

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Nebraska Tractor Tests

Tractor Test and Power Museum, The Lester F. Larsen

7-29-1953

Test 499: Allis-Chalmers Model WD-45

Nebraska Tractor Test Lab

University of Nebraska-Lincoln, tractortestlab@unl.edu

Follow this and additional works at: <https://digitalcommons.unl.edu/tractormuseumlit>



Part of the [Energy Systems Commons](#), [History of Science, Technology, and Medicine Commons](#), [Other Mechanical Engineering Commons](#), [Physical Sciences and Mathematics Commons](#), [Science and Mathematics Education Commons](#), and the [United States History Commons](#)

Nebraska Tractor Test Lab, "Test 499: Allis-Chalmers Model WD-45" (1953). *Nebraska Tractor Tests*. 1011.

<https://digitalcommons.unl.edu/tractormuseumlit/1011>

This Article is brought to you for free and open access by the Tractor Test and Power Museum, The Lester F. Larsen at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Tractor Tests by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

The Experiment Station
University of Nebraska College of Agriculture
W. V. Lambert, Director, Lincoln, Nebraska

Department of Agricultural Engineering
Dates of test: July 29 to August 10, 1953
Manufacturer: ALLIS-CHALMERS MANUFACTURING COMPANY, MILWAUKEE, WISCONSIN
Manufacturer's rating: Not rated.

NEBRASKA TRACTOR TEST NO. 499

ALLIS-CHALMERS WD 45

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury
		Gal per hour	Hp-hr per gal	Lb per hp-hour		Cooling med	Air	
TEST B—100% MAXIMUM LOAD—TWO HOURS								
43.21	1400	3.795	11.39	0.535	0.00	171	75	28.968
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR								
40.47	1400	3.279	12.34	0.494	0.00	168	74	28.970
TEST D—RATED LOAD—ONE HOUR								
38.61	1402	3.233	11.94	0.510	0.00	164	72	28.950
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)								
38.63	1403	3.250	11.89	0.513	...	164	73	.....
1.98	1654	1.403	1.41	4.318	...	138	72	.....
21.35	1545	2.245	9.51	0.641	...	155	72	.....
39.88	1366	3.230	12.35	0.493	...	170	75	.....
10.97	1574	1.743	6.29	0.968	...	150	76	.....
31.20	1509	2.777	11.24	0.542	...	163	77	.....
24.00	1508	2.441	9.83	0.620	0.00	157	74	28.938

TORQUE (At Dynamometer)

Eng. RPM	1405	1330	1250	1179	1100	1025	943	867	796	732
Lb. ft.	265.5	269.0	274.1	278.4	284.0	285.3	286.0	287.9	283.5	280.4

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lb	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury
					Gal per hour	Hp-hr per gal	Lb per hp-hr		Cool ing med	Air	
TEST F—100% MAXIMUM LOAD—3rd Gear											
37.84	2856	4.97	1402	6.27	.....	Not Recorded	.....	179	83	28.920
TEST G—OPERATING MAXIMUM LOAD											
30.63	5441	2.11	1400	16.30	.....	Not Recorded	.....	175	85	28.930
35.81	3679	3.65	1404	8.15	.....	Not Recorded	.....	179	87	28.920
36.12	2719	4.98	1403	5.92	.....	Not Recorded	.....	185	91	28.920
33.86	1113	11.41	1408	2.64	.....	Not Recorded	.....	175	90	28.920
TEST H—RATED LOAD—TEN HOURS—3rd Gear											
30.18	2250	5.03	1399	4.86	2.837	10.64	0.573	0.00	162	80	29.060
TEST J—OPERATING MAXIMUM LOAD—3rd Gear											
28.94	2381	4.56	1408	15.62	.....	Not Recorded	.....	163	72	29.100
TEST K—OPERATING MAXIMUM LOAD—3rd Gear											
25.78	2248	4.30	1407	16.31	.....	Not Recorded	.....	160	82	29.100

TIRES, WHEELS and WEIGHT

	Tests F, G, & H	Test J	Test K
Rear wheels			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	520 lb each	None	None
Added cast iron	1380 lb each	None	None
Rear tires			
No. and size	Two 13-28	Two 13-28	Two 12-28
Ply	6	6	4
Air pressure	18 lb	12 lb	12 lb
Front wheels			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	61 lb each	None	None
Added cast iron	90 lb	None	None
Front tires			
No. and size	Two 5.50-16	Two 5.50-16	Two 5.50-16
Ply	4	4	4
Air pressure	28 lb	28 lb	28 lb
Height of drawbar	19½ inches	21 inches	19½ inches
Static weight			
Rear end	6340 lb	2541 lb	2463 lb
Front end	1490 lb	1239 lb	1231 lb
Total weight as tested with operator	8005 lb	3955 lb	3869 lb

HORSEPOWER SUMMARY

	Draw-bar	Belt
1. Sea level (calculated) maximum horsepower (based on 60°F and 29.92" HG)	40.01	45.27
2. Observed maximum horsepower (tests F & B)	37.84	43.21
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (formerly ASAE and SAE ratings)	30.01	38.48

We, the undersigned, certify that this is a true and correct report of official tractor test No. 499.

L. F. LARSEN
Engineer-in-Charge

C. W. SMITH
L. W. HURLBUT
F. D. YUNG
Board of Tractor
Test Engineers

EXPLANATION OF TEST REPORT

TEST A: The manufacturer's representative operates the tractor for a minimum of 12 hours using light to heavy drawbar loads in each gear.

This serves as a period for limber up, general observation and adjustments. Adjustments that are permissible include valve tappet clearance, breaker point gap, spark plug gaps, clutch and others of a similar nature. No new parts or accessories can be installed without having mention made of it in the report.

No data are recorded during this preliminary run except the time that the engine is operated.

BELT HORSEPOWER TESTS

TEST B: The throttle valve is held wide open and the belt load on the dynamometer is adjusted so that the engine is at the rated speed recommended by the manufacturer. Carburetor, ignition timing and manifold adjustments are all set for maximum engine power.

This test is designed to determine maximum belt horsepower of the tractor at rated speed and to measure fuel consumption at the maximum power on the belt.

TEST C: For tractors with carburetors the best fuel economy does not always occur when the engine develops maximum power at rated speed. Test C is intended to allow the manufacturer's representative to select a more economical fuel setting even though there is a slight loss of power. *This more practical carburetor setting is used in all later tests except test F.* The throttle valve is held wide open and load adjusted to give rated rpm. Tests B and C are the same for diesel tractors, which have an altogether different fuel system.

TEST D: The throttle control lever is set so that the governor will maintain rated engine speed when rated load is applied. Rated load is 85% of 100% maximum, as obtained in test B, corrected to standard conditions.

This rating is somewhat less than the maximum belt horsepower in order that the operator may have a certain amount of reserve.

TEST E:

Varying load serves to show the range of engine speeds when the engine is controlled by the governor during the following varied loads of 20 minutes each: rated load, no load, $\frac{1}{2}$ rated load, maximum load at wide open throttle valve, $\frac{1}{4}$ and $\frac{3}{4}$ rated load.

The average result of this test shows the average power and fuel consumption. Since the average tractor is subjected to varying loads, these data serve well in predicting fuel consumption and efficiency of a tractor in general use.

Torque, lb-ft at dynamometer, is obtained with wide open throttle and sufficient load is applied to give several readings.

DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instrument in the test car. All tests are made on the same dirt test

course which is maintained by grading, sprinkling and rolling so that it remains very nearly the same throughout the season. The same tires, wheels and weights are used for all tests except J and K.

TEST F: A drawbar test, the results of which are used to determine the rated drawbar horsepower in test H. The carburetor is set to develop maximum power as in test B. The rated gear recommended by manufacturer as plow gear is used in this test. The drawbar load is adjusted to give rated engine speed.

TEST G: Maximum drawbar horsepower is determined in each gear when the carburetor is set for fuel economy as in test C. The throttle valve is held wide open and the load is applied so that the engine runs at rated engine speed.

When operating in low gear it is not uncommon for the tractor to develop less drawbar horsepower than in rated gear because of excessive wheel slippage. When excessive wheel slippage occurs the load is reduced until slippage approaches 16%. When the load is reduced it is necessary to operate the tractor engine at part throttle and control engine speed by governor action.

TEST H: Intended to test the ability of the tractor to run continuously for 10 hours at rated drawbar horsepower and to determine the fuel consumption during that time. Rated drawbar horsepower is 75% of 100% maximum drawbar horsepower (Test F), corrected to standard conditions.

When operating at rated load the throttle control lever is set to maintain rated engine speed. This rating is less than maximum drawbar horsepower in order that the operator may have a certain amount of reserve.

TEST J: The tractor is operated in rated gear with all added weight removed. This test shows the effect of the removal of added weight on the performance of the tractor when compared with test G.

Removal of wheel weights generally increases wheel slippage and decreases drawbar horsepower.

TEST K: Similar to test J except that the smallest tires and lightest wheels offered by the manufacturer are used.

