

# NEBRASKA OECD TRACTOR TEST 2219-SUMMARY 1166

## JOHN DEERE 7R 290 DIESEL

### e23 TRANSMISSION

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

**Dates of tests:** September 9 - 24, 2020

**Manufacturer:** John Deere Tractor Works, 3500 East Donald Street, P.O. Box 270, Waterloo Ia, 50704-0270

**CONSUMABLE Fluids, OIL and TIME: Fuel** No. 2 Diesel **Specific gravity converted to 60°/60°F (15°/15°C)** 0.8386 **Fuel weight** 6.982 lbs/gal (0.837 kg/l) **Diesel Exhaust Fluid (DEF)** 32% aqueous urea solution **DEF weight** 9.071 lbs/gal (1.087 kg/l) **Oil SAE 10W-30 API service classification CK-4 Transmission and hydraulic lubricant** John Deere Hy-Gard fluid **Front axle lubricant** John Deere Hy-Gard fluid **Total time engine was operated:** 23.0 hours

**ENGINE: Make** John Deere **Diesel Type** six cylinder vertical with turbocharger, air to air aftercooler and D.E.F. (diesel exhaust fluid) exhaust treatment **Serial No.** \*RG6090U086763\* **Crankshaft** lengthwise **Rated engine speed** 2100 **Bore and stroke** 4.661" x 5.354" (118.4 mm x 136.0 mm) **Compression ratio** 16.0 to 1 **Displacement** 548 cu in (8984 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 paper element and prestrainer **Fuel cooler** radiator for pump return fuel **Exhaust** regenerative particulate filter integrated within a vertical muffler **Cooling medium temperature control** thermostat and variable speed fan

**ENGINE OPERATING PARAMETERS: Fuel rate:** 88.4 - 95.7 lb/h (40.1 - 43.4 kg/h) **High idle:** 2190 - 2210 rpm **Turbo boost:** nominal 21.8 - 25.4 psi (150 - 175 kPa) as measured 23.6 psi (163 kPa)

**CHASSIS: Type** front wheel assist with duals **Serial No.** \*1RW7290SCLC110405\* **Tread width** rear 60.0" (1524 mm) to 128.9" (3272 mm) front 60.0" (1524 mm) to 88.0" (2235 mm) **Wheelbase** 115.2" (2925 mm) **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with full range operator controlled power shift **Nominal travel speeds mph (km/h)** first 1.50 (2.42) second 1.74 (2.80) third 2.01 (3.23) fourth 2.32 (3.73) fifth 2.67 (4.29) sixth 3.08 (4.96) seventh 3.53 (5.68) eighth 4.08 (6.56) ninth 4.66 (7.50) tenth 5.38 (8.66) eleventh 6.21 (10.00) twelfth 7.15 (11.51) thirteenth 8.26 (13.29) fourteenth 9.45 (15.21) fifteenth 10.92 (17.57) sixteenth 12.68 (20.41) seventeenth 14.65 (23.57) eighteenth 16.91 (27.22) nineteenth 19.54 (31.44) twentieth 22.48 (36.17) twenty-first 25.96 (41.78) twenty-second 26.10 (42.00) twenty-third 26.10 (42.00) electronically limited

#### POWER TAKE-OFF PERFORMANCE

Power HP (kW)	Crank shaft speed rpm	Diesel Consumption		D.E.F. Consumption		Mean Atmospheric Conditions
		Gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Gal/hr (l/h)	
<b>MAXIMUM POWER AND FUEL CONSUMPTION</b>						
<b>Rated Engine Speed—(PTO speed—1077 rpm)</b>						
255.17 (190.28)	2100	13.44 (50.88)	0.368 (0.224)	18.98 (3.74)	0.71 (2.69)	Fuel used during active exhaust regeneration-1.20 gal (4.53 l) (see note 1, p.2)
<b>Standard Power Take-off Speed (1000 rpm)</b>						
279.14 (208.16)	1950	14.27 (54.02)	0.357 (0.217)	19.56 (3.85)	0.67 (2.53)	
<b>Maximum Power (1 hour)</b>						
283.60 (211.48)	1701	14.09 (53.33)	0.347 (0.211)	20.13 (3.97)	0.62 (2.36)	

#### VARYING POWER AND FUEL CONSUMPTION

255.17 (190.28)	2100	13.44 (50.88)	0.368 (0.224)	18.98 (3.74)	0.71 (2.69)	Air temperature
222.59 (165.99)	2154	12.15 (45.98)	0.381 (0.232)	18.33 (3.61)	0.66 (2.51)	72°F (22°C)
167.53 (124.92)	2164	9.80 (37.11)	0.409 (0.249)	17.09 (3.37)	0.46 (1.73)	Relative humidity
112.40 (83.82)	2177	7.61 (28.81)	0.473 (0.288)	14.77 (2.91)	0.26 (0.98)	38%
56.52 (42.15)	2190	5.64 (21.36)	0.697 (0.424)	10.02 (1.97)	0.16 (0.59)	Barometer
1.28 (0.96)	2197	4.39 (16.60)	23.847 (14.506)	0.29 (0.06)	0.18 (0.69)	29.06" Hg (98.42 kPa)

Maximum torque - 947 lb.-ft. (1283 Nm) at 1551 rpm

Maximum torque rise - 48.3%

Torque rise at 1681 engine rpm - 39%

Power increase at 1701 engine rpm - 11.1%

#### 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		D.E.F. Consumption		Temp. °F(°C)		Barom. inch Hg (kPa)
					lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	lb/hp.hr (kg/kW.h)	cool- ing med	Air dry bulb		
<b>Power at Rated Engine Speed—11th Gear-Manual mode</b>											
231.06 (172.30)	14376 (63.95)	6.03 (9.70)	2099	3.0	0.406 (0.247)	17.18 (3.38)	0.027 (0.017)	219 (104)	58 (14)	28.96 (98.07)	
<b>75% of Pull at Rated Engine Speed—11th Gear-Manual mode</b>											
179.15 (133.59)	10768 (47.90)	6.24 (10.04)	2159	2.3	0.436 (0.265)	16.02 (3.16)	0.023 (0.014)	217 (103)	75 (24)	28.93 (97.97)	
<b>50% of Pull at Rated Engine Speed—11th Gear-Manual mode</b>											
121.37 (90.51)	7195 (32.00)	6.33 (10.19)	2172	1.5	0.492 (0.299)	14.20 (2.80)	0.020 (0.012)	217 (103)	75 (24)	28.92 (97.93)	
<b>75% of Pull at Reduced Engine Speed—6.5 mph (10.4 km/h)-Auto mode</b>											
179.90 (134.15)	10742 (47.48)	6.28 (10.11)	1429	2.3	0.393 (0.239)	17.78 (3.50)	0.009 (0.006)	218 (103)	76 (24)	28.92 (97.93)	
<b>50% of Pull at Reduced Engine Speed—6.5 mph (10.4 km/h)-Auto mode</b>											
121.44 (90.55)	7194 (32.00)	6.33 (10.19)	1237	1.4	0.412 (0.250)	16.96 (3.34)	0.015 (0.009)	216 (102)	76 (24)	28.92 (97.93)	

**DRAWBAR PERFORMANCE**  
**UNBALLASTED - FRONT DRIVE ENGAGED**  
**MANUAL MODE - 2100 ENGINE RPM**  
**DRAWBAR 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)	D.E.F. Consumption lb/hp.hr (kg/kW.h)	Temp. °F(°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)	
					6th Gear					
178.67 (133.23)	24631 (109.56)	2.72 (4.38)	2154	13.9	0.474 (0.288)	14.72 (2.90)	0.028 (0.017)	217 (103)	65 (18)	28.83 (97.63)
					7th Gear					
202.58 (151.06)	24340 (108.27)	3.13 (5.03)	2132	13.5	0.456 (0.277)	15.31 (3.02)	0.030 (0.018)	219 (104)	60 (16)	28.81 (97.56)
					8th Gear					
220.47 (164.40)	21752 (96.76)	3.81 (6.12)	2100	6.6	0.425 (0.259)	16.43 (3.24)	0.025 (0.015)	218 (103)	66 (19)	28.83 (97.63)
					9th Gear					
228.24 (170.19)	19250 (85.63)	4.45 (7.16)	2100	4.6	0.414 (0.252)	16.86 (3.32)	0.024 (0.015)	218 (103)	67 (19)	28.95 (98.04)
					10th Gear					
228.97 (170.74)	16591 (73.80)	5.18 (8.33)	2100	4.0	0.413 (0.251)	16.91 (3.33)	0.024 (0.014)	218 (103)	68 (20)	28.95 (98.04)
					11th Gear					
231.06 (172.30)	14376 (63.95)	6.03 (9.70)	2099	3.0	0.406 (0.247)	17.18 (3.38)	0.027 (0.017)	219 (104)	58 (14)	28.96 (98.07)
					12th Gear					
230.97 (172.23)	12437 (55.32)	6.96 (11.20)	2100	2.5	0.407 (0.247)	17.16 (3.38)	0.027 (0.016)	218 (103)	60 (16)	28.96 (98.05)
					13th Gear					
230.77 (172.08)	10723 (47.70)	8.07 (12.99)	2100	2.2	0.407 (0.248)	17.16 (3.38)	0.027 (0.017)	218 (103)	62 (17)	28.95 (98.04)

reverse 1.41 (2.27), 1.88 (3.02), 2.50 (4.02), 3.30 (5.31), 3.77 (6.07), 5.03 (8.10), 6.69 (10.76), 8.84 (14.22), 11.86 (19.08), 15.81 (25.45), 18.64 (30.00) electronically limited **Clutch** wet multiple disc hydraulically actuated by foot pedal **Brakes** wet multiple disc hydraulically operated by two foot pedals that can be locked together **Steering** hydrostatic **Power take-off** 1000 rpm at 1950 engine rpm **Unladen tractor mass** 25265 lb (11460 kg)

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

**NOTE 1:** The manufacturer declares that the average time between active regenerations is 40 hours. A 1% power increase was observed during the active regeneration.

**REMARKS:** All test results were determined from observed data obtained in accordance with official OECD, SAE and Nebraska test procedures. This tractor fell 1.2% short of meeting the manufacturer's remote hydraulic flow claim of 59 GPM (223.3 l/min) with the 85 cc pump. The performance figures on this summary were taken from a test conducted under the OECD Code 2 test procedure.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **2219**, Nebraska Summary 1166, February 23, 2021.

Roger M. Hoy  
 Director

M.F. Kocher  
 P.J. Jasa  
 J.D. Luck  
 Board of Tractor Test Engineers

TRACTOR SOUND LEVEL WITH CAB	Front Wheel Drive	
	Engaged dB(A)	Disengaged dB(A)
At no load in 9th gear	69.1	69.0
Transport speed - no load - 21st gear		70.1
Bystander in 21st gear		83.7

Horizontal distance of drawbar hitch point behind rear wheel axis - 47.4" (1203 mm)

**TIRES AND WEIGHT**

**Rear Tires** - No., size, ply & psi (kPa)  
**Front Tires** - No., size, ply & psi (kPa)  
**Height of Drawbar**  
**Static Weight with operator** - Rear  
 - Front  
 - Total

**Tested without ballast**

Four 480/80R50;\*\*\*;11(75)  
 Two 420/85R34;\*\*\*;16 (110)  
 20.5 in (520 mm)  
 16710 lb (7579 kg)  
 8730 lb (3960 kg)  
 25440 lb (11539 kg)

**DRAWBAR PERFORMANCE**  
**UNBALLASTED - FRONT DRIVE ENGAGED - AUTO MODE**  
**(Loads based on 2100 engine rpm manual mode performance runs)**  
**DRAWBAR POWER AT SELECTED TRAVEL SPEEDS**

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank- shaft speed rpm	Slip %	Fuel Consumption		D.E.F. Consumption	Temp. °F(°C)		Barom. inch Hg (kPa)
					lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	lb/hp.hr (kg/kW.h)	cool- ing med	Air dry bulb	
3.1 mph (5.0 km/h)										
176.49 (131.60)	24431 (108.67)	2.71 (4.36)	1393	12.3	0.426 (0.259)	16.41 (3.23)	0.020 (0.012)	217 (103)	66 (19)	28.83 (97.63)
3.5 mph (5.6 km/h)										
189.87 (141.59)	23808 (105.90)	3.00 (4.82)	1299	10.0	0.414 (0.252)	16.87 (3.32)	0.018 (0.011)	217 (103)	62 (16)	28.83 (97.61)
4.1 mph (6.6 km/h)										
220.40 (164.35)	21704 (96.54)	3.81 (6.13)	1594	6.6	0.395 (0.240)	17.69 (3.49)	0.007 (0.004)	218 (103)	67 (19)	28.84 (97.66)
4.7 mph (7.6 km/h)										
228.18 (170.15)	19104 (84.98)	4.48 (7.21)	1588	4.6	0.390 (0.237)	17.92 (3.53)	NA (NA)	218 (103)	68 (20)	28.95 (98.04)
5.5 mph (8.8 km/h)										
228.21 (170.18)	16342 (72.69)	5.24 (8.43)	1598	3.9	0.386 (0.235)	18.10 (3.57)	0.015 (0.009)	218 (103)	70 (21)	28.95 (98.04)
6.2 mph (10.0 km/h)										
230.81 (172.12)	14448 (64.27)	5.99 (9.64)	1571	3.1	0.381 (0.232)	18.34 (3.61)	0.019 (0.012)	218 (103)	60 (15)	28.96 (98.07)
7.2 mph (11.6 km/h)										
230.74 (172.06)	12383 (55.08)	6.99 (11.25)	1594	2.5	0.384 (0.233)	18.20 (3.58)	NA (NA)	218 (103)	62 (17)	28.95 (98.04)
8.3 mph (13.4 km/h)										
230.83 (172.13)	10685 (47.53)	8.10 (13.04)	1594	2.2	0.384 (0.234)	18.18 (3.58)	NA (NA)	218 (103)	64 (18)	28.95 (98.04)

**DRAWBAR PERFORMANCE**  
**UNBALLASTED - FRONT DRIVE ENGAGED - 1700 ENGINE 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)	D.E.F. Consumption lb/hp.hr (kg/kW.h)	Temp. °F(°C) cool- ing med	Air dry bulb	Barom. inch Hg (kPa)
6th Gear										
178.53 (133.13)	24613 (109.48)	2.72 (4.38)	2154	13.8	0.474 (0.288)	14.74 (2.90)	0.028 (0.017)	218 (103)	65 (18)	28.83 (97.63)
7th Gear										
202.30 (150.85)	24302 (108.10)	3.13 (5.03)	2133	13.5	0.455 (0.276)	15.36 (3.03)	0.029 (0.018)	219 (104)	60 (16)	28.82 (97.58)
8th Gear										
221.15 (164.91)	21812 (97.02)	3.81 (6.12)	2101	6.6	0.423 (0.257)	16.50 (3.25)	0.025 (0.015)	218 (103)	66 (19)	28.84 (97.66)
9th Gear										
238.32 (177.72)	21246 (94.51)	4.21 (6.78)	2023	6.1	0.411 (0.250)	16.97 (3.34)	0.021 (0.013)	218 (103)	69 (20)	28.85 (97.68)
10th Gear										
248.39 (185.22)	19788 (88.02)	4.71 (7.58)	1944	5.3	0.401 (0.244)	17.42 (3.43)	0.021 (0.013)	218 (103)	69 (21)	28.85 (97.70)
11th Gear										
254.02 (189.42)	19831 (88.21)	4.80 (7.72)	1700	4.7	0.388 (0.236)	18.02 (3.55)	0.021 (0.013)	219 (104)	59 (15)	28.96 (98.07)
12th Gear										
255.71 (190.68)	17209 (76.55)	5.57 (8.96)	1700	3.9	0.385 (0.234)	18.13 (3.57)	0.021 (0.012)	219 (104)	61 (16)	28.96 (98.05)
13th Gear										
256.67 (191.40)	14852 (66.06)	6.48 (10.43)	1702	3.2	0.383 (0.233)	18.24 (3.59)	0.020 (0.012)	218 (103)	63 (17)	28.95 (98.04)
14th Gear										
256.72 (191.44)	12937 (57.55)	7.44 (11.97)	1700	2.6	0.383 (0.233)	18.22 (3.59)	0.020 (0.012)	218 (103)	65 (18)	28.95 (98.04)
15th Gear										
255.22 (190.32)	11085 (49.31)	8.63 (13.89)	1701	2.2	0.386 (0.235)	18.10 (3.57)	0.020 (0.012)	218 (103)	65 (18)	28.95 (98.04)

## HYDRAULIC PERFORMANCE

CATEGORY: III

Quick Attach: Yes

OECD Static test

Maximum force exerted through whole range:

lift cylinders  
15862 lbs (70.6 kN) (2x100 mm)  
18302 lbs (81.4 kN) (1x100 mm & 1x115 mm)

i) Sustained pressure at compensator cutoff:

63 cc pump      85 cc pump  
2907 psi (200 bar)      2931 psi (202 bar)  
**three outlet sets combined**

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

44.3 GPM (167.5 l/min)      58.3 GPM (220.7 l/min)

iii) Pump delivery rate at maximum hydraulic power:

43.5 GPM (164.7 l/min)      57.5 GPM (217.6 l/min)

Delivery pressure:

2671 psi (184 bar)      2571 psi (177 bar)

Power:

67.8 HP (50.5 kW)      86.2 HP (64.3 kW)

**single outlet set**

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

36.0 GPM (136.2 l/min)      36.4 GPM (137.9 l/min)

iii) Pump delivery rate at maximum hydraulic power:

34.5 GPM (130.8 l/min)      35.4 GPM (134.0 l/min)

Delivery pressure:

2330 psi (161 bar)      2244 psi (155 bar)

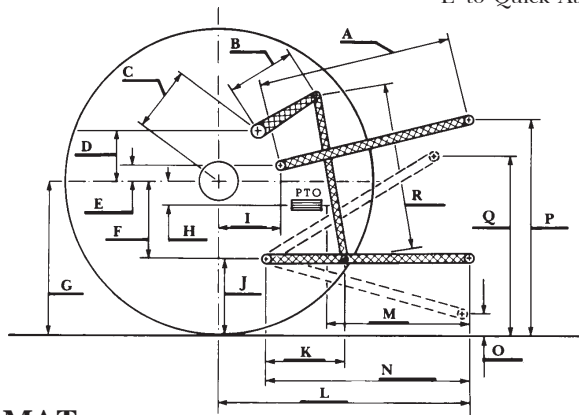
Power:

47.0 HP (35.0 kW)      46.4 HP (34.6 kW)

## HITCH DIMENSIONS AS TESTED—NO LOAD

	inch	mm
A	28.0	710
B	20.5	520
C	22.9	581
D	18.9	480
E	7.3	185
F	14.4	365
G	38.8	985
H	3.5	90
I	22.4	570
J	24.4	620
K	29.3	745
L	52.0	1321
*L'	56.0	1423
M	28.0	712
N	43.4	1102
O	9.0	230
P	51.9	1319
Q	39.4	1001
R	44.9	1140

\*L' to Quick Attach ends



### RECOMMENDED CITATION FORMAT:

NTTL.(2021). Nebraska OECD tractor test 2219 for John Deere 7R 290 e23 Diesel. Lincoln, NE:Nebraska Tractor Test Laboratory. Retrieved from <http://tractortestlab.unl.edu>



**JOHN DEERE 7R 290 DIESEL**

Institute of Agriculture and Natural Resources  
University of Nebraska–Lincoln