATING PARAMETERS:** Fuel rate: 112.4-124.3 lb/h (51.0-56.4 kg/h) High idle: 2260-2340 rpm Turbo boost nominal 17.0-23.1 psi (117-159 kPa) as measured 18.3 psi (126 kPa)

**CHASSIS:** Type tracklayer-rubber tracked Serial No. \*6HS00201\* Tread width 90.1" (2285 mm) Length of track on ground 107.1" (2721 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 2.79 (4.49) second 4.00 (6.44) third 4.93 (7.93) fourth 5.64 (9.08) fifth 6.45 (10.38) sixth 7.06 (11.36) seventh 8.07 (12.99) eighth 9.25 (14.89) ninth 12.54 (20.18) tenth 17.99 (28.95) reverse 2.03 (3.27), 4.71 (7.58) Clutch multiple wet disc hydraulically actuated by foot pedal Brakes caliper disc hydraulically operated by foot pedal Steering differential steering hydrostatically actuated by steering wheel Power take-off 1000 rpm at 2050 engine rpm Unladen tractor mass 34800 lb (15785 kg)

# **DRAWBAR PERFORMANCE AT 2100 RPM** **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)	Hp.hr/gal (kW.h/l)	Temp.°F (°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
1st Gear									
214.09 (159.64)	33452 (148.80)	2.40 (3.86)	2137	14.66	0.511 (0.311)	13.81 (2.72)	188 (87)	57 (14)	28.59 (96.82)
2nd Gear									
262.49 (195.74)	25785 (114.70)	3.82 (6.14)	2097	3.53	0.448 (0.272)	15.78 (3.11)	189 (87)	60 (16)	28.58 (96.78)
3rd Gear									
263.38 (196.40)	20728 (92.20)	4.77 (7.67)	2095	2.20	0.443 (0.270)	15.94 (3.14)	191 (88)	76 (24)	28.63 (96.95)
4th Gear									
262.68 (195.88)	17979 (79.97)	5.48 (8.82)	2096	1.62	0.444 (0.270)	15.91 (3.13)	191 (88)	75 (24)	28.65 (97.02)
5th Gear									
260.12 (193.97)	15466 (68.79)	6.31 (10.15)	2097	1.31	0.447 (0.272)	15.81 (3.11)	191 (88)	74 (23)	28.67 (97.09)
6th Gear									
260.51 (194.26)	14135 (62.88)	6.91 (11.12)	2099	1.20	0.448 (0.273)	15.76 (3.10)	190 (88)	64 (18)	28.62 (96.92)
7th Gear									
258.20 (192.54)	12221 (54.36)	7.92 (12.75)	2101	1.05	0.454 (0.276)	15.57 (3.07)	190 (88)	63 (17)	28.60 (96.85)
8th Gear									
256.03 (190.92)	10578 (47.05)	9.08 (14.61)	2096	0.99	0.460 (0.280)	15.34 (3.02)	190 (88)	64 (18)	28.61 (96.88)

# **DRAWBAR PERFORMANCE AT 1900 RPM** **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)	Hp.hr/gal (kW.h/l)	Temp.°F (°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
1st Gear									
214.23 (159.75)	33299 (148.12)	2.41 (3.88)	2137	14.24	0.510 (0.310)	13.86 (2.73)	188 (87)	57 (14)	28.59 (96.82)
2nd Gear									
277.41 (206.86)	29648 (131.88)	3.51 (5.65)	1993	6.69	0.451 (0.275)	15.65 (3.08)	189 (87)	63 (17)	28.58 (96.78)
3rd Gear									
285.82 (213.14)	25325 (112.65)	4.23 (6.81)	1900	4.18	0.434 (0.264)	16.28 (3.21)	192 (89)	75 (24)	28.63 (96.95)
4th Gear									
290.24 (216.43)	22089 (98.26)	4.93 (7.93)	1900	2.51	0.428 (0.260)	16.52 (3.25)	192 (89)	75 (24)	28.64 (96.99)
5th Gear									
295.45 (220.32)	19448 (86.51)	5.70 (9.17)	1903	1.83	0.421 (0.256)	16.76 (3.30)	192 (89)	65 (18)	28.62 (96.92)
6th Gear									
293.71 (219.02)	17641 (78.47)	6.24 (10.05)	1903	1.52	0.424 (0.258)	16.65 (3.28)	193 (89)	65 (18)	28.62 (96.92)
7th Gear									
292.41 (218.05)	15320 (68.14)	7.16 (11.52)	1904	1.36	0.427 (0.259)	16.56 (3.26)	192 (89)	63 (17)	28.60 (96.85)
8th Gear									
290.69 (216.77)	13292 (59.13)	8.20 (13.20)	1898	1.15	0.428 (0.260)	16.52 (3.25)	192 (89)	64 (18)	28.61 (96.88)

## **TRACTOR SOUND LEVEL WITH CAB**

**dB(A)**

At 75% load in 6th gear	76.3
Bystander	---

## **TRACKS, BALLAST AND WEIGHT**

**Track Width**  
**Ballast—Cast iron** Front

## **Tested Without Ballast**

30.0 in (760 mm)  
None

**Height of Drawbar**  
**Static Weight with Operator**

18.5 in (470 mm)  
34975 lb (15864 kg)

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

**REMARKS:** All test results were determined from observed data obtained in accordance with official OECD, SAE and Nebraska test procedures. For the maximum power tests, the temperature of the returned fuel was maintained at 148° F (64°C). Water was used to cool the PTO reduction box during the PTO test sequence. 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 and correct report of official Tractor Test No. **1749**, Summary 265, June 23, 1998.

**LEONARD L. BASHFORD**  
Director

**M. F. KOCHER**  
**R. D. GRISSO**  
**G.J. HOFFMAN**  
Board of Tractor Test Engineers

### THREE POINT HITCH PERFORMANCE (OECD Static Test)

CATEGORY: III

Quick Attach: None

Maximum Force Exerted Through Whole Range:

11851 lbs (52.7 kN)

i) Opening pressure of relief valve:

NA

Sustained pressure with pump stalled:

2930 psi (202 bar)

ii) Pump delivery rate at minimum pressure and rated engine speed:

41.4 GPM (156.7 l/min)

iii) Pump delivery rate at maximum

hydraulic power:

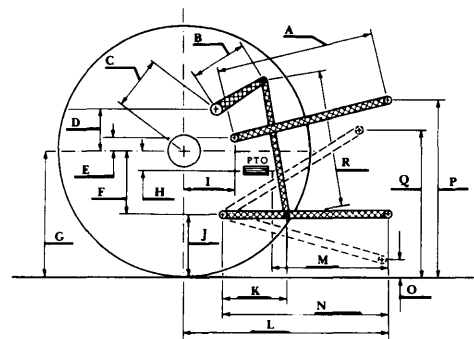
38.9 GPM (147.3 l/min)

Delivery pressure:

2630 psi (181 bar)

Power:

59.7 HP (44.5 kW)



### THREE POINT HITCH PERFORMANCE (SAE Static Test)

Observed Maximum Pressure psi (bar)

2880 (198)

Location

lift cylinder

Hydraulic oil Temperature °F (°C)

153 (67)

Location

pump inlet

Category

III

Quick Attach

none

Hitch point distance

to ground level in. (mm)

11.1 (282)

16.0 (406)

24.0 (610)

32.0 (813)

40.3 (1024)

Lift force on frame lb.

28587

25231

22017

18300

14583

" " " " (kN)

(127.2)

(112.2)

(97.9)

(81.4)

(64.9)

### HITCH DIMENSIONS AS TESTED—NO LOAD

	inch	mm
A	26.5	673
B	21.5	545
C	18.6	472
D	16.3	415
E	16.6	422
F	3.9	98
G	23.9	606
*H	-5.1	130
I	14.6	370
J	20.0	508
K	21.1	535
L	40.6	1030
M	25.5	648
N	30.1	765
O	9.3	236
P	47.0	1194
Q	37.5	952
R	25.6	651

\*PTO is above rear axle



CATERPILLAR CHALLENGER 75E DIESEL

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Institute of Agriculture and Natural Resources  
University of Nebraska-Lincoln  
Darrell Nelson, Dean and Director