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2023

Nebraska Tractor Test: 2263 John Deere 9R 590 18 Speed

Nebraska Tractor Test Lab

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NEBRASKA OECD TRACTOR TEST 2263-SUMMARY 1226
JOHN DEERE 9R 590 DIESEL
18 SPEED

POWER TAKE-OFF PERFORMANCE

Power HP (kW)	Crank shaft speed rpm	Diesel Consumption Gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	D.E.F. Consumption Gal/hr (l/h)	Mean Atmospheric Conditions
MAXIMUM POWER AND FUEL CONSUMPTION						
SEE NOTE 1 - PAGE 2						
321.02 (239.38)	2100	18.64 (70.56)	0.408 (0.248)	17.22 (3.39)	0.79 (3.01)	Fuel used during active exhaust regeneration-1.02 gal (3.88l) (see note 2, p.2)
369.74 (275.71)	1895	20.27 (76.72)	0.385 (0.234)	18.24 (3.59)	0.82 (3.11)	
372.02 (277.41)	1749	19.83 (75.05)	0.374 (0.228)	18.76 (3.70)	0.66 (2.50)	

VARYING POWER AND FUEL CONSUMPTION

321.02 (239.38)	2100	18.64 (70.56)	0.408 (0.248)	17.22 (3.39)	0.79 (3.01)	Air temperature
279.61 (208.51)	2149	17.06 (64.60)	0.429 (0.261)	16.39 (3.23)	0.73 (2.76)	73°F (23°C)
209.57 (156.28)	2150	13.86 (52.48)	0.465 (0.283)	15.12 (2.98)	0.53 (1.99)	Relative humidity
139.67 (104.15)	2150	11.37 (43.03)	0.572 (0.348)	12.29 (2.42)	0.49 (1.85)	31%
69.93 (52.15)	2150	8.46 (32.02)	0.849 (0.517)	8.27 (1.63)	0.29 (1.11)	Barometer
1.28 (0.95)	2150	5.80 (21.95)	31.872 (19.387)	0.22 (0.04)	0.39 (1.47)	28.81" Hg (97.56 kPa)

Maximum Torque - 1188 lb.-ft. (1610 Nm) at 1550 rpm

Maximum Torque Rise - 47.9%

Torque rise at 1679 engine rpm - 44%

Power increase at 1749 engine rpm - 15.9%

DRAWBAR PERFORMANCE (Unballasted)
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)	D.E.F. Consumption lb/hp.hr (kg/kW.h)	Temp. [°] F (°C) cool- ing med	Barom. in. Hg (kPa)		
Power at Rated Engine Speed—7th Gear- Manual mode										
466.46 (347.84)	34360 (152.84)	5.09 (8.19)	2099	3.1	0.427 (0.260)	16.46 (3.24)	0.020 (0.012)	205 (96)	49 (9)	28.59 (96.82)
75% of Pull at Rated Engine Speed—7th Gear - Manual mode										
363.35 (270.95)	25692 (114.28)	5.30 (8.53)	2168	2.2	0.437 (0.266)	16.08 (3.17)	0.021 (0.013)	204 (95)	47 (8)	28.65 (97.02)
50% of Pull at Rated Engine Speed—7th Gear- Manual mode										
247.18 (184.32)	17183 (76.43)	5.39 (8.67)	2190	1.5	0.470 (0.286)	14.95 (2.94)	0.030 (0.018)	203 (95)	48 (9)	28.66 (97.05)
75% of Pull at Reduced Engine Speed—5.5 mph (8.8 km/h)-Auto mode										
363.97 (271.41)	25545 (113.63)	5.34 (8.59)	1444	2.2	0.384 (0.234)	18.29 (3.60)	0.034 (0.021)	203 (95)	47 (8)	28.65 (97.02)
50% of Pull at Reduced Engine Speed—5.5 mph (8.8 km/h)-Auto mode										
247.80 (184.78)	17272 (76.83)	5.38 (8.66)	1444	1.5	0.405 (0.247)	17.33 (3.41)	0.026 (0.016)	201 (94)	50 (10)	28.66 (97.05)

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

Dates of tests: April 20 - 26, 2023

Manufacturer: John Deere Tractor Works, 3500 East Donald St., 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) 0.8434 Fuel weight 7.023 lbs/gal (0.842 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, hydraulic and final drive lubricant John Deere Hy-Gard fluid **Total time engine was operated:** 22.5 hours

ENGINE: Make John Deere Diesel **Type** six cylinder vertical with two turbochargers, air to air aftercooler and D.E.F.(diesel exhaust fluid) exhaust treatment **Serial No.** *RG6136U005583* **Crankshaft lengthwise Rated engine speed** 2100 **Bore and stroke** 5.197" x 6.496" (132.0 mm x 165.0 mm) **Compression ratio** 15.9 to 1 **Displacement** 826 cu in (13548 ml) **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements and aspirator **Oil filter** one full flow cartridge **Oil cooler** radiator for crankcase oil, radiator for transmission/hydraulic oil also feeding front and rear axles **Fuel filter** two paper cartridges **Fuel cooler** radiator for returned fuel **Exhaust** DOC(diesel oxidation catalyst) and SCR(selective catalyst reduction) integrated within a vertical muffler **Cooling medium temperature control** 1 thermostat and variable speed fan

ENGINE OPERATING PARAMETERS: Fuel rate: Stationary PTO operations (390 engine hp) 126.7 - 137.2 lb/h (57.5 - 62.2 kg/h) Drawbar operations (590 engine hp) 191.1 - 206.5 lb/h (86.7 - 93.7 kg/h) **High idle:** 2215-2265 rpm (2125-2175 rpm with PTO engaged) **Turbo boost:** nominal 33.4 - 37.7 psi (230-260 kPa) as measured 35.5 psi (245 kPa)

CHASSIS: Type four wheel drive with duals **Serial No.***1RW9640DEPA080498* **Tread width** rear 155.0" (3937 mm) to 160.5" (4077 mm), front 155.0" (3937 mm) to 160.5" (4077 mm) **Wheelbase** 154.0" (3912 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 2.56 (4.12) second 3.16 (5.09) third 3.48 (5.60) fourth 3.91 (6.29) fifth 4.30 (6.92) sixth 4.82 (7.76) seventh 5.31 (8.55) eighth 5.91 (9.51) ninth 6.56 (10.55) tenth 7.29 (11.73) eleventh 8.03 (12.92) twelfth 8.84 (14.22) thirteenth 9.91 (15.95) fourteenth 10.91 (17.55) fifteenth 13.47 (21.68) sixteenth 16.63 (26.76) seventeenth 20.38 (32.79) eighteenth 24.86 (40.00) (electronically limited)

DRAWBAR PERFORMANCE
(Unballasted at 2100 rpm - manual mode)
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. ^o F cool- ing med Air dry bulb Barom. inch Hg (kPa)
1st Gear								
335.43 (250.13)	52086 (231.69)	2.42 (3.89)	2160	7.5	0.471 (0.286)	14.91 (2.94)	0.024 (0.015)	204 (96) 46 (8) 28.79 (97.49)
397.31 (296.27)	51065 (227.15)	2.92 (4.70)	2103	6.9	0.457 (0.278)	15.36 (3.03)	0.024 (0.015)	204 (96) 47 (8) 28.79 (97.49)
428.17 (319.29)	49613 (220.69)	3.24 (5.21)	2102	6.2	0.445 (0.271)	15.79 (3.11)	0.023 (0.014)	204 (96) 47 (8) 28.79 (97.49)
456.14 (340.14)	46657 (207.54)	3.67 (5.91)	2102	5.4	0.436 (0.265)	16.10 (3.17)	0.023 (0.014)	204 (96) 49 (9) 28.79 (97.49)
460.40 (343.32)	42483 (188.97)	4.06 (6.53)	2100	4.6	0.433 (0.263)	16.20 (3.19)	0.023 (0.014)	204 (96) 51 (11) 28.79 (97.49)
460.79 (343.61)	37524 (166.92)	4.61 (7.41)	2099	3.5	0.433 (0.264)	16.20 (3.19)	0.021 (0.013)	205 (96) 50 (10) 28.57 (96.75)
466.46 (347.84)	34360 (152.84)	5.09 (8.19)	2099	3.1	0.427 (0.260)	16.46 (3.24)	0.020 (0.012)	205 (96) 49 (9) 28.59 (96.82)
469.53 (350.13)	30945 (137.65)	5.69 (9.16)	2100	2.6	0.425 (0.259)	16.52 (3.25)	0.020 (0.012)	205 (96) 49 (9) 28.50 (96.51)
467.69 (348.76)	27717 (123.29)	6.33 (10.19)	2099	2.3	0.425 (0.259)	16.52 (3.25)	0.020 (0.012)	205 (96) 49 (9) 28.51 (96.55)
468.44 (349.31)	24879 (110.67)	7.07 (11.37)	2100	2.1	0.426 (0.259)	16.50 (3.25)	0.021 (0.013)	205 (96) 50 (10) 28.52 (96.58)
469.99 (350.47)	22639 (100.70)	7.79 (12.53)	2099	2.0	0.422 (0.257)	16.64 (3.28)	0.021 (0.013)	204 (96) 50 (10) 28.53 (96.61)
472.34 (352.22)	20646 (91.84)	8.58 (13.81)	2099	1.8	0.419 (0.255)	16.75 (3.30)	0.021 (0.012)	205 (96) 50 (10) 28.55 (96.68)

TRACTOR SOUND LEVEL WITH CAB **dB(A)**

At no load in 6th gear	72.3
Transport speed-no load-18th gear	72.9
Bystander in 18th gear	87.4

Horizontal distance of drawbar hitch point behind rear wheel axis - 44.0"(1118 mm), 49.9"(1268 mm)

TIRES, BALLAST 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 800/70R38;***;0(60)

Four 800/70R38;***;9(60)

23.0 in (585 mm)

19255 lb (8734 kg)

28630 lb(12986 kg)

47885 lb(21720 kg)

reverse 2.56 (4.12), 3.48 (5.60), 3.91 (6.29), 5.31 (8.55), 5.91 (9.51), 8.03 (12.92) **Clutch** wet multiple disc hydraulically actuated by foot pedal **Brakes** wet multiple disc hydraulically actuated by foot pedal **Steering** hydrostatic and articulated **Power take-off** 1000 rpm at 1895 engine rpm **Unladen tractor mass** 47710 lb (21641 kg)

REPAIRS AND ADJUSTMENTS: No repairs or adjustments.

NOTE 1. In stationary PTO operation, this model operates in a derated power mode. With stationary PTO operation, using FieldCruise™, an isochronous governor is utilized. All PTO tests were conducted with FieldCruise™ engaged.

NOTE 2. The manufacturer declares that the average time between active regenerations is over 50 hours. A 1% power increase was observed during the active exhaust regeneration.

NOTE 3: The performance figures on this report are the result of replacing the electronic control module of the John Deere 9R 640 with the John Deere 9R 590 module.

NOTE 4: This tractor has a driveline protection system that limits the maximum engine torque in gears 1 through 3.

NOTE 5: The John Deere 9R 590 T.E.C.U. (Tractor Electronic Control Unit) is compliant with ISOBUS 11783.

REMARKS: All test results were determined from observed data obtained in accordance with official OECD, SAE and Nebraska test procedures. The drawbar pull in 1st gear was limited to avoid excessive power hop. This tractor fell 0.1% short meeting the manufacturer's remote hydraulic flow claim of 58.0 GPM (219 l/min). The manufacturer's remote hydraulic flow claim of 42.0 GPM (159 l/min) with the optional 3/4" coupler set was not verified. 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. **2263**, Nebraska Summary 1226, April 16, 2024.

Roger M. Hoy
Director

P.J. Jasa
J.D. Luck
Y. Shi
Board of Tractor Test Engineers

DRAWBAR PERFORMANCE
UNBALLASTED - 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 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)
3.5 mph(5.6 km/h)									
424.39 (316.47)	48646 (216.39)	3.27 (5.26)	1717	6.0	0.409 (0.249)	17.19 (3.39)	0.026 (0.016)	204 (96)	48 (9)
3.9 mph(6.2 km/h)									
454.92 (339.23)	46606 (207.31)	3.66 (5.89)	1701	5.4	0.407 (0.248)	17.27 (3.40)	0.028 (0.017)	204 (96)	51 (11)
4.2 mph(6.8 km/h)									
458.06 (341.58)	42614 (189.56)	4.03 (6.49)	1687	4.7	0.398 (0.242)	17.65 (3.48)	0.027 (0.016)	204 (96)	53 (12)
4.7 mph(7.6 km/h)									
460.15 (343.13)	37869 (168.45)	4.56 (7.34)	1696	3.5	0.396 (0.241)	17.74 (3.49)	0.025 (0.015)	205 (96)	49 (9)
5.2 mph(8.4 km/h)									
465.54 (347.15)	34480 (153.37)	5.06 (8.14)	1692	3.1	0.394 (0.240)	17.81 (3.51)	0.024 (0.015)	205 (96)	49 (9)
5.8 mph(9.4 km/h)									
469.33 (349.98)	30918 (137.53)	5.69 (9.16)	1894	2.7	0.404 (0.246)	17.40 (3.43)	0.022 (0.013)	204 (96)	49 (9)
6.5 mph(10.4 km/h)									
467.38 (348.52)	27717 (123.29)	6.32 (10.17)	1886	2.4	0.402 (0.245)	17.46 (3.44)	0.022 (0.013)	204 (96)	49 (9)
7.2 mph(11.6 km/h)									
468.34 (349.24)	24923 (110.86)	7.05 (11.35)	1903	2.1	0.399 (0.243)	17.60 (3.47)	0.022 (0.013)	204 (96)	50 (10)
8.1 mph(13.0 km/h)									
469.55 (350.14)	22484 (100.01)	7.83 (12.60)	1918	1.9	0.397 (0.242)	17.68 (3.48)	0.021 (0.013)	205 (96)	50 (10)
8.7 mph(14.0 km/h)									
472.10 (352.04)	20677 (91.98)	8.56 (13.78)	1867	1.8	0.395 (0.240)	17.77 (3.50)	0.023 (0.014)	204 (96)	50 (10)
8.7 mph(14.0 km/h)									
472.10 (352.04)	20677 (91.98)	8.56 (13.78)	1867	1.8	0.395 (0.240)	17.77 (3.50)	0.023 (0.014)	204 (96)	50 (10)

DRAWBAR PERFORMANCE
(Unballasted at 1800 RPM, Manual mode)
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)	D.E.F. Hp.hr/gal (kW.h/l)	Consumption lb/hp.hr (kg/kW.h)	Temp. ^o F cool- ing med (°C)	Air dry bulb (°F)	Barom. inch Hg (kPa)
1st Gear										
335.18 (249.94)	52036 (231.47)	2.42 (3.89)	2160	7.5	0.472 (0.287)	14.87 (2.93)	0.024 (0.015)	204 (96)	46 (8)	28.79 (97.49)
2nd Gear										
397.80 (296.64)	51142 (227.49)	2.92 (4.70)	2101	6.9	0.459 (0.279)	15.30 (3.01)	0.023 (0.014)	204 (96)	47 (8)	28.79 (97.49)
3rd Gear										
431.13 (321.49)	50561 (224.91)	3.20 (5.15)	2091	6.8	0.446 (0.271)	15.77 (3.11)	0.023 (0.014)	204 (96)	48 (9)	28.79 (97.49)
4th Gear										
467.52 (348.63)	49210 (218.90)	3.57 (5.75)	2063	6.3	0.434 (0.264)	16.17 (3.19)	0.024 (0.015)	204 (96)	50 (10)	28.79 (97.49)
5th Gear										
488.70 (364.42)	47501 (211.29)	3.86 (6.21)	2018	5.7	0.424 (0.258)	16.56 (3.26)	0.023 (0.014)	204 (96)	52 (11)	28.79 (97.49)
6th Gear										
501.30 (373.82)	45062 (200.45)	4.18 (6.73)	1935	5.2	0.418 (0.254)	16.81 (3.31)	0.024 (0.015)	205 (96)	54 (12)	28.79 (97.49)
7th Gear										
513.11 (382.63)	43650 (194.16)	4.41 (7.10)	1848	4.7	0.408 (0.248)	17.21 (3.39)	0.025 (0.015)	204 (96)	57 (14)	28.79 (97.49)
8th Gear										
523.84 (390.63)	40800 (181.49)	4.82 (7.75)	1801	4.0	0.400 (0.243)	17.56 (3.46)	0.026 (0.016)	205 (96)	45 (7)	28.79 (97.48)
9th Gear										
521.77 (389.08)	36446 (162.12)	5.37 (8.64)	1800	3.5	0.401 (0.244)	17.50 (3.45)	0.026 (0.016)	204 (95)	46 (8)	28.78 (97.46)
10th Gear										
525.56 (391.91)	32819 (145.99)	6.01 (9.66)	1800	2.9	0.398 (0.242)	17.65 (3.48)	0.025 (0.015)	204 (96)	43 (6)	28.79 (97.49)
11th Gear										
528.19 (393.87)	29843 (132.75)	6.64 (10.69)	1801	2.6	0.395 (0.240)	17.78 (3.50)	0.023 (0.014)	204 (96)	44 (6)	28.79 (97.49)
12th Gear										
533.73 (398.00)	27353 (121.67)	7.32 (11.77)	1800	2.3	0.392 (0.238)	17.93 (3.53)	0.024 (0.015)	204 (95)	45 (7)	28.79 (97.48)
13th Gear										
526.48 (392.59)	23995 (106.74)	8.23 (13.24)	1800	2.1	0.397 (0.241)	17.69 (3.49)	0.025 (0.015)	204 (95)	45 (7)	28.78 (97.46)

Lugging ability in 11th gear

Crankshaft speed rpm	2100	2000	1900	1800	1700	1600	1401	1100
Pull-lbs (kN)	22606 (100.56)	26014 (115.72)	28213 (125.50)	29985 (133.38)	31410 (139.72)	32063 (142.62)	31339 (139.40)	28982 (128.92)
Increase in pull %	0	15	25	33	39	42	39	28
Power-Hp (kW)	469.61 (350.18)	513.74 (383.10)	528.04 (393.76)	530.70 (395.74)	524.30 (390.97)	503.40 (375.39)	430.76 (321.21)	313.52 (233.79)
Speed-mph (km/h)	7.79 (12.54)	7.41 (11.92)	7.02 (11.30)	6.64 (10.69)	6.26 (10.07)	5.89 (9.48)	5.16 (8.30)	4.06 (6.53)
Slip %	1.9	2.1	2.4	2.5	2.7	2.7	2.7	2.6

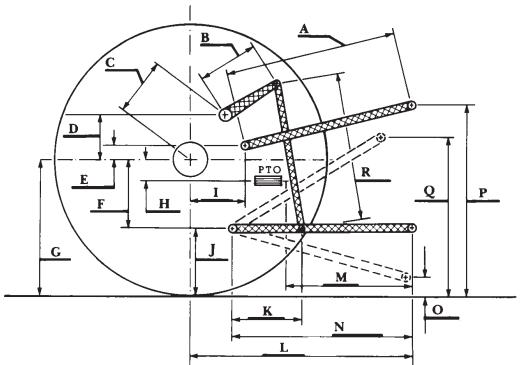
HYDRAULIC PERFORMANCE

CATEGORY: 4N/4 Quick Attach: Yes OECD Static test	
Maximum force exerted through whole range:	
<u>Category 4N</u> <u>lift cylinders</u>	
16084 lbs(71.5 kN) (1 x 90 mm and 1x100 mm)	
21408 lbs(95.2 kN) (2 x 110 mm)	
<u>Category 4</u>	
15769 lbs(70.1 kN) (1 x 90 mm and 1x100 mm)	
21384 lbs(95.1 kN) (2 x 110 mm)	
 Single pump system	
<u>single outlet set</u> <u>three outlet sets combined</u>	
i) Sustained pressure of the open relief valve:	2860 psi (197 bar)
ii) Pump delivery rate at minimum pressure and rated engine speed:	37.2 GPM (140.9 l/min) 57.9 GPM (219.0 l/min)
iii) Pump delivery rate at maximum hydraulic power:	35.1 GPM (132.9 l/min) 58.3 GPM (220.7 l/min)
Delivery pressure:	2262 psi (156 bar) 2461 psi (170 bar)
Power:	46.3 HP (34.6 kW) 83.7 HP (62.4 kW)
 Dual pump system	
<u>Pump 1</u> <u>Pump 2</u>	
<u>three sets combined</u> <u>two sets combined</u>	
2899 psi (200 bar)	2906 psi (200 bar)
58.1 GPM (219.9 l/min) 36.9 GPM (139.7 l/min)	58.3 GPM (220.7 l/min) 36.9 GPM (139.8 l/min)
116.4 GPM (440.6 l/min)	
58.1 GPM (219.8 l/min) 34.5 GPM (130.8 l/min)	57.6 GPM (218.0 l/min) 35.3 GPM (133.8 l/min)
2494 psi (172 bar) 2269 psi (156 bar)	2478 psi (171 bar) 2359 psi (163 bar)
84.5 HP (63.0 kW) 45.7 HP (34.1 kW)	83.3 HP (62.1 kW) 48.6 HP (36.3 kW)
<u>single outlet set - 1/2" couplers</u>	
2899 psi (200 bar)	2906 psi (200 bar)
36.9 GPM (139.7 l/min)	36.9 GPM (139.8 l/min)
34.5 GPM (130.8 l/min)	35.3 GPM (133.8 l/min)
2269 psi (156 bar)	2359 psi (163 bar)
45.7 HP (34.1 kW)	48.6 HP (36.3 kW)

	Category 4N		Category 4	
	inch	mm	inch	mm
A	31.7	805	30.3	770
B	19.7	500	19.7	500
C	25.0	635	25.0	635
D	24.4	620	24.4	620
E	12.8	325	12.8	325
F	13.8	350	13.8	350
G	36.6	930	36.6	930
H	2.4	60	2.4	60
I	18.7	474	18.7	474
J	22.8	580	22.8	580
K	30.9	785	30.9	785
L	52.8	1342	52.8	1342
*L'	58.7	1491	59.6	1515
M	22.8	579	22.8	579
N	45.6	1159	45.6	1159
O	9.1	230	9.1	230
P	50.8	1290	50.8	1291
Q	41.1	1045	40.9	1040
R	47.0	1195	47.2	1200

*L' to Quick Attach ends

HITCH DIMENSIONS AS TESTED—NO LOAD



RECOMMENDED CITATION FORMAT:

NTTL.(2024).Nebraska OECD Tractor test 2263 for John Deere 9R 590 Diesel.
Lincoln, NE: Nebraska Tractor Test Laboratory. Retrieved from <http://tractortestlab.unl.edu>



JOHN DEERE 9R 590 DIESEL