

UNIVERSITY OF NEBRASKA
LINCOLN
DEPARTMENT OF AGRICULTURAL ENGINEERING

INSTRUCTIONS TO APPLICANT FOR TRACTOR TEST

Three copies are required of each application and all exhibits attached thereto.

Mail three copies to the Agricultural Engineering Department, College of Agriculture, University of Nebraska, Lincoln, Nebraska, together with draft for \$250.00; priority of test is determined by our date of receipt.

Specifications will include no equipment except that supplied with stock tractors. It may include items (such as extension wheel rims) for which an extra charge is made but such items must be offered for sale by the tractor manufacturer as a part of the tractor and must not be attachments for which the tractor manufacturer is not directly responsible.

If the customer has choice of two or more makes or types of any item of equipment (such as wheel lugs) description will be given of each make or type. All of these makes or types will be sent with the tractor submitted for test.

In filling out specification sheets, if the blanks provided are not suitable for describing some part of the tractor, specifications on that part should be given on a separate sheet.

APPLICATION FOR THE TEST OF THE

"CATERPILLAR"

(Name)

TWENTY

(Model)

Tractor

SAN LEANDRO, CALIF. APR. 7 19 28

P. O.

Date

Department of Agricultural Engineering,
College of Agriculture,
University of Nebraska,
Lincoln, Nebraska.

Gentlemen:

CATERPILLAR TRACTOR CO.

(Applicant)

hereby applies for test

as provided by Nebraska law, of the

"CATERPILLAR"

(Trade Name)

TWENTY 20-25

(Model, H. P. Rating)

Tractor. Specifications of this tractor

are given on sheets attached hereto and marked exhibits

"A" - PAGES 1 - 8 INC. B, C

(A, B, C, Etc.)

(Each loose sheet and each set of sheets permanently bound together to be marked as an exhibit.)

All of the claims made regarding the construction and performance of this tractor by the applicant either directly or thru his selling agents are covered in sheets and catalogs attached hereto and marked exhibits

D, E

(Each loose sheet and each catalog to be marked as an exhibit.)

All printed operating instructions furnished to purchasers of this tractor are enclosed herewith and marked exhibits

F

Mr. J. MILTON DAVIES

(Name)

RESEARCH ENGINEER

(Position with Applicant)

will be the official representative of the applicant during the test, and will carry proper credentials.

CATERPILLAR TRACTOR CO.

(Applicant)

hereby agrees that no claim for the tractor in excess of

those declared herewith will be made by the applicant either directly or thru his agents; and that no tractor will be offered for sale either by the applicant or his agents under permit based on this test, which does not correspond exactly with description given herewith; excepting such changes in claims made for the tractor or in construction of the tractor as may from time to time be approved in writing by the Board of Tractor Test Engineers and the State Railway Commission.

Respectfully submitted,

(Signature)

(Name typewritten)

J. V. Munro

(Position) Vice Pres. In Charge Purchases.

(TO BE SIGNED BY AN OFFICER HAVING POWER TO MAKE CONTRACTS FOR THE APPLICANT)

SPECIFICATIONS OF "CATERPILLAR" Twenty TRACTOR
(Name) (Model)

1. Manufacturer: Caterpillar Tractor Co.
Address San Leandro, Calif., and Peoria, Ill.
Tractor submitted for test by Caterpillar Tractor Co.
Horsepower rating: Drawbar 20 Belt 25 Fuel Gasoline Is this tractor to
be advertised or sold for operation on kerosene? Yes (If necessary, although not recommended)

ENGINE

2. Manufacturer: Caterpillar Tractor Co.
Name "CATERPILLAR" Model Twenty-Four cycle. bore 4 in.
Stroke 5 1/2 in. Crankshaft r. p. m. rated load 1100 Engine weight 1660 lbs. (Specify equipment
included) Magneto, Carburetor, Air Cleaner, Radiator
Engine mounted with crankshaft lengthwise Yes crosswise - - - of tractor frame.
3. Cylinders:
Number 4 Type of cylinder castings Single Material Gray Iron Vertical Yes
Horizontal - - - Opposed - - - Clearance Volume 22.17 cu. in. Compression
pressure lbs. per sq. in. gage at 1100 r.p.m. L. I. or T. head Valve in head Head detachable Yes
Are cylinders ground to dimension? Honed
4. Valves:
Type Poppet Location in head
Inlet: No. per cyl. 1 O. D. 1 29/32 in. Port. diam. 1 5/8 in. Lift 3/8 in. Seat angle 45°
Material: Head Rich C.N.#7 Stem Rich C.N.#7
Exhaust: No. per cyl. 1 O. D. 1 23/32 in. Port. diam. 1 7/16 in. Seat angle 45°
Material: Head Rich C.S. #1 Stem Rich C.S.#1
Timing: Inlet opens 10° after T. C. Closes 40° after L. C. Exhaust opens 35° before L. C.
closes 10° after T. C.
5. Pistons:
Weight of one with rings and pin 5 lbs. 14 oz. Length 5 1/4 in. Material Gray Iron
Piston clearance (for diameters). First land - in. Second land - in. Third land - of piston.
Skirt .004 in. Are pistons ground to dimensions? Yes
6. Piston Rings:
Make or type Concentric - Diagonal Cut - Gray Iron
Number per piston 5 Width 1/8 in.
7. Piston Pin:
Length 3 21/64 in. Diameter 1 1/2 in. Solid or hollow Hollow Material S.A.E. 1020 C.D.
Seamless Heat treatment Carburized-S.A.E. 1020 - IV Ground to dimension Yes
Method of holding piston pin Floating Pin Held in place by aluminum plugs in
piston.

SPECIFICATIONS OF "CATERPILLAR" Twenty TRACTOR
 (Name) (Model)

8. Piston Pin Bearings:

a. Bearing in piston bosses Yes Total length 1 11/16 in. Removable bushing No
 Material _____
 b. Bearing in connecting rod end Yes Length 1 7/16 in. Removable bushing Yes
 Material Bronze

9. Connecting Rod:

Type I Section Length c. to c. 11 1/2 in. Material S.A.E.1045 Steel Forging
 Heat treatment S.A.E. 1045 - VI
 Weight complete with all bolts, nuts and bearings in place 5 lbs. 12 oz.
 Bearing cap bolts: No. 2 Length 3 3/16 in. Material S.A.E.3135 C.F.Steel
 Crank bearing: Diam. 2 1/2 in. Length 2 1/8 in. Material Babbitt

10. Crankshaft:

Weight 82.6 Lbs. Material S.A.E.1045 Steel Forging Heat Treatment S.A.E.1045 - VII
 Counter balanced No Main crankshaft bearings. Number 3
 Type Babbitt

DIMENSIONS OF EACH BEARING

	Diameter		Length		Material
Front	<u>2 1/2</u>	in.	<u>2 3/8</u>	in.	<u>Babbitt cast in steel cap and shell</u>
		in.		in.	
		in.		in.	
Center	<u>2 1/2</u>	in.	<u>3 3/4</u>	in.	<u>Babbitt cast in steel cap and shell</u>
		in.		in.	
		in.		in.	
* Rear	<u>2 1/2</u>	in.	<u>2 3/4</u>	in.	<u>Babbitt cast in steel cap and shell</u>

* Rear is flywheel end.

11. Flywheel:

Diameter 17 1/2 in. Weight 117.2 lbs. Solid or spokes Solid Method of attaching
 (mark x): Flange X Taper - - Straight - -

12. Camshaft:

Material S.A.E.1020 Steel Forging Heat treatment Carburized - S.A.E.1020-IV
 Cams: Integral Yes Separate - - Camshaft bearings. Number 3

SPECIFICATIONS OF "CATERPILLAR" Twenty TRACTOR
 (Name) (Model)

DIMENSIONS OF EACH BEARING

	Diameter		Length		Material
Front	2 1/4	in.	2 15/16	in.	Gray Iron (Crankcase)
		in.		in.	
		in.		in.	
Center	2 1/4	in.	3 1/8	in.	Gray Iron (Crankcase)
		in.		in.	
		in.		in.	
Rear	2 1/4	in.	2 1/2	in.	Gray Iron (Crankcase)

Camshaft drive: Spur gear - - Helical gear Yes Chain - - Crankshaft gear material S.A.E. Steel Forging
 Camshaft gear material S.A.E. Steel Forging

13. Lubricating System (mark x):

(a) Circulating X (b) Non-circulating - - (c) Pressure feed X (d) Gravity feed - -
 (e) Splash - - (f) Drilled crankshaft X
 (g) Mechanical lubricator - - Make - - Capacity - - gals.

Camshaft lubrication (mark x):

Bearings: Independent lead - - Pressure - - Splash X
 Gears: Independent lead - - Pressure X Splash - -
 Piston lubrication (mark x): Independent lead - - Pressure - - Splash X

14. Lubricating Oil:

Capacity 3 1/2 gals. to fill crank case to proper operating level.

Oils recommended (give trade names and grades for summer and winter operation).

No trade names are recommended. A list of practically all oil refiners has been published showing the grades of their oil suitable for use in "CATERPILLAR" tractors. This list is furnished on request.

15. Oil-pump Type:

Type Spur Gear Location In sump at rear of engine

16. Governor:

Make Own Type Flyball Enclosed Yes

SPECIFICATIONS OF **"CATERPILLAR"** **Twenty** **TRACTOR**
 (Name) (Model)

Is governor independent of hand throttle? **No** Regulation: Increase in final speed not over **200** r.p.m.
 from rated load speed to no load, with carburetor set for maximum fuel economy.

17. Ignition System: (Give information for all makes or types supplied on stock tractors of this model).

Magneto **Yes** H. T. **Yes** L. T. Make **Eisemann** Model **G4 -3rd Edition**
 Impulse coupling **Yes** Make **Eisemann** **I-S-5**
 Magneto H. T. L. T. Make Model
 Impulse coupling Make
 Magneto H. T. L. T. Make Model
 Impulse coupling Make
 Battery System Make Model
 Battery System Make Model
 Battery Make Type Volts Amp. Hours
 Battery Make Type Volts Amp. Hours
 Firing order **1-3-4-2** Maximum spark advance **30** ° before top center Maximum re-
 tard **Set spark** Spark plugs: Make or makes **Champion**
 Size and thread **7/8 - 18** Type **Regular**
 Location **Side of cyl.head** Gap **.025** in.

18. Starting Device:

Electrical **Yes** Make **Delco-Remy** Model **732 - B** Volts **6**
 Air Pressure: Make - - Model - - Pressure - -

19. Carburetion System:

Carburetor (Give information for all carburetors supplied on stock tractors):

Make **Ensign** Size **1 1/4** Model **AE** Fuels **Gasoline, Distillate, Kero-
 sene**
 Make Size Model Fuels
 Make Size Model Fuels

20. Exhaust Heat used for:

Air - - Fuel - - Mixture in carburetor - - Mixture in manifold **Yes**

21. Hot-water Jacket on:

Carburetor - - Manifold - -

22. Enclose Cut or Blue Print (Size 8 1/2"x11" or 11"x17") and explanation showing shape and dimensions of intake manifold and application of exhaust heat to air, fuel, or mixture if so used.

23. Is Water Injected With Fuel? **No** Describe control valve - -

SPECIFICATIONS OF "CATERPILLAR" Twenty TRACTOR
(Name) (Model)

24. Fuel Tanks:

Number One Capacity of each in gals. 25 Location At rear
of engine

25. Air Cleaner:

Make Pomona Size 5 1/2 (Mark x) (a) Dry centrifugal - - (b) Strained
thru cloth or screen - - (c) Water - - (d) Oil (specify kind) Centrifugal and oil
(e) Other type (describe) - - filter.

26. Cooling System:

Cooling fluid Water If oil, give specification of oil - -
Capacity of system 5 gals.
Radiator: Make Modine Core Type Turbo tube Important dimensions Core 23 3/8x
x 2 3/16 thick - 2 rows of tubes 23 1/2
Circulation of cooling fluid: Thermosyphon - - Pump Yes Type of pump Centrifugal.
Pump delivery gal. per min. at rated speed of engine - -

27. Air Circulation:

By exhaust nozzle - - By fan Yes Fan diameter 20 in. Number of blades 6
Speed at rated speed of engine 1584 r.p.m. Type drive Helical Gear

28. Belt Pulley:

Diameter 11 5/8 in. Face 6 1/2 in. Material Compressed Paper Is face of pulley lagged? No
If so, with what material? - - Speed (at rated speed of engine) - - r.p.m.
If gear drive, give gear ratio crank shaft to pulley shaft 1 to 1 Belt pulley shaft bearings: (De-
scribe each bearing.)

Type	Make	Size	Material
<u>Ball</u>	<u>Fafnir</u>	<u>405</u>	
<u>Roller</u>	<u>Hyatt</u>	<u>47074</u>	

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29. Clutches:

Single Plate Flywheel Clutch Multiple
For transmission: Type Disc Steering Clutch Make Own Size - -
On differential (if used) type - - Make - - Size - -
For belt pulley (if separate clutch): - - Make - - Size - -
Type - - Make - - Size - -

30. Brakes: (Describe each brake.)

(a) Type Contracting Band
(Contracting band or shoe)
When gears are in neutral, does brake control belt pulley or traction wheel? Tracks

SPECIFICATIONS OF **"CATERPILLAR"** **Twenty** **TRACTOR**
 (Name) (Model)

By which lever or pedal is brake operated? **Pedal for operating each brake**

(b) Type **Contracting Band** When gears are in neutral does brake control belt pulley
 (Contracting band or shoe)
 or traction wheels? **Tracks**

(c) Differential brake (if used). Type **- -**

How controlled **- -** Can both differential brakes be set at once? **- -**

31. Transmission:

Manufacturer **Caterpillar Tractor Co.** Type **Sliding Gear**

Enclosed to what extent **Fully Enclosed.**

Reduction (pairs of gears) engine to drive wheels or tracks.

Speed	Type of gear with number of teeth and in their pairs of contact, from engine, to drive wheel or track					Gear ratio from engine to drive wheels or tracks
Type	Spur	Bevel	Spur			
1st low	15 with 33	13 with 53	13 with 71	with	with	48.98 to 1
2nd low	21 " 27	13 " 53	13 " 71	"	"	28.63 to 1
3rd low	26 " 22	13 " 53	13 " 71	"	"	18.84 to 1
4th low	"	"	"	"	"	
Reverse	21 " 15 13 " 27	13 " 53	13 " 71	"		37.45 to 1

Give following information for each gear wheel:

* Location	Type Gear	Pitch Diameter	No. of Teeth	Face Inches	Finish	Material	Heat Treatment
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Low Sliding	Spur	3.000	15	1 1/8	Shaper	S.A.E.2345	S.A.E.2345	VIII
Low Driven	Spur	6.600	33	1 1/8	Shaper	S.A.E.2345	S.A.E.2345	VIII
Int.Sliding	Spur	4.200	21	1 1/8	Shaper	S.A.E.2345	S.A.E.2345	VIII
Int.Driven	Spur	5.400	27	1 1/8	Shaper	S.A.E.2345	S.A.E.2345	VIII
High Sliding	Spur	5.200	26	1	Shaper	S.A.E.2345	S.A.E.2345	VIII
High Driven	Spur	4.400	22	1	Shaper	S.A.E.2345	S.A.E.2345	VIII
Rev. Driven	Spur	3.000	15	3/4	Shaper	S.A.E.2345	S.A.E.2345	VIII
Rev.Constant Mesh	Spur	2.600	13	3/4	Shaper	S.A.E.2345	S.A.E.2345	VIII
Bevel Pinion	Bevel	2.889	13	1 1/2	Gener- ator	S.A.E.2345	S.A.E.2345	VIII
Bevel Gear	Bevel	11.778	53	1 1/2	Gener- ator	S.A.E.2345	S.A.E.2345	VIII
Final Drive Pinion	Spur	2.600	13	3	Hob	S.A.E.2345	S.A.E.2345	VIII
Final Drive Gear	Spur	14.200	71	2 1/2	Hob	S.A.E.2345	S.A.E.2345	VIII

Track Sprocket	Shaft Roller	Timken	559 - 552A	
Reverse Idler	Plain	- -	1 DIA.x2 1/2	Bronze
Steering Clutch Release	Ball	Bearings Co. of America	AC 212	

* Location may be given by reference to cut or blue print attached hereto if desired.

SPECIFICATIONS OF **"CATERPILLAR"**
(Name)**Twenty**
(Model)

TRACTOR

32. Differential:

Make Type.....

Open or enclosed Can it be locked?

If chain drive is used, give make and description of chain

33. Rate of Travel at Rated Engine Speed:

Also mark by (x) speed normally used for plowing.

Speed	Calculated Speed in Miles per Hour (No slippage allowance)	Advertised Miles per Hour on Rated Load
1st (Low)	1.795	1.79
2nd X	3.07	3.07
3rd	4.67	4.67
4th		
Reverse	2.347	2.35

34. Drive Wheels:

Number Cast solid Section of spoke sq. in. Shape of

Spoke section Spokes cast in or built up Diameter in.

Face in. Extension rims width in. Lugs: Give descriptions and dimensions of each type of lug furnished on stock tractors in Nebraska.

How is power transmitted to the rim?

Drive wheel axle: Live Stationary Diameter

Material:

35. If Track-laying Type:

No of tracks **Two** No. shoes per track **29** Length of track bearing on ground **56 7/8**CL Sprkt. to CL Idler Width of each track **11** in. Length of each track shoe c. to c. of pins **6 3/4** in.

36. Non-driving Wheels:

No. Cast solid Section of spoke sq. in.

Shape of spoke section Spokes cast in or built up Diameter in.

Face in. Bearings of non-drive wheels (describe each bearing).

Location	Type	Make	Size	Material

SPECIFICATIONS OF "CATERPILLAR" Twenty TRACTOR
(Name) (Model)

37. Steering Arrangement:

Knuckle type - - Swinging axle - - Other type (describe) Multiple Disc Clutches

38. Static Weight on each wheel or track. (Tanks and radiator full, wheel lugs attached.)

Wheel	Weight, Lbs.
R.H. TRACK	3855
L.H. TRACK	3855

Total weight (as above) 7710 Lbs.

39. Frame:

Cast - - Material - -

Built up - - Material - -

Hot riveted - - Cold riveted - - Bolted - -

Description No frame - Engine and Transmission Bolted Together

Frame mounting (mark x):

To drive wheels. Spring - - Rigid Yes

To non-drive wheels. Spring Yes Rigid - -

40. Drawbar:

Height 15 3/4 in. Vertical adjustment (give limits) None in.

Lateral adjustment 13 in. Total

Swiveled Yes Point of swivel how far forward or back of rear axle 8 1/4 Back in.

41. General Dimensions:

Wheel base c. to c. front and rear wheels 56 7/8 in. Tread c. to c.: front wheels - - in.

rear wheels or tracks 42 in. Width over all 60 1/2 in. Length over all 115 3/4 in.

Height over all 60 1/2 in. Diameter of circle wholly within which tractor may be turned 10 FT

42. The Following Items of Equipment Included in the Above Specifications Are Supplied at an Extra Charge:

Electric Starter