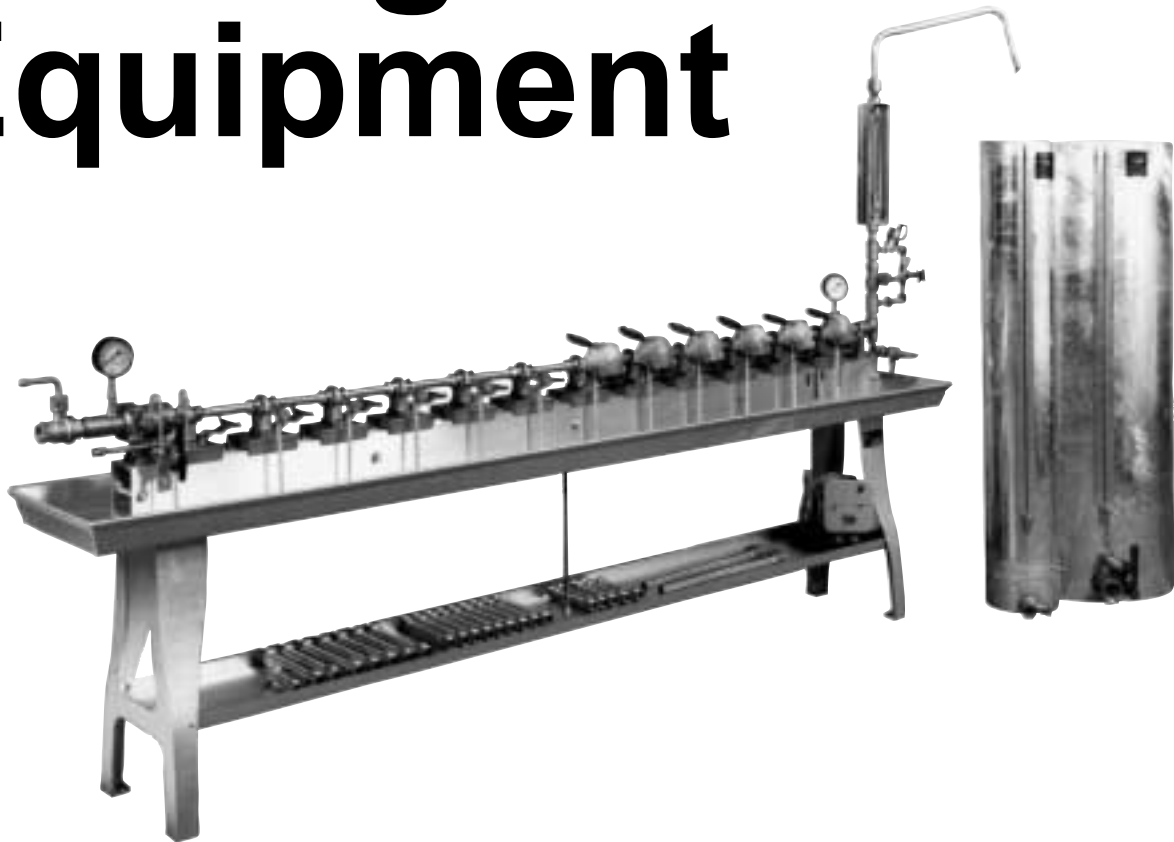


Ford Water Meter Testing Equipment



Contents

Why Test Water Meters?	3
Principle and Practice in Water Meter Testing	4
The Meter Performance Curve on Positive Displacement Meters	4
The Two Ways Calibrated Tanks Can Be Used	5
The Advantages of Series Testing	6
How to Select Meter Testing Equipment	7
Ford Standard Test Benches	8
The Ford Tester Clamp	9
Ford Indianapolis Type Test Benches	10
Ford Akron Type Test Benches	12
Flange Adapters for 3", 4" and 6" Meters	13
The Ford Testerate Indicator	14
The Ford Double Range Testerate Indicator	15
Ford Calibrated Test Tanks	16
The Ford Electric Control Unit	17
Ford Meter Shop Accessories	18
Meter Repair Bench	18
Meter Vise	18
Service Cart	18
Warranty	20

Why Test Water Meters?

What Meter Accuracy Means in Dollars and Cents

The accuracy of a water meter is a matter of dollars and cents to the customer and the utility. Over-registration charges the customer for water he never received; under-registration cheats the utility of its due income. Wide variation in the accuracies of meters in a water system means inequitable charges to water users.

Fortunately for water customers, disc or rotary piston water meters that were originally accurate cannot over-register beyond a slight speeding up in some conditions. This action is self-limiting, for friction occurs with the build-up of deposits on the disc or piston and chamber and impedes over-registration. Disc water meters always slow down in service as they become worn, corroded or encrusted. This under-registration results in a loss of revenue to the water works.

Some states have adopted regulations that specify limits between meter tests in water utilities, both in time and in volume of water. These limits are necessarily broad, as the composition of water and its effects on meters varies widely in any state. Many utilities profitably test and repair more frequently than required by regulation. However, these regulations do show the growing realization that meter testing is important.

Meter Accuracy and Unaccounted-for Water

An important index to the relative efficiency attained in the water plant operation is the figure indicating the percentage of "lost" or unaccounted-for water. It is determined by deducting total sales from total production, with allowance for unmetered use, and expressing the difference as a percentage of the total.

It is apparent that there are numerous ways in which water is lost. Students of the subject agree that meter under-registration, or meter "slip" as it is frequently called, is a major source of loss. This is particularly true in utilities metered many years ago and having had no systematic program of meter maintenance in the meantime. In any case, it is well to scrutinize the trend of unaccounted-for water as an indication of meter performance. Keep in mind the close relationship between meter registration and revenue and how much an overall improvement of only a few percent means in revenue.

A tiny flow of only 1/4 GPM will total 360 gallons in 24 hours. The volume of unregistered water that can slip past a meter in poor condition is almost unbelievable until the easy arithmetical calculations are made.



The Value of Unregistered Water

Sales Price of Water		\$1.25 per 1000 Gallons			\$1.50 per 1000 Gallons			\$1.75 per 1000 Gallons		
Volume-Gallons		10,000	50,000	100,000	10,000	50,000	100,000	10,000	50,000	100,000
UNDER- REGISTRATION PERCENT	4	\$.50	\$2.50	\$5.00	\$.60	\$3.00	\$6.00	\$.70	\$3.50	\$7.00
	6	.75	3.75	7.50	.90	4.50	9.00	1.05	5.25	10.50
	8	1.00	5.00	10.00	1.20	6.00	12.00	1.40	7.00	14.00
	10	1.25	6.25	12.50	1.30	7.50	15.00	1.75	8.75	17.50
	12	1.50	7.50	15.00	1.80	9.00	18.00	2.10	10.50	21.00
	14	1.75	8.75	17.50	2.10	10.50	21.00	2.45	12.25	24.50
	16	2.00	10.00	20.00	2.40	12.00	24.00	2.80	14.00	28.00
	18	2.25	11.25	22.50	2.70	13.50	27.00	3.15	15.75	31.50
	20	2.50	12.50	25.00	3.00	15.00	30.00	3.50	17.50	35.00

The Value of Unregistered Water

The table above shows the value of water unregistered by meters with various percentages of slowness, and various amounts of water drawn through the meter. Water is valued at from \$1.25 to \$1.75 per thousand gallons. These figures can easily be transposed into cubic feet by recalling that 100 cubic feet equals 750 gallons.

From the table it will be seen that with water at \$1.25 per thousand gallons, the return on the investment of testing and repairing a meter 4% slow will be only \$5.00 with every 100,000 gallons of water drawn through the meter. It would take a large and active account to make frequent testing pay under these conditions.

On the other hand, with water at \$1.75 per thousand gallons a meter failing to register 20% of the water passing through it would lose \$35.00 for the water works with every 100,000 gallons. Under these conditions, testing will pay a handsome return on the cost.

Surcharge for Sewage

The practice of charging for sewage disposal and treatment as a percentage of the water bill puts additional emphasis on meter accuracy. Surcharges are as high as 150% of the water bill, and 100% surcharges are common.

If a municipality has a surcharge of 100%, the effect is that the water meter is measuring the bill for sewage service in addition to its normal function of metering the water drawn by the customer. With a water rate of \$1.50 per thousand gallons and a surcharge of 100% the meter is, in effect, measuring \$3.00 water — all the more reason for accuracy.

If sewage service charges are to be based on meter readings, it would be only fair for the sewerage authority to carry part of the cost of meter testing and repairing. Such an arrangement is entirely logical.

Principle and Practice in Water Meter Testing

The testing of a water meter is very simple. It consists of checking the registration of the meter against the actual volume of water passing through the meter, as measured in an accurate volumetric tank or weighed on accurate scales.

Meter accuracy may be defined as the quotient obtained by dividing the quantity registered during test by the actual volume of water. Thus a meter registering 9 gallons when 10 gallons are run through it has an accuracy of 9/10, or 90%.

A meter registering 52 cubic feet on an actual volume of 50 cubic feet is 52/50, or 104% accurate. Meter accuracy is often expressed in percentage fast or slow. Thus a meter that records 95 gallons when 100 gallons are run through it, under-registers or is slow by 5%. A meter registering 102 gallons on the same volume would be 2% fast. It is better, however, to express accuracy in actual terms, which would be 95% and 102% in these cases.

The Meter Performance Curve On Positive Displacement Meters

What it is and what it shows

It would take a lot of time but it would be possible to run an almost infinite number of accuracy tests on a water meter. You could start with a ridiculously low rate, say one hundredth of a gallon per minute, and then gradually increase the rate in increments of one hundredth of a gallon per minute until the capacity of the meter, 20 GPM for a 5/8" meter, is reached. This program would call for 2000 tests.

If the results of all these tests were plotted on even a large sheet of paper the marks would be so close together they would look like a solid line. This line would show graphically the performance of the meter at all rates of flow. Because the line is hardly ever straight, it has been called the performance curve. Every meter has a performance curve. A dead meter would show a performance "curve" of a straight line at the zero percentage level.

Obviously, no ordinary meter will register at all on the extremely low flows of only a few hundredths of a gallon per minute. Thus, the curve starts from the corner of the chart

and runs horizontal at the zero level. But as the rate of test flow increases there comes a point where the meter starts to register. It is characteristic of positive displacement meters that when registration does start, the accuracy improves very rapidly, and the curve becomes almost vertical.

Within a comparatively short range the curve rises from zero to almost the maximum percentage the meter will reach. Many 5/8" meters in good condition will register over 95% at 1/8 GPM and 100% at 1/4 GPM. The curve continues to rise gradually with increasing rates of flow until the maximum point is reached at a rate between one and three gallons per minute for a 5/8" meter.

As the flow rates increase after the maximum point on the curve, the accuracy falls off very gradually until the maximum capacity of the meter is reached. This part of the performance curve is almost a straight line and the drop is commonly only about two percentage points for the span.

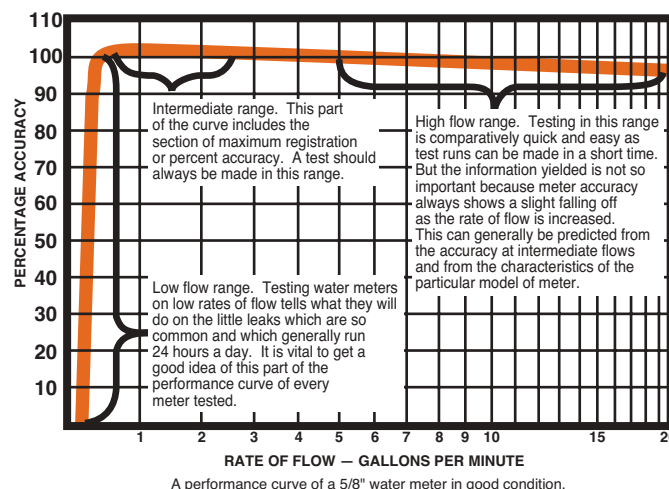
How the Performance Curve Serves as a Guide in Meter Testing

A knowledge of the general characteristics of water meters is necessary for intelligent and efficient repair and testing. The performance curve serves as an excellent guide in many ways.

For maximum registration of low flows, the curve should start up from the base line at as low a rate as possible. In other words, the meter should be sensitive and register small flows.

There is no necessity of running several tests at various high flows. The performance curve is almost straight after the maximum point is reached. More than one test in this range would be a waste of time.

The drawing at right, on approximately logarithmic spacing, shows graphically the different sections of the performance curve of a meter and the relative importance of each. All positive displacement meters have performance curves of this shape, but shifted to the right as the meter size increases.

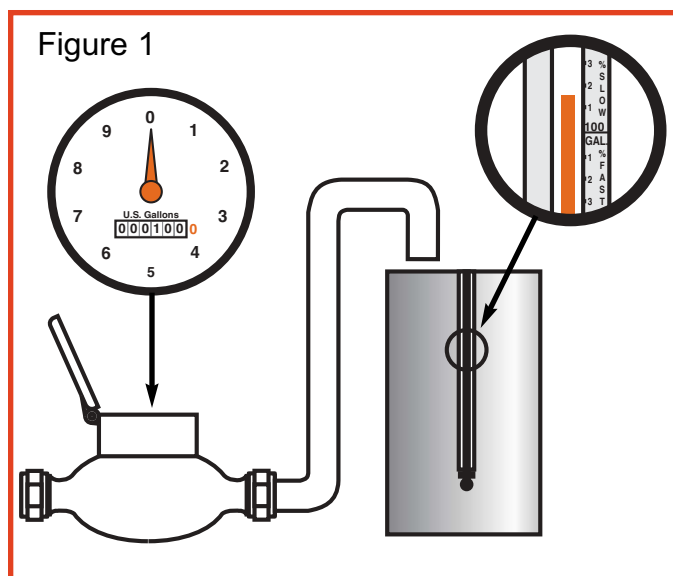


The Two Ways Calibrated Tanks Can Be Used

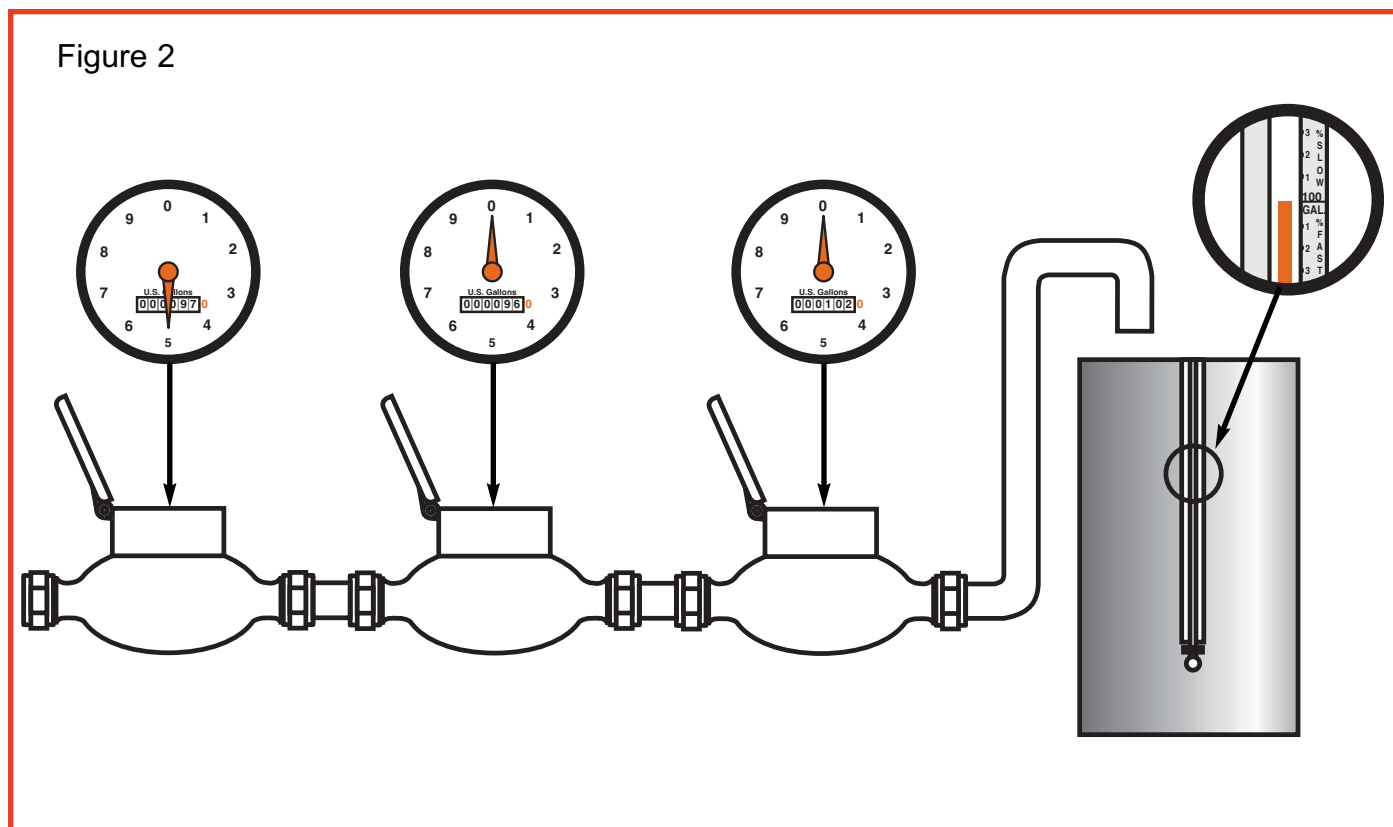
When a single meter is being tested with a Ford Calibrated Tank there is a choice in the method and procedure. When the meter has a small test hand, the better procedure is to stop the flow when the meter indicates the passage of the test volume, say one cubic foot, ten gallons or ten cubic feet. Thus the test hand makes one or more complete revolutions and is stopped exactly on a mark (see Figure 1). The percentage accuracy of the meter can then be read directly from the water level in the gauge glass of the calibrated tank as shown in the drawing.

It may be a little confusing at first thought to note that a water level above the 100% point in the tank indicates a slow meter. This is true because the meter has failed to register as much water as has passed through it. It has under-registered or is slow by the percentage shown on the gauge strip.

When two or more meters are tested in series it is necessary to stop the test flow when the tank gauge indicates that the desired test volume has run into it (see Figure 2). Then the accuracy of each meter is figured by dividing its reading by the actual volume as explained above and as shown in Figure 2.



In testing one meter at a time the accuracy can be read directly from the tank if it is calibrated in percentages. In testing the above meter the flow has been stopped when the meter has shown a registration of 100 gallons; the tank gauge shows the meter to be 98-1/2% accurate or 1-1/2% slow.



In series testing the test flow is stopped when the volumetric tank shows that the correct test volume has been run through the meters. In the above example there are 100 gallons in the tank and the meters read, from left to right, 97-1/2 gallons, 96 gallons and 102 gallons. In other words, these meters are registering 97-1/2%, 96% and 102%.

The Advantages of Series Testing

How many meters should be tested in series?

Except in small meter shops where only a very few meters are tested in a day, the advantages of series testing more than justify the small extra cost for equipment and space required.

In series testing two or more meters are connected in line. The same water is run through all the meters and measured in a tank. The same water and the same tank are used for all, and the time for testing is the same as for one meter. The economical number of meters to test in series depends on the following factors:

1. The meter testing load - the number of meters to be tested in one day. It might even pay a very small utility to accumulate for several weeks and then test in series, depending on factors below.

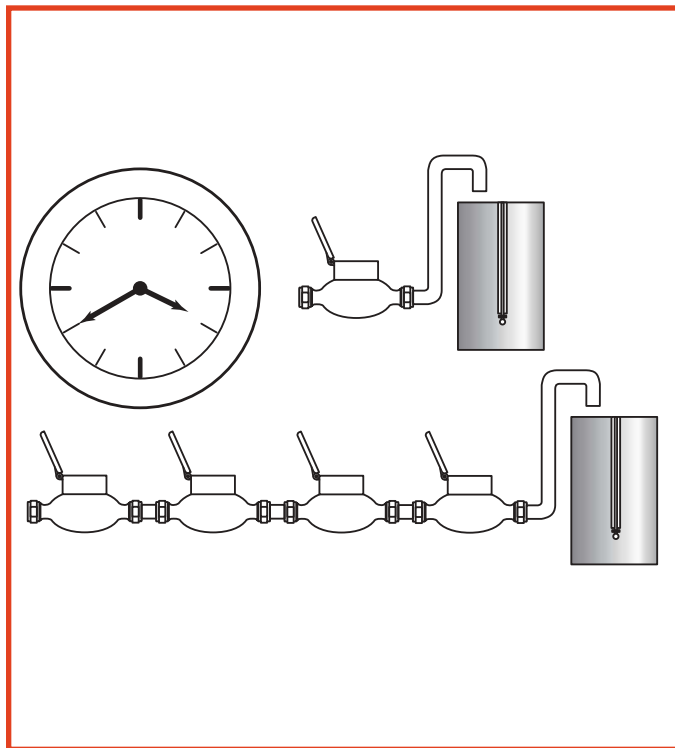
2. The additional cost of the added equipment and space required. Additional units on testing machines are nominal in price, and space is generally available so that, if much useful time is saved, series testing pays a good return on the investment.

3. The water pressure available. It should assure an ample flow through all meters to flush out all the air and provide a reasonable rate for the high-flow test, say 7 to 10 GPM for 5/8" meters.

4. The value of the water and manpower saved. Some meter shops repump water for testing as an economy measure. In one meter shop the switch from 5-unit to 10-unit test benches increased production of the department over 40% and paid a magnificent return on the added investment.

There is no good rule of thumb to apply in deciding on the correct number of meters to be tested in series because of the above variables. It might be considered good practice and good economics to start with one testing unit for every five meters to be tested in a day, gradually decreasing the ratio to ten units for 100 meters.

For testing really large numbers of meters, both Standard and Indianapolis Type Test Benches are available with two rows of test units having separate piping and valves. Either row may be run separately or both in series. As many as 24 meters can be tested at one time.



The same water and the same tank will test two, four, eight or more meters in the same time as one meter. The saving in series testing can be substantial and can pay a handsome return on the modest additional investment.



Testing 12 meters in series on an Indianapolis Type Test Bench. Electric control closes the valves at completion of test.

How to Select Meter Testing Equipment

For the small shop with few meters to test, a single unit bench is adequate, although series benches offer so many savings in use, and cost so little more, that they should be considered carefully. For larger shops series machines are definitely recommended, the number of units depending on the volume of testing to be done and the space available.



This meter shop has a No. 4 Standard Test Bench with Testerate Indicator and Electric Flow Control Valve, Nos. 1-F and 10-FG Calibrated Tanks. The bench is adapted to test 1-1/2" and 2" meters by a Tester Clamp.

A single calibrated tank may be sufficient for the small meter shop where nearly all the meters tested are of the 5/8" size. Such a tank is ordinarily for tests of one cubic foot and/or ten gallons. The combination of a large and small tank is much more convenient and is actually a necessity for the larger meter shop. When meters to be tested read in cubic feet, the Nos. 1-F and 10-FG Tanks are the best combination. When meters read in gallons, the Nos. 10-GF and 100-GF Tanks are appropriate. They are calibrated in both gallons and cubic feet and have percentage markings at 1 cubic foot, 10 gallon, 10 cubic feet and 100 gallon points, as well as at intermediate points. See page 16.

Any test bench that holds both large and small meters is necessarily a compromise. Either the means of clamping domestic sizes (5/8", 3/4" and 1", which in most cases constitute almost 90% of the testing) is necessarily more cumbersome and less efficient, or the flow through the larger sizes is limited. The Tester Clamp will adapt any Ford Standard Type Test Bench or 1" Indianapolis Test Bench to take 1-1/4" to 2" meters, and at 75 lbs. pressure will provide a flow of 40 GPM, which is ample for low and intermediate flow tests on these sizes.

When there are enough 1-1/2" and 2" meters to justify special equipment, the Akron Type Test Bench is recommended. Large calibrated tanks for testing big meters at greater quantities are also advised. See page 12.

In large meter shops there are generally great numbers of 5/8" or 5/8" x 3/4" meters to test and the use of special equipment can pay a good return on the investment. The Indianapolis Test Bench holds up to twelve meters, all of which are clamped into test position with one small hydraulic cylinder. A double-row Indianapolis Bench can hold up to 24 meters, which can be tested with one stream of water. See page 10.

An electric control valve to stop the test flow automatically saves time for the operator, who can start a test and then do other work. The Testerate Indicator is a valuable piece of equipment in any meter shop. It shows the rate of test flow in gallons per minute. See page 17.

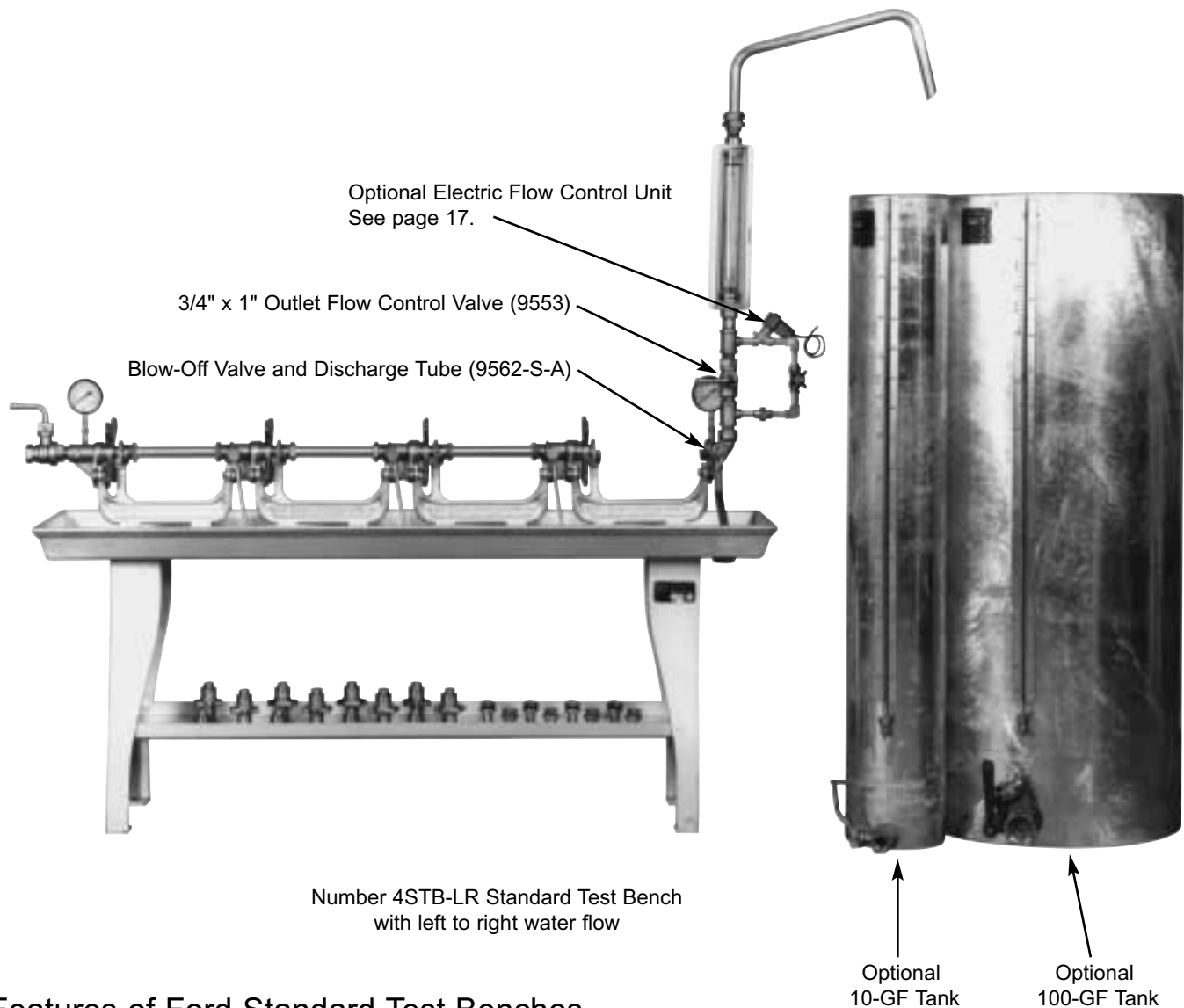
Every meter shop needs a repair bench. The bench includes a sink and a meter vise to improve the efficiency of meter repairing. See page 18.



The No.4 Akron Bench is used for testing 1-1/2" and 2" meters. The machine includes a Double Range Testerate Indicator and test tanks.

Ford Standard Test Benches

Ford Standard Test Benches are made in a wide range of capacities and with a variety of convenient accessories as described below and on the following pages.



Features of Ford Standard Test Benches

- Benches are available for holding from one to eight meters. Double Benches can be made with units in two rows – see next page.
- Each test bench unit is quickly adaptable to hold a 5/8", 5/8" x 3/4", 3/4" or 1" meter. Bench can be adapted for testing 1-1/4", 1-1/2" and 2" meters by means of an optional Tester Clamp – see next page.
- Any meter can be removed and replaced without disturbing others. Inlet and outlet piping remains stationary.
- Each meter is easily clamped water tight between rubber gaskets by turning pilot type hand wheel. There is no excessive force to distort the meter casing.
- All water passages are brass. The pan is of heavily galvanized steel, except on the Number 1STB Bench, which is not galvanized.
- The Testerate Indicator, shown on the bench above and described on page 14, indicates accurately the rate of test flow and permits close control by adjustment of the outlet valve.

Ford Standard Test Benches

Standard Test Benches include the following:

1. Adapters and gaskets for 5/8", 5/8" x 3/4", 3/4" and 1" meters
2. Ball Valve at inlet and outlet
3. Testrate Indicator (see page 14)
4. Pressure gauges at inlet and outlet
5. Bleeder or adjusting valve at outlet of each unit
6. A drain valve at bench outlet
7. 18" copper swinging delivery pipe at outlet
8. Idlers for all but one meter testing station

On all benches, inlet valve is tapped for 1" pipe connection 36 1/2" above the floor. **Not included:** Calibrated Tanks (see page 16) and Electric Flow Control Unit (see page 17.)

CATALOG NUMBER		NUMBER OF UNITS	LENGTH OF PAN	WIDTH OF PAN	APPROX. SHIP. WT LBS.
FLOW LEFT TO RIGHT	FLOW RIGHT TO LEFT				
SINGLE ROW STANDARD TEST BENCHES					
1STB-LR	1STB-RL	1	22"	14"	200.0
2STB-LR	2STB-RL	2	38"	16-1/2"	290.0
3STB-LR	3STB-RL	3	54"	16-1/2"	360.0
4STB-LR	4STB-RL	4	70"	16-1/2"	430.0
5STB-LR	5STB-RL	5	86"	16-1/2"	490.0
6STB-LR	6STB-RL	6	102"	16-1/2"	530.0
8STB-LR	8STB-RL	8	134"	16-1/2"	610.0
DOUBLE ROW STANDARD TEST BENCH					
16STB-DR-LR	16STB-DR-RL	16	140"	20"	—

Ordering Information – Options Available

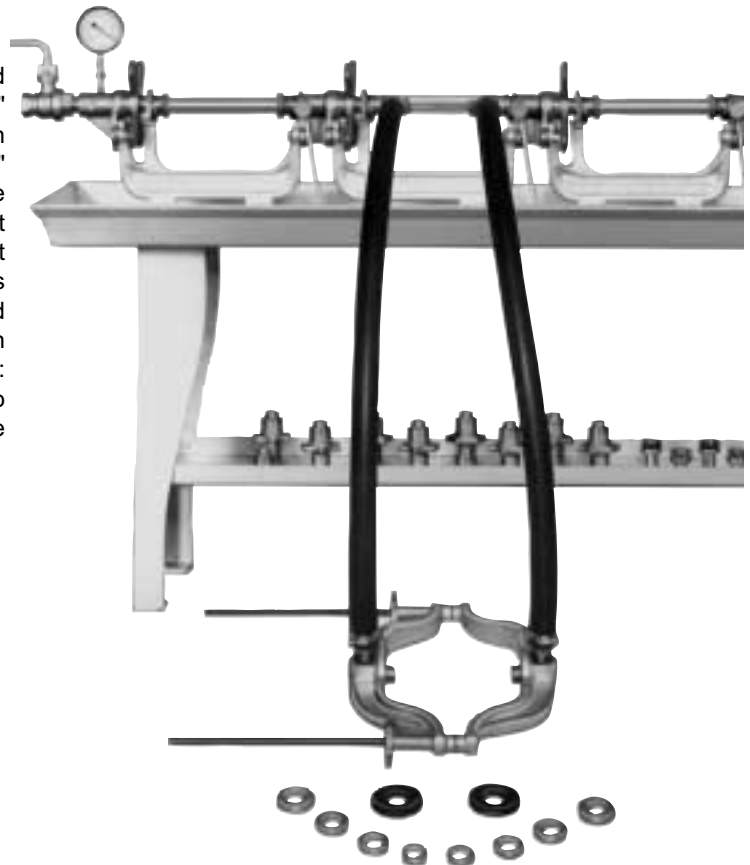
Please order by Catalog Number from the table above. (Picture on page 8 shows bench with water flow from left to right.) Options include Calibrated Tanks (see page 16) and Electric Flow Control Unit (see page 17).

The Ford Tester Clamp for 1-1/4", 1-1/2" and 2" Meters

The optional Tester Clamp quickly adapts any Standard Bench or 1" Indianapolis Bench to test 1-1/4", 1-1/2" and 2" meters at minimum and intermediate flow tests. The bar with hoses attached is tightened into any unit, the same as a 1" meter, and the large meter is then connected between the clamp halves on the floor – or in a pan – in front of the test bench. The rate of flow is adequate for testing 2" meters at minimum and intermediate flows. Lifting these large meters into position is avoided. For the meter shop with limited numbers of large meters to test, the Tester Clamp, used with a Standard Bench, provides adequate facilities. NOTE: Tester Clamp intermediate flows may not be accurate due to specific meter application requirements, which may require straight runs before and after the meter.

Ordering Information

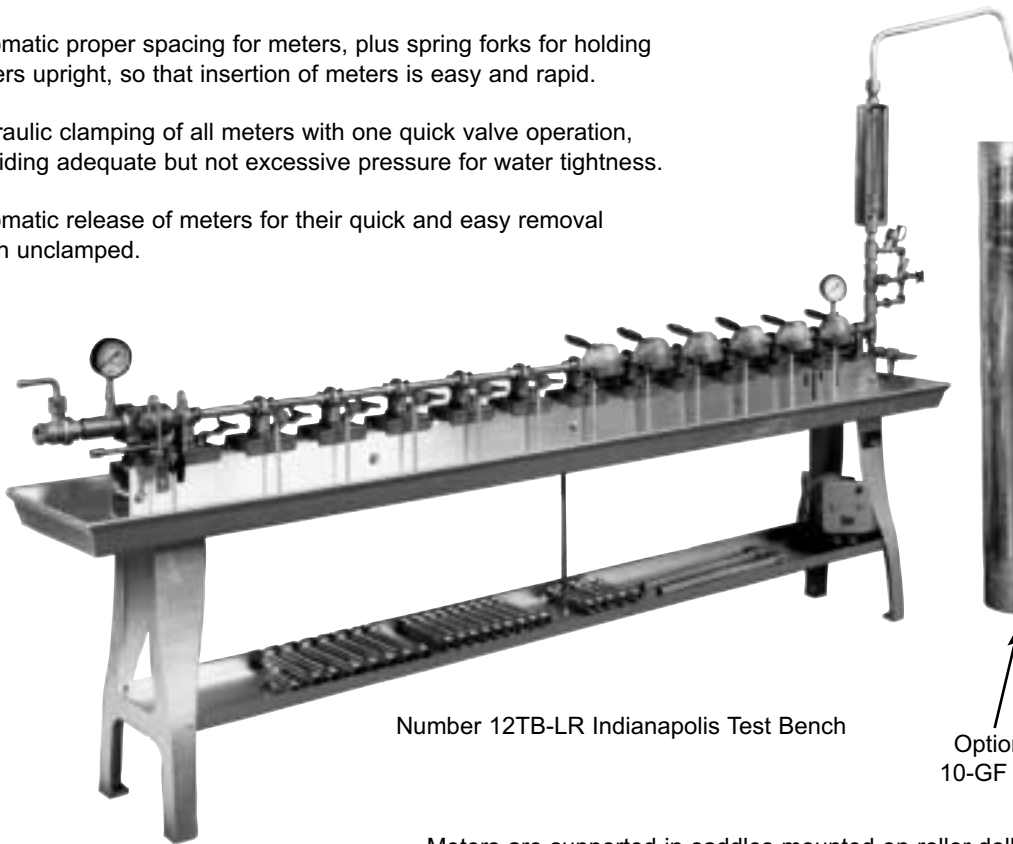
Order by Catalog Number: TC.



Ford Indianapolis Type Test Benches

The Indianapolis Type Test Bench provides maximum efficiency for testing 5/8", 5/8" x 3/4", 3/4" and 1" meters. This efficiency is provided by these exclusive Ford features:

1. Automatic proper spacing for meters, plus spring forks for holding meters upright, so that insertion of meters is easy and rapid.
2. Hydraulic clamping of all meters with one quick valve operation, providing adequate but not excessive pressure for water tightness.
3. Automatic release of meters for their quick and easy removal when unclamped.



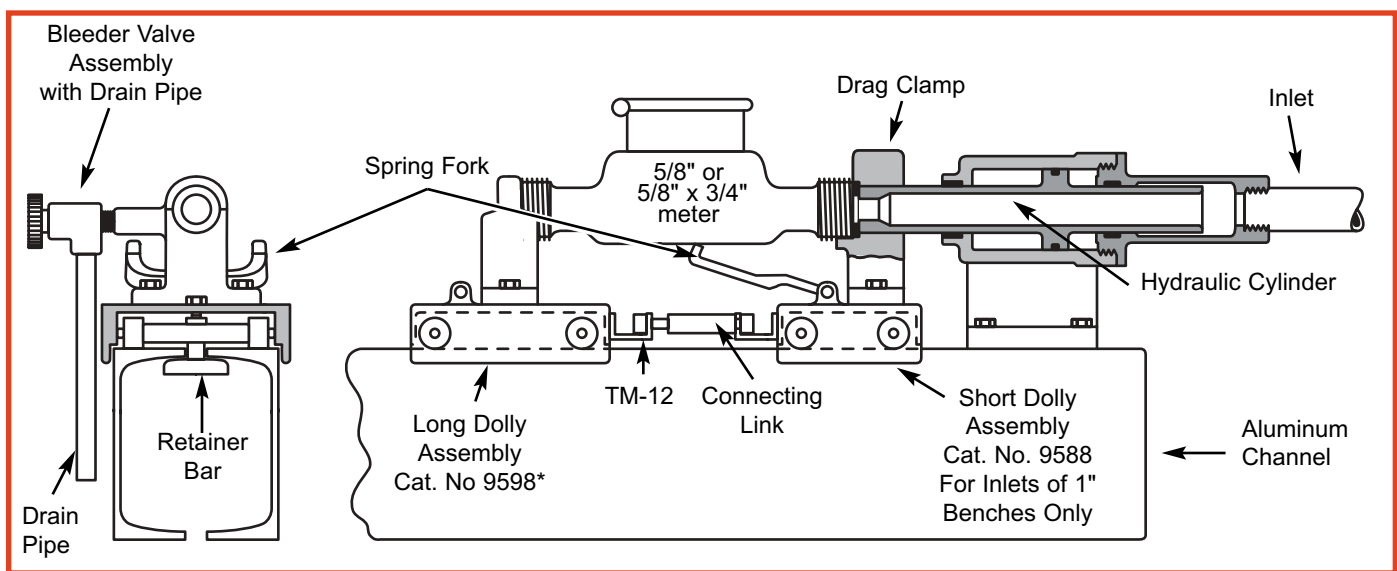
Number 12TB-LR Indianapolis Test Bench

Tanks are optional.
See page 16.

Optional 10-GF Tank

Optional 100-GF Tank

Meters are supported in saddles mounted on roller dollies, free to move easily along aluminum tracks. Motion of the dollies is limited by links that control spacing of saddles for meters to be tested. Time for loading and unloading the test bench is reduced to a minimum.



The drawing shows the hydraulic cylinder, which is controlled by a small four-way valve. Also shown is an end view of one dolly with spring fork and bleeder valve, which is used to adjust the reading of each meter to an exact mark before the test is started.

Ford Indianapolis Type Test Benches

Indianapolis Test Benches for 5/8" and 5/8" x 3/4" Meters include the following:

1. Hydraulic cylinder at inlet for automatic clamping of meters
2. Units or spaces for 10 or 12 meters as ordered
3. Ball Valve at inlet
4. Testrate Indicator (see page 14)
5. Pressure gauges at inlet and outlet
6. Bleeder or adjusting valve at outlet of each unit
7. A drain valve at outlet of bench
8. 18" copper swinging delivery pipe at outlet of bench
9. **All necessary gaskets and adapters for testing 5/8" x 3/4" and 5/8" meters**
10. Idlers for all but one meter testing station

Inlet valve is tapped for 1" pipe connection 36" above the floor. Delivery pipe outlet is 62" above floor. **NOT INCLUDED:** Calibrated Tanks (see page 16) and Electric Flow Control Unit (see page 17).

NOTE: The Double Row Indianapolis Test Bench (24ITB-DR) has two rows of 12 test stations each. They are plumbed so the two rows can be tested in series or each row tested separately.

CATALOG NUMBERS		NUMBER OF UNITS	LENGTH OF PAN	WIDTH OF PAN	APPROX. SHIP. WT. LBS.
FLOW LEFT TO RIGHT	FLOW RIGHT TO LEFT				
SINGLE ROW INDIANAPOLIS TEST BENCHES					
10ITB-LR	10ITB-RL	10	102"	16-1/2"	550.0
12ITB-LR	12ITB-RL	12	118"	16-1/2"	600.0
DOUBLE ROW INDIANAPOLIS TEST BENCH					
24ITB-DR-LR	24ITB-DR-RL	24	124"	20"	900.0

Ordering Information – Options Available

Please order by Catalog Number from the table above. (Picture on page 10 shows a bench with water flow from left to right). Options include Calibrated Tanks (see page 16) and Electric Flow Control Unit (see page 17).

Sizes and Specifications of Indianapolis Type Test Benches for 1", 3/4", 5/8" x 3/4" and 5/8" Meters



The Numbers 110 and 112 Indianapolis Type Test Benches can be used for efficient testing of 1" and smaller meters. The 110ITB style bench holds six 1", seven 3/4" and ten 5/8" or 5/8" x 3/4" meters. The 112ITB style bench holds eight 1", ten 3/4" and twelve 5/8" or 5/8" x 3/4" meters. All adapters are included and the benches can be changed from one size to another in less than five minutes. Each change must be complete; these benches are not adaptable to a mixture of sizes.

When changing meter sizes on a bench, it is necessary to change the links that control the space between the meter support pedestals. The support pedestals are configured to accept 1" meters; adapter rings are inserted in each pedestal when testing smaller meters.

NOTE: The Double Row Indianapolis Test Bench for 1", 3/4", 5/8"x3/4" and 5/8" meters (124ITB-DR) has two rows of 12 test stations each. They are plumbed so the two rows can be tested in series or each row tested separately.

CATALOG NUMBERS		NUMBER OF UNITS	LENGTH OF PAN	WIDTH OF PAN	APPROX. SHIP. WT. LBS.
FLOW LEFT TO RIGHT	FLOW RIGHT TO LEFT				
SINGLE ROW INDIANAPOLIS TEST BENCHES					
110ITB-LR	110ITB-RL	10	102"	16-1/2"	650.0
112ITB-LR	112ITB-RL	12	118"	16-1/2"	700.0
DOUBLE ROW INDIANAPOLIS TEST BENCH					
124ITB-DR-LR	124ITB-DR-RL	24	124"	20"	1000.0

Ordering Information – Options Available

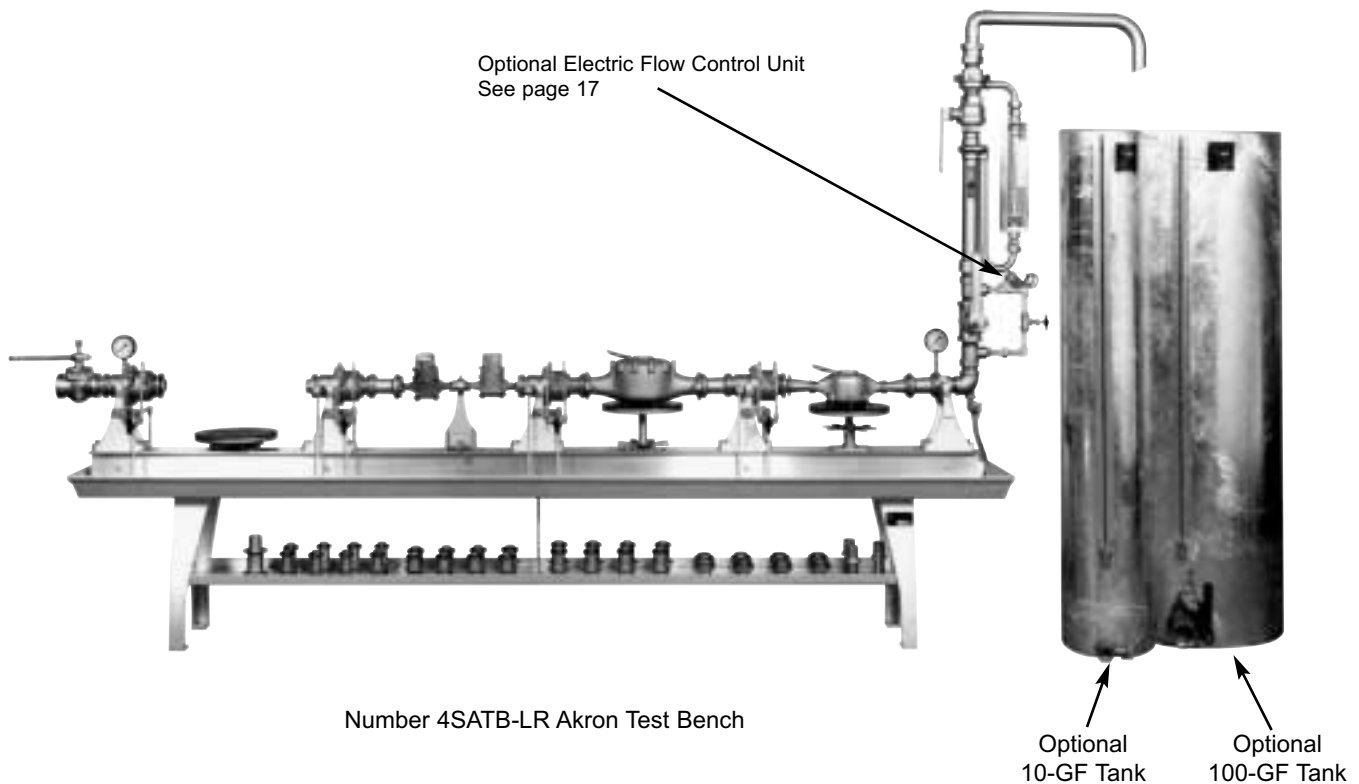
Please order by Catalog Number from the table above. Options include Calibrated Tanks (see page 16) and the Electric Flow Control Unit (see page 17.)

Ford Akron Type Test Benches

For Large Meters

Akron Type Test Benches are designed primarily for testing 1-1/2" and 2" meters but can hold smaller sizes with optional adapters. Benches are available for testing from one to four meters at a time. Each unit includes an adjustable plate or table for supporting and positioning the 1-1/2" and 2" meters and a hydraulic cylinder for clamping the meter water tight. Benches are made in two models: the S style for testing up to 2" disc type meters 17" long, the L style for up to 2" compound meters 21" long.

Each testing unit includes adapters for 2", 1-1/2" and 1-1/4" meters. Optional adapters are available for 1" (Catalog Number AD-4), 3/4", 5/8" x 3/4" and 5/8" meters (Catalog Number AD-3S or AD-3L) at extra cost. In testing the latter two sizes (both 7-1/2" long) they are placed two in each unit, with a removable center support. 3/4" meters are placed two in each unit on the L style bench and only one per unit on the S style. If a large number of 5/8" through 1" meters are to be tested, we recommend a Standard or Indianapolis type bench. Akron Benches are designed for only occasional testing of small meters.



No. 4 Akron Type Test Bench with Double Range Testrate Indicator and with units arranged to demonstrate versatility of adapting to various sizes of meters. The first unit at the left is prepared to receive a 2" disc meter. The second unit contains two 5/8" x 3/4" meters; the middle support is removable. The third unit contains a 1-1/2" disc meter with flanged ends. The fourth unit at the right end is adapted to receive a 1" meter. The Electric Flow Control Unit at bench outlet is **not** included but is available and is convenient for stopping slow flows at end of test.

Ford Akron Type Test Benches

Akron Test Benches include the following:

1. Hydraulic clamping cylinder and adjustable pedestal for each unit
2. 2" valve at inlet
3. Bleeder or adjusting valve at outlet of each unit
4. Pressure gauges at inlet and outlet of bench
5. Double Range Testrate Indicator with flow adjusting valve at bench outlet - see page 15 for description
6. All necessary adapters and gaskets for 1-1/4" flanged meters, 1-1/2" and 2" flanged and tapped meters
7. 2" Idlers for all but one meter testing station

Inlet valve is tapped for 2" pipe connection 38" above the floor. Top of Double Range Testrate Indicator at outlet of Akron Bench is 90" above floor.

NOT INCLUDED ARE: discharge pipe, because of wide variation in delivery piping desired; Calibrated Test Tanks (see page 16); Electric Flow Control Unit (see page 17).

ACCESSORIES AVAILABLE ON ORDER AT ADDITIONAL COST: adapters for meters 1" and smaller; Electric Flow Control Unit (see page 17) for automatic stopping of intermediate and low flow test runs; Akron Type Tester Clamp for 3", 4" and 6" meters (see below).

CATALOG NUMBER		NO. OF UNITS	MAXIMUM LENGTH OF METER	LENGTH OF PAN	WIDTH OF PAN	APPROX. SHIPPING Wt. LBS.
FLOW LEFT TO RIGHT	FLOW RIGHT TO LEFT					
1SATB-LR	1SATB-RL	1	17"	54"	14"	550.0
2SATB-LR	2SATB-RL	2	17"	70"	16-1/2"	700.0
3SATB-LR	3SATB-RL	3	17"	102"	16-1/2"	880.0
4SATB-LR	4SATB-RL	4	17"	134"	16-1/2"	990.0
1LATB-LR	1LATB-RL	1	21"	54"	16-1/2"	600.0
2LATB-LR	2LATB-RL	2	21"	86"	16-1/2"	750.0
3LATB-LR	3LATB-RL	3	21"	118"	16-1/2"	940.0
4LATB-LR	4LATB-RL	4	21"	134"	16-1/2"	1090.0

Ordering Information – Options Available

Please order by Catalog Number. Indicate desired direction of flow – right to left or left to right as operator faces bench. (Picture on page 12 shows flow left to right). Specify adapters for 1", 3/4", 5/8" x 3/4" or 5/8" meters if desired. Akron Type Benches include Double Range Testrate Indicator. Electric Flow Control Unit (see page 17) and Calibrated Tanks (see page 16) are optional equipment.

A 2" Swing Discharge Pipe with 24" reach (complete with swivel union) is available. Catalog Number SPD-7.

Akron Type Tester Clamp for 3", 4" and 6" Meters

The Akron Type Test Bench can be adapted for testing 3", 4" and 6" meters by means of accessory equipment shown in the picture at right. The two ells, connected by a solid bar, are clamped in one of the bench units, the same as a 2" meter. Two 6 foot lengths of 2" diameter hose connect the ells to meter flanges of 3", 4" or 6" sizes, which are interchangeable and which bolt to meters for testing.

Even with moderate pressure available, the rate of flow is well beyond the 100 GPM recommended for minimum rate testing of many types of 6" meters. NOTE: Flow tests may not be accurate due to specific meter application requirements, which may include straight runs before and after the meter.

The large meter can be placed on the floor, or in a pan, in front of the Akron Type Bench. The bench with tester clamp provides convenience in connecting the meter for test, valves for control and adjustment of test flows, and the Double Range Testrate Indicator for accurate indication of test flow rates.

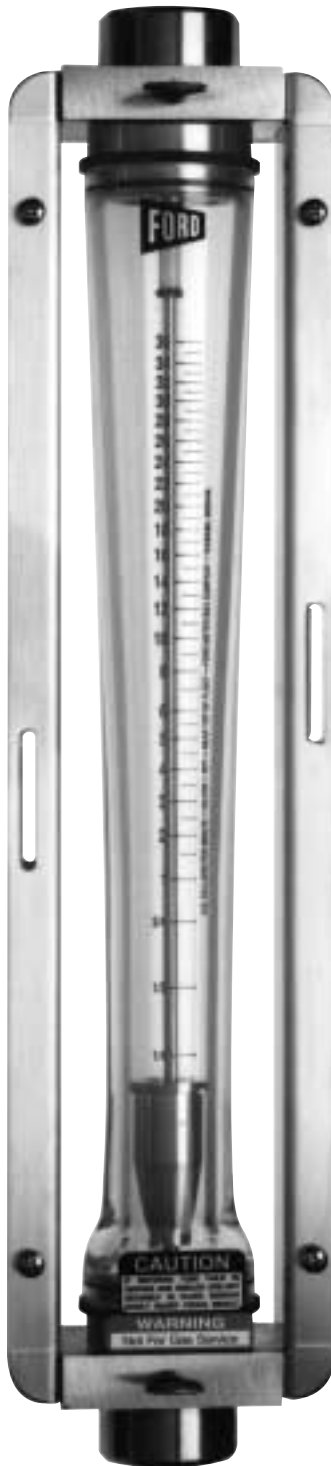
Each Akron Type Tester Clamp includes parts shown in the picture at right, plus flanges for 3", 4" and 6" meters.



Ordering Information

Please order by the Catalog Number: **TC-A**

The Ford Testerate Indicator



The Testerate Indicator is a special Rotameter designed for use in water meter testing. It consists of a tapered, calibrated clear glass tube in which a stainless steel rotor is free to move up and down on a stainless steel guide in the center of the tube. The rate of flow (1/4 to 36 gpm) passing through the Testerate Indicator is indicated by the figure even with the flat top of the rotor body. These figures are on the surface of the glass tube and can be read easily.

As compared with other Rotameters, the Testerate Indicator has an extended range of registration. The triple taper of the glass tube permits wide spacing of the calibration marks at low rates of flow, where accuracy of reading is most important.

The Testerate Indicator is ordinarily included on all Standard and Indianapolis Test Benches and is also available as a separate item. Several thousand of these unique instruments are in use in water utility meter shops and by meter manufacturers.

The Importance of Rate of Flow in Meter Testing

All specifications of meter accuracy designate specific rates of flow, or ranges of flow rates, at which meters must be accurate within definite limits. Standards established by AWWA and those set by governmental regulatory agencies all include the factor of flow rate.

The Testerate Indicator shows instantly the rate of flow in gallons per minute, permitting the setting and maintaining of desired rates in all testing.

Ordering Information

Order by Catalog Number from the table below.

CATALOG NUMBER	How CALIBRATED	APPROX. WEIGHT LBS.
KTI	U.S. Gallons/minute	10.0
KTI-IG	Imperial Gallons/minute	10.0
KTI-L	Liters/hour	10.0
KTI-LM	Liters/minute	10.0

The Testerate Indicator has a length of 17-5/8". Both ends are tapped 1" I.P. thread.

The Ford Double Range Testerate Indicator

The Double Range Testerate Indicator extends the capacity of the standard Indicator shown on page 14 from 40 to 175 GPM. In operation, smaller flows are indicated by closing the top Ball Valve so that all water passes through the Indicator tube and the rate is read from the figures on the tube.

Rates of flow over 36 GPM are registered by opening wide the top valve, resulting in 20% of the flow going through the glass tube. The rate is then read from the auxiliary scale mounted along side the tube. The total range of the instrument provides accurate indication and control of minimum and intermediate test rates for meters up to 6" in size as specified by AWWA.

The Double Range Testerate Indicator is normally included on Akron Type Test Benches – see page 12 – and is available separately for plumbing into piping or mounting on the side of a large calibrated test tank. Water passages are all brass and copper. The total height is 31-3/4"; both ends have 2" male pipe threads.

Ordering Information

Order by Catalog Number from table below.

CATALOG NUMBER	How CALIBRATED	APPROX. WEIGHT LBS.
KTI-DR	U.S. Gallons/minute	51.0
KTI-DR-IG	Imperial Gallons/minute	51.0
KTI-DR-L	Liters/hour	51.0
KTI-DR-LM	Liters/minute	51.0



Ford Calibrated Testing Tanks

In water meter shops a calibrated tank (or tanks) is essential. It provides an accurate volume against which meter registration is compared in testing. *All Tanks are guaranteed accurate within one-fourth of one percent at full scale.*

Calibration of Tanks

All Ford Calibrated Tanks have gauge glasses with strips marked clearly to show volumes in gallons, cubic feet, or both. All tanks are also marked to show percentages fast or slow when the test flow through a single meter is stopped at a specified registered volume. In series testing, the flow is ordinarily stopped when the required volume is reached in the tank. The accuracy of each meter is then computed by dividing its registered volume by the actual volume in the tank.

Test volumes are ordinarily chosen to correspond to one or more revolutions of the test hand on the meter dial. Thus tanks are calibrated at one cubic foot, ten gallons, ten cubic feet and one-hundred gallons. Larger tanks are available as listed below.

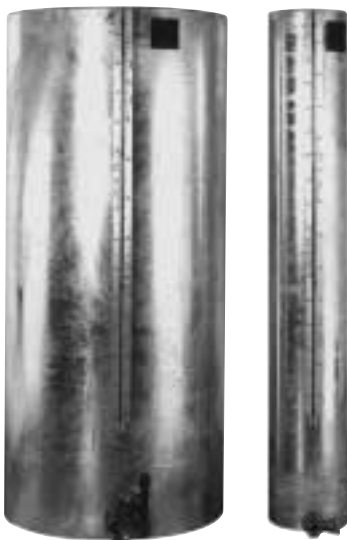
Tank Design and Construction

All Ford Calibrated Tanks are of steel, galvanized in the 100 gallon and smaller sizes. All have non-swirling vanes to provide for quick and complete drainage. All have quick opening drain valves and aluminum gauge strips with brass fittings. Each gauge glass has a red stripe at the back which is magnified by the water so that readings are easy and accurate.

Special Large Tanks

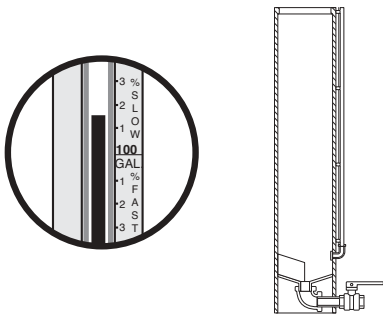
All calibrated tanks above the 100 gallon size can be made to special order if space available in your meter shop requires limitations in height or diameter. Dimensions shown in the table below are standard. Large tanks are painted and are fitted with quick-opening drain valves and aluminum gauge strips with brass fittings. They also have non-swirling vanes.

The position of the gauge glass can be as specified, expressed in degrees clockwise or counter-clockwise from the drain valve as viewed from above. Standard positioning of the glass gauge is above the drain valve.



Pictured above are 10 gallon and 100 gallon tanks (Nos. 10-GF and 100-GF), ordinarily used together, as are the one cubic foot and ten cubic foot tanks (1-F and 10-FG). In nearly all cases two tanks are recommended, the smaller for low and intermediate tests and the larger for high-flow tests.

CATALOG NUMBER	NOMINAL SIZE	DIA.	HEIGHT	CALIBRATION POINTS	SIZE DISCHARGE	APPROX. SHIPPING Wt. Lbs.
1-F	1 cu. ft.	7"	60"	1 & 1/2 cu. ft.	1"	105.0
10-GF	10 gal.	9"	60"	10 & 5 gal. - 1 cu. ft.	1"	120.0
20-GF	3 cu. ft.	13"	60"	3 & 2 cu. ft. - 20 & 10 gal.	1-1/2"	130.0
10-FG	10 cu. ft.	22"	60"	10 & 5 cu. ft. - 70 & 30 gal.	1-1/2"	200.0
100 -GF	100 gal.	26"	60"	100 & 50 gal. - 10 cu. ft.	2"	240.0
50-F	50 cu. ft.	47"	72"	50 & 25 cu. ft.	3"	690.0
500-G	500 gal.	54"	72"	500 & 250 gal.	3"	800.0
100-F	100 cu. ft.	67"	72"	100 & 50 cu. ft.	3"	1230.0
1000-G	1000 gal.	73"	78"	1000 & 500 gal.	3"	1600.0
25-L	25 liters	7"	60"	AS SPECIFIED BY PURCHASER	1"	110.0
50-L	50 liters	9"	60"		1"	117.0
100-L	100 liters	13"	60"		1-1/2"	190.0
150-L	150 liters	16"	60"		1-1/2"	215.0
200-L	200 liters	19"	60"		1-1/2"	275.0
400-L	400 liters	26"	60"		2"	375.0
500-L	500 liters	30"	60"		2"	420.0
600-L	600 liters	32"	60"		2"	480.0
1000-L	1 cu. meter	39"	72"		3"	505.0
2000-L	2 cu. meters	54"	72"		3"	970.0
3000-L	3 cu. meters	67"	72"		3"	1500.0
4000-L	4 cu. meters	73"	78"		3"	1925.0
5000-L	5 cu. meters	84"	78"		3"	2550.0



Detail of tank construction and calibration (at left). The water in the gauge glass magnifies the red stripe on the back, making the gauge more easily read.

Ford Meter Testing Equipment

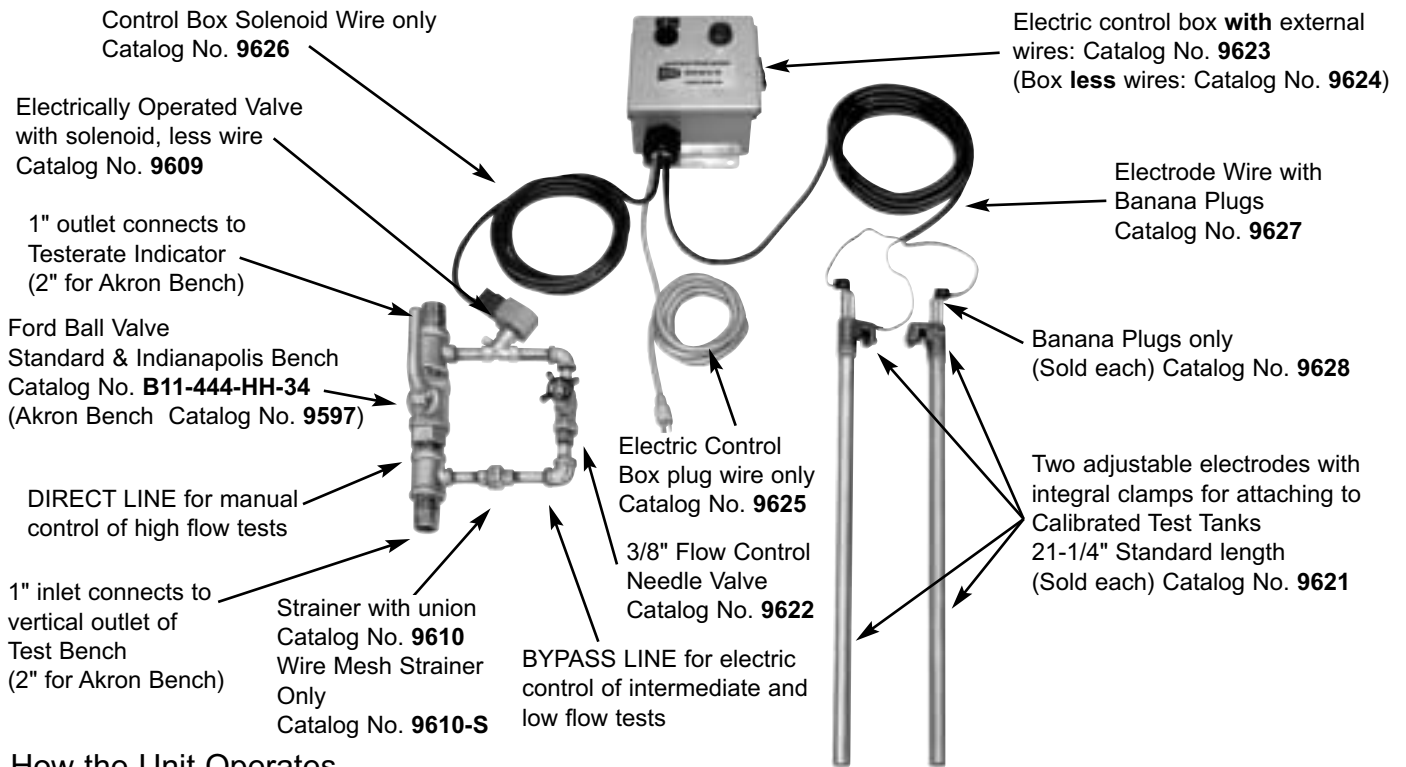
Electric Control in the Testing of Meters

Manual control of low-flow test streams in meter testing can waste considerable time. The stopping of the flow at the proper time is necessary for accuracy and the operator must stand by to close the valve. Tests at high rates of flow are usually run in reasonably short periods of time, but low-flow tests, to be accurate, are necessarily time-consuming. *Electric control of test flows permits the operator to start the test and then do other work until the test is completed. The human factor in stopping the test flow is eliminated, thereby increasing efficiency and eliminating error.*

The Ford Electric Control Unit

The Electric Control Unit may be included with a Standard, Indianapolis or Akron Test Bench, or may be ordered as a package for installation on almost any test bench now in service.

The by-pass of the unit contains an electrically operated valve which automatically closes when water reaches the preset level in the calibrated test tank. It is designed for low or intermediate flow tests of not over three or four gallons per minute. For high-flow testing, the by-pass is closed, diverting the water through the direct line valve, which is operated manually.



How the Unit Operates

When water in the tank reaches the pre-set test volume level, it makes contact with one of the electrodes and forms a current path through the relay. This causes the relay contacts to open and de-energizes the solenoid circuit of the electric valve, causing it to close and stop the test flow. A red light on the transformer box warns against leaving the current on when the valve is not in use.

Two electrodes are included to control variation in volume (caused by over-run after valve closes) when testing two rates of flow.

CATALOG NUMBER	TYPE	BENCH
ECU-1	ordered with bench	Indianapolis Standard
ECU-2	ordered with bench	Akron
ECU-3	install on existing bench	Indianapolis Standard
ECU-4	install on existing bench	Akron

Ordering Information

If **Electric Control Unit** is to be included when ordering Test Bench, please specify. Order by Catalog Number above.

If **Calibrated Tanks** are not included in order, **give distance from top of tank to water level at test volume.**

When ordering Electric Control Unit for installation on test bench now in service, indicate distance from top of tank to water level at test volume. Also specify water flow direction of bench on which Electric Control Unit is to be installed – right to left or left to right – as operator faces bench. Unit is shipped assembled and ready for quick installation. Order by Catalog Number above.

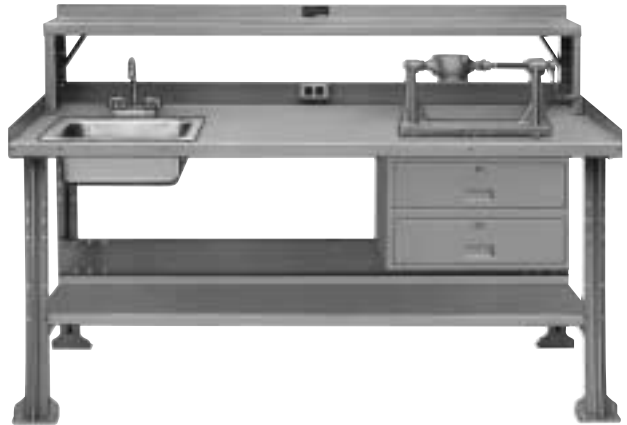
DANGER: Use GFI circuit to prevent fatal electrical shock. Installation and maintenance requires a qualified electrician.

Ford Meter Shop Accessories

Meter Repair Bench

This bench is designed for the meter shop. It is made of heavy pressed steel, enameled gray, with a top measuring 34 x 72". The stainless steel sink is 14 x 15" inside by 6-1/2" in depth, with a swinging faucet for hot and cold water. Two drawers and an upper and lower shelf are included, and a GFI double electrical receptacle is mounted on the back panel. The bench is shipped completely assembled, along with a meter vise (see below).

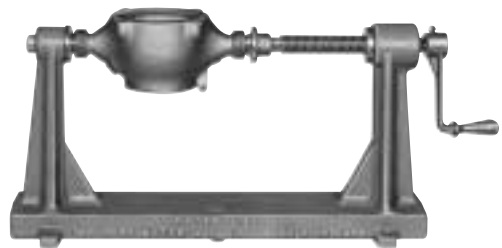
To order, specify **Repair Bench, Number 9541**.
Approximate shipping weight is 540.0 lbs.



Meter Vise

The Meter Vise is available as a standard accessory on the Repair Bench or as a separate item. It holds firmly meters from 5/8" to 1" in size and facilitates repair work. The left end is drilled and tapped for an air hose connection for operating the meter during inspection and repair.

To order, specify **Meter Vise, Number 9547**.



Service Cart

The Service Cart is steel, enameled gray. Each tray is 3" deep and measures 16" x 30". Four wheels – two stationary and two swivel – are 5" in diameter with rubber tires.

To order, specify **Service Cart, Number 9548**.



Section K

Ford Water Meter Testing Equipment

Warranty

All merchandise is warranted to be free from defects in material and factory workmanship. We will provide, free of charge, new products in equal quantities for any that prove defective within one year from date of shipment from our factory.

Manufacturer shall not be liable for any loss, damage, or injury, direct or consequential, arising out of the use of or the inability to use the product.

Before using, user shall determine the suitability of the product for his intended use and user assumes all risk and liability whatever in connection therewith. No claims for labor or consequential damage will be allowed. The foregoing may not be changed except by agreement signed by an officer of the manufacturer.

Please Note:

The Ford Meter Box Company considers the information in this catalog to be correct at the time of publication. Items and option availability, including specifications, are subject to change without notice. Please verify that your product information is current.



The Ford Meter Box Co., Inc. 775 Manchester Avenue, P.O. Box 443, Wabash, Indiana, USA 46992-0443
Telephone: 219/563-3171 FAX: 1-800-826-3487 Overseas FAX: 219/563-0167 <http://www.fordmeterbox.com>