

UNIVERSITY OF NEBRASKA  
LINCOLN  
DEPARTMENT OF AGRICULTURAL ENGINEERING

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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

**Twin City**

(Name)

**FT**

(Model)

Tractor

**Minneapolis, February 29, 1928**  
P. O. Date

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

Gentlemen:

**Minneapolis Steel and Machinery Company**

(Applicant)

hereby applies for test

as provided by Nebraska law, of the

**Twin City**

(Trade Name)

**Model FT 21-32**

(Model, H. P. Rating)

Tractor. Specifications of this tractor

are given on sheets attached hereto and marked exhibits

**A page 1, 2, 3, 4, 5, 6, 7, 8, 9,**

**B, and 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.

(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.

Mr. **A. W. Lavers,**

(Name)

**Mechanical Engineer.**

(Position with Applicant)

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

**Mpls. Steel & Machy. Company**

(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)

**W. C. Mac Farlane,**

(Position)

**President**

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

SPECIFICATIONS OF Twin City FT TRACTOR  
 (Name) (Model)

1. Manufacturer: Minneapolis Steel and Machinery Company  
 Address 2354 Minnehaha Ave., Minneapolis, Minn.  
 Tractor submitted for test by Minneapolis Steel and Machinery Company  
 Horsepower rating: Drawbar 18 Belt 30 Fuel Gas or Kero. Is this tractor to  
 be advertised or sold for operation on kerosene? Yes

## ENGINE

2. Manufacturer: Minneapolis Steel and Machinery Company  
 Name Twin City Model FE cycle. bore 4 1/2 in.  
 Stroke 6 in. Crankshaft r. p. m. rated load 1075 Engine weight 1100 lbs. (Specify equipment  
 included) flywheel, fan, magneto and carburetor  
 Engine mounted with crankshaft lengthwise X crosswise \_\_\_\_\_ of tractor frame.
3. Cylinders:  
 Number 4 Type of cylinder castings Cast in pairs Material Cast Iron Vertical X  
 Horizontal \_\_\_\_\_ Opposed \_\_\_\_\_ Clearance Volume 30.5 cu. in. Compression  
 pressure 75 lbs. per sq. in. gage at 1070 r.p.m. L. I. or T. head I Head detachable Yes  
 Are cylinders ground to dimension? Yes
4. Valves:  
 Type poppet Location in head.  
 Inlet: No. per cyl. 1 O. D. 2.094 in. Port. diam 1 13/16 in. Lift .405 in. Seat angle 45°  
 Material: Head Nickel chromium Stem Nickel chromium steel  
 Exhaust: No. per cyl. 1 O. D. 2.094 in. Port. diam 1 3/4 in. Seat angle 45°  
 Material: Head Silchrome Stem Silchrome  
 Timing: Inlet opens 11° post T. C. Closes 39 ° after L. C. Exhaust opens 30° ° before L. C.  
 closes 8° ° 0° post T. C.
5. Pistons:  
 Weight of one with rings and pin 5 lbs. 8 oz. Length 5 1/2 in. Material Cast iron  
 Piston clearance (for diameters). First land .0175 in. Second land .0095 in. Third land .0095 in.  
 Skirt .0055 in. Are pistons ground to dimensions? Yes
6. Piston Rings:  
 Make or type 3 plain and one oil regulating per piston  
 Number per piston 4 Width 1/4 in.
7. Piston Pin:  
 Length 3 7/8 in. Diameter 1 1/4 in. Solid or hollow hollow Material cold rolled  
steel Heat treatment case hardened Ground to dimension Yes  
 Method of holding piston pin set screw



SPECIFICATIONS OF Twin City FT TRACTOR  
(Name) (Model)

## 8. Piston Pin Bearings:

a. Bearing in piston bosses..... Total length.....in. Removable bushing.....

Material .....

b. Bearing in connecting rod end yes Length 2 in. Removable bushing yes

Material phosphor bronze - S.A.E. 64

## 9. Connecting Rod:

Type..... Length c. to c. 12 in. Material S.A.E. 1045 D.F. Steel

Heat treatment Brinell 4.2 to 4.6

Weight complete with all bolts, nuts and bearings in place 7 lbs. 0 oz.

Bearing cap bolts: No. 4 Length 2 15/16 in. Material.....

Crank bearing: Diam. 2 3/8 in. Length 2 7/8 in. Material babbitt lined bronze

## 10. Crankshaft:

Weight 110 lbs. Material S.A.E. 1045 - D.F. Steel Heat Treatment Brinell 3.9 to 4.1

Counter balanced No Main crankshaft bearings. Number 3

Type removable babbitt lined bronze.

## DIMENSIONS OF EACH BEARING

	Diameter		Length		Material
Front	<u>2 1/4"</u>	in.	<u>2 13/16</u>	in.	<u>babbitt lined bronze</u>
<u>center</u>	<u>2 11/16</u>	in.	<u>2 5/16</u>	in.	<u>" " "</u>
		in.		in.	
		in.		in.	
		in.		in.	
		in.		in.	
* Rear	<u>2 3/4</u>	in.	<u>3 3/4</u>	in.	<u>babbitt lined bronze</u>

\* Rear is flywheel end.

## 11. Flywheel:

Diameter 18 in. Weight 140 lbs. Solid or spokes solid Method of attaching

(mark x): Flange X Taper..... Straight.....

## 12. Camshaft:

Material S.A.E. 1020 - D.F. Steel Heat treatment case harden cams

Cams: Integral X Separate..... Camshaft bearings. Number 3 and bearings.

SPECIFICATIONS OF Twin City FT TRACTOR  
(Name) (Model)

## DIMENSIONS OF EACH BEARING

	Diameter		Length		Material
Front	4 9/16	in.	1 7/8	in.	cast iron
center	2 3/8	in.	2 1/2	in.	Phos. bronze
		in.		in.	
		in.		in.	
		in.		in.	
		in.		in.	
Rear	3"	in.	2 5/8	in.	Phos. bronze

Camshaft drive: Spur gear..... Helical gear X..... Chain..... Crankshaft gear material steel  
S.A.E. 1045..... Camshaft gear material semi-steel.

## 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 X..... Pressure..... Splash X.....  
 Piston lubrication (mark x): Independent lead..... Pressure..... Splash X.....

## 14. Lubricating Oil:

Capacity 3 gals. to fill crank case to proper operating level.

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

Summer: flash not less than 370°F, fire not less than 425°F, Visc  
 at 210°F, not less than 55 saybolt at 100°F, not more than 500  
 saybolt, pour test not more than 35°F.

Winter: flash not less than 335°F., fire not less than 380°F., Visc  
 at 210°F, not less than 50 saybolt, at 100°F not more than 450 saybolt,  
 15. Oil-pump Type: pour test not more than 100°F.

Type vane Location submerged at center of engine.

## 16. Governor:

Make own Type flyball Enclosed yes.

SPECIFICATIONS OF Twin City TT TRACTOR  
(Name) (Model)

Is governor independent of hand throttle? Yes Regulation: Increase in final speed not over 125 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 X H. T. X L. T. Make American Bosch Model ZR 4  
Impulse coupling Yes Make American Bosch  
Magneto X H. T. X L. T. Make American Bosch Model U 4  
Impulse coupling Yes Make American Bosch  
Magneto X H. T. X L. T. Make Robert Bosch Model FU 4  
Impulse coupling Yes Make Robert Bosch  
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 42 ° before top center Maximum re-  
tard 20 Spark plugs: Make or makes A-O  
Size and thread 7/8" - 18 Type Standard  
Location in Cylinder Head Gap 1/32 in.

18. Starting Device:

Electrical X Make Model Volts 6  
Air Pressure: Make Model Pressure

19. Carburetion System:

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

Make Kingston Size 1 1/2" Model Special Fuels Gasoline or Kerosene  
Make Stromberg Size 1 1/2" Model M - 3 Fuels Gasoline  
Make Size Model Fuels

20. Exhaust Heat used for:

Air Fuel Mixture in carburetor Mixture in manifold X

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 Twin City FT TRACTOR  
(Name) (Model)

## 24. Fuel Tanks:

Number 2 Capacity of each in gals. 30 - 1 Location at rear  
of engine, over transmission; gravity feed

## 25. Air Cleaner:

Make Donaldson Twister & Own Size 1 9/16" (Mark x) (a) Dry centrifugal X (b) Strained  
thru cloth or screen (c) Water (d) Oil (specify kind)  
(e) Other type (describe)

## 26. Cooling System:

Cooling fluid Water If oil, give specification of oil  
Capacity of system 10 gals.  
Radiator: Make Modine core Type cast tank Important dimensions core is 23 7/8  
high, 19" wide, 2 1/4" thick, 2 rows of tubes, 6 fins to 1 inch.  
Circulation of cooling fluid: Thermosyphon Pump X Type of pump Centrifugal  
Pump delivery gal. per min. at rated speed of engine 30

## 27. Air Circulation:

By exhaust nozzle By fan X Fan diameter 20 in. Number of blades 4  
Speed at rated speed of engine 2060 r.p.m. Type drive Belt

## 28. Belt Pulley:

Diameter 16 in. Face 7 1/2 in. Material Cast Iron Is face of pulley lagged? No  
If so, with what material? Speed (at rated speed of engine) 657 r.p.m.  
If gear drive, give gear ratio crank shaft to pulley shaft 1.652 to 1 Belt pulley shaft bearings: (De-  
scribe each bearing.)

Type	Make	Size	Material
<u>2 Taper Roller</u>	<u>Timken</u>	<u>455 - 453 A</u> <u>462 - 453 A</u>	
<u>1 Thrust Ball</u>	<u>Aetna</u>	<u>2"x 3-3/16 X 7/8</u>	

## CHASSIS

## 29. Clutches:

For transmission: Type Disc Make Twin Disc Size 11-1/2"  
On differential (if used) type Make Size  
For belt pulley (if separate clutch):  
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? Traction Wheel





SPECIFICATIONS OF Twin City FT TRACTOR  
(Name) (Model)

## 32. Differential:

Make Own Type Bevel Gear Pinion  
Open or enclosed Enclosed Can it be locked? No  
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)	<u>2.36</u>	
2nd <u>x</u>	<u>3.17</u>	
3rd	<u>4.45</u>	
4th		
Reverse	<u>1.74</u>	

## 34. Drive Wheels:

Number 2 Cast solid No Section of spoke .75 sq. in. Shape of  
Spoke section 2"x3/8" Spokes cast in or built up Built Up Diameter 50  
in. Face 12 in. Extension rims width 8 and 12 in. Lugs: Give descrip-  
tions and dimensions of each type of lug furnished on stock tractors in Nebraska Long Angle Lugs 3 1/2"  
x2 1/2"x3/8"-1'-10" lg.; Short Angle Lugs 3"x2 1/2"x3/8"-1'-5 1/2" lg.; 3" high  
Pyramid Lugs; Municipal Lugs 2"x3/4" bars-2'-0" lg.; 2-bolt Spade Lugs  
5" high x 3-1/4" high.  
How is power transmitted to the rim? Through hub and spokes.  
Drive wheel axle: Live x Stationary Diameter 3"  
Material:

## 35. If Track-laying Type:

No of tracks No. shoes per track Length of track bearing on ground  
in. Width of each track in. Length of each track shoe c. to c. of pins in.

## 36. Non-driving Wheels:

No. 2 Cast solid No Section of spoke .56 sq. in.  
Shape of spoke section 3/8"x1 1/2" Spokes cast in or built up Built Up Diameter 34 in.  
Face 5 3/4 in. Bearings of non-drive wheels (describe each bearing).

Location	Type	Make	Size	Material
<u>Frt. Wh. - O.S.</u>	<u>Taper Roller</u>	<u>Timken</u>	<u>#2581-2523</u>	
<u>Frt. Wh. - I.S.</u>	<u>Taper Roller</u>	<u>Timken</u>	<u>#355- 3525</u>	

SPECIFICATIONS OF Twin City FT TRACTOR  
(Name) (Model)

## 37. Steering Arrangement:

Knuckle type ☒ Swinging axle..... Other type (describe).....

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

Wheel	Weight, Lbs.
Front	1100
Rear	1650

Total weight (as above) 5500 lbs.

## 39. Frame:

Cast Yes Material Cast Iron

Built up..... Material.....

Hot riveted..... Cold riveted..... Bolted.....

Description .....

Frame mounting (mark x):

To drive wheels. Spring..... Rigid ☒

To non-drive wheels. Spring..... Rigid ☒

## 40. Drawbar:

Height 16 in. Vertical adjustment (give limits) None in.

Lateral adjustment 34 in.

Swiveled Yes Point of swivel how far forward or back of rear axle 15-1/2" back in.

## 41. General Dimensions:

Wheel base c. to c. front and rear wheels 84 in. Tread c. to c.: front wheels 47-3/4 in.

rear wheels or tracks 54 in. Width over all 66 in. Length over all 134 in.

Height over all 66 in. Diameter of circle wholly within which tractor may be turned 29'-0"

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

Lugs and Extension Rims.

Specifications of Twin City FT Tractor

Additional information on Transmission Gears.

(Continued from Page 6.)

Location	Type Gear	Pitch Diameter	No. of Teeth	Face Inches	Finish	Material	Heat Treatment
Rev. Idler	Spur	5.0"	25	1 5/8"	Cut	1045	Brinell 3.8 - 4.0
Low Gear	Spur	21.793	109	1 1/2"	Cut	1045	Straight Harden Brinell 3.8 - 4.0
Plow Gear	Spur	20.793	104	1 1/2"	Cut	1045	Straight Harden Brinell 3.8 - 4.0
High Gear	Spur	19.393	97	1 1/4"	Cut	1045	Straight Harden Brinell 3.8 - 4.0
Bull Pinion	Spur	4.0"	16	4 1/8"	Cut	3120	Carb. 1/16" deep
Bull Gear	Spur	27.0"	108	4"	Cut	1045	Straight Harden Brinell 3.7 - 4.0