



AFTK-25 OPERATING INSTRUCTIONS APPARATUS SERVICE TESTING

Equipment Required:

- 1- **Smooth bore tips of a size sufficient for the anticipated flow (GPM).** Three or Four inlet multi-universal.
Note: Larger capacity pumpers will require two multi-universals and sets of tips.
Note: **Akron Brass's Style 3488 Discharge Pipe** is recommended in line before the smooth bore tip for test accuracy.

- 2- **Akron Brass's Apparatus Flow Test Kit** with proper smooth bore tips which gives flow accuracy to within $\pm 3\%$.
Note: Nozzle pressure reading should be between 60-70 PSI ideally, but never under 50 PSI or over 100 PSI.
Note: Gauge from **Apparatus Flow Kit** can be remote mounted to the **ATGK-3** Test Gauge Panel

- 3- **Akron Brass's ATGK-3** pump test gauges for hanging at operators panel with 1/4" connecting hoses to the UL vacuum and pressure test fitting plate on the operators panel pump test gauges:

 Vacuum Test Gauge, 3-1/2" with a 0-30 in. scale in one (1) pound increments and certified to be accurate to 1% of in. reading full scale

 Pressure Test Gauge, 3-1/2" with a 0-300 PSI scale in five (5) pound increments and certified to be accurate to 1% of PSI reading full scale

- 4- **Akron Brass's Hand Held Pitot** if **Apparatus Flow Test Kit** is not used. Gauge is a 3-1/2" with a 0-160 PSI scale in two (2) pound increments and certified to be accurate to 1% of PSI reading full scale.

- 5- Copy of "**Typical Hose Layout & Tip Sizes**" see attached.

- 6- Copy of "**Annual Pump Service Test**" see attached.

- 7- Copy of "**Discharge Table for Circular Outlets**" see attached.

- 8- Clipboard, pens & pencils, stop watch and any other items you might require.

Service Testing Pumper Apparatus:

- 1- **Purpose of Test:**
 - A- To insure the pump and its accessories will perform as required
 - B- To expose defects or problems before causing an interruption of service
 - C- To illustrate and record the performance history of the apparatus being tested

 - 2- **Frequency of the Service Test:**
 - A- Every 12 months
 - B- After extensive repairs to the engine, drive train, or pump
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3- Conditions of Test:

- A- From draft
- B- Lift not to exceed 10 feet through 20 feet of hard suction hose plus strainer

4- Performance Measurements:

- A- Discharges (GPM) at Net Pump Pressure (NPP) for a given period of time
- B- Gauge accuracy should be 1% full scale
- C- Engine RPM, Engine Oil Pressure, and Engine Temperature

5- Sequences of Service Test and Procedures:

A- Run a Dry Vacuum Test:

- 1- Drain pump
- 2- Connect 20 feet of Hard Suction Hose to the pump inlet and put the suction cap on the other end
- 3- Run primer to develop a vacuum 22 in.
- 4- Hold dry vacuum test for 10 minutes (a drop of 10 in. over 5 minutes is acceptable)

B- Priming Test:

- 1- Close all valves, drains, etc.
- 2- Transfer valve to be set to volume position if a two stage pump
- 3- Engage primer and pull a prime in 30 seconds for pump capacities of 1250 GPM or less and in 45 seconds for pumps with a capacity of 1500 GPM or more

C- Capacity Test 100% of pump's rated GPM @ 150 PSI Net Pump Pressure (NPP):

- 1- Have the proper number of 2-1/2" hoses connected to pump discharges, and have the discharge valve open.
- 2- Increase RPM to proper setting
- 3- Maintain RPM while developing
 - a- **150 PSI Net Pump Pressure (NPP)**
 - b- **100% rated GPM of the pump**
- 4- Duration of the test – 20 minutes
- 5- Measurements to be taken and recorded at the start of this test and at 5 minute intervals
 - a- Tachometer reading
 - b- Pump Pressure PSI reading
 - c- Pump Vacuum in. reading
 - d- Pitot Gauge reading
 - e- Pump Mode
 - f- Tip Size
 - g- Layout of the hose lines

D- Automatic Pump Pressure Control Test:

- 1- While pumping **100% rated GPM** of the pump, engage pressure control device and set to maintain pressure at **150 PSI Net Pump Pressure (NPP)**
- 2- Slowly close all discharge valves
- 3- Pressure surge should be **no more than 30 PSI**

E- Overload Test:

- 1- Open an adequate number of discharge valves

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Overload Test Con't:

- 2- Increase discharge to **100% rated GPM** at a discharge pressure of **165 PSI Net Pump Pressure (NPP)**
- 3- Duration of the test – 5 minutes
- 4- Measurements to be taken and recorded as in (C-5 above) at start of the test and 5 minute intervals

F- Automatic Pump Pressure Control Test:

- 1- While pumping at **100% rated GPM** of the pump, engage pressure control device and set to maintain pressure at **90 PSI Net Pump Pressure (NPP)**
- 2- Slowly close all discharge valves
- 3- Pressure surge should be **no more than 30 PSI**

G- 70% Test:

- 1- Open an adequate number of discharge valves
- 2- Place transfer valve in proper mode of operation (two stage pumps)
- 3- Increase RPM to proper setting
- 4- Maintain RPM while developing
 - a- **200 PSI Net Pump Pressure (NPP)**
 - b- **70% rated GPM of the pump**
- 5- Duration of the test – 10 minutes
- 6- Measurements to be taken and recorded as in (C-5 above) at the start of the test and 5 minute intervals

H- 50% Test:

- 1- Open an adequate number of discharge valves
- 2- Place transfer valve in proper mode of operation (two stage pumps)
- 3- Increase RPM to proper setting
- 4- Maintain RPM while developing
 - a- **250 PSI Net Pump Pressure (NPP)**
 - b- **50% rated GPM of the pump**
- 5- Duration of test – 10 minutes
- 6- Measurements to be taken and recorded as in (C-5 above) at the start of the test and 5 minute intervals

I- Automatic Pump Pressure Control Test:

- 1- While pumping **50% rated GPM** of the pump, engage pressure control device and set to maintain pressure at **250 PSI Net Pump Pressure (NPP)**
- 2- Slowly close all discharge valves
- 3- Pressure surge should be **no more than 30 PSI**

J- Tank-To-Pump Test (Optional):

- 1- Maintain a full water tank by supplying it from an outside source of water (hydrant)
- 2- Open tank to pump valve(s) and develop a GPM discharge flow from the pump required for the size (capacity in gallons) of the tank
- 3- After GPM flows is established, close off outside water source to the tank
- 4- Start timing to determine rate of flow from tank to pump

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Tank-To-Pump Test Con't:

Rate of Flow

- 250 GPM (4.16 gallons / second)
- 500 GPM (8.30 gallons / second)

Capacity of Tank

- 300-750 gallons
- 750 gallons or larger

5- Flow must be maintained for at least 80% of the capacity of the tank

COMPUTING PERFORMANCE

Computing Pump Discharge Pressure:

A- Net Pump Pressure (NPP) is the measurement of the total amount of work performed by the pump:

- 1- To lift the water into the pump
- 2- To discharge the water from the pump

B- Allowances are made for:

- 1- Height of lift
- 2- Friction loss in the hard suction intake hose plus the strainer

C- Measuring the Amount of Lift:

- 1- Measuring difference in elevation between surface or water and the pump intake in feet
- 2- Converting vacuum gauge reading in feet of lift
 - a- Multiply gauge reading (inches of in.) by 1.13
 - b- Result is the difference in elevation (in feet)

D- Find Hard Suction Intake Hose Friction Loss from the Below Table:

- 1- Identify the rated GPM (capacity) of the pump to be service tested
- 2- Identify the hard suction hose diameter to be used
- 3- Identify from the below table the friction loss in 20 feet of hard suction hose

Allowances for Friction Loss in Hard Suction Hose (Feet)			
GPM of Pump	Diameter of Suction Hose in Inches	One 10' Length of Hard Suction Hose	Each Additional 10' Length of Suction Hose
500	4"	6	+1
	4-1/2"	3-1/2	+1/2
750	4-1/2"	7	+1-1/2
	5"	4-1/2	+1
1000	5"	8	+1-1/2
	6"	4	+1/2
1250	5"	12-1/2	+2
	6"	6-1/2	+1/2
1500	6"	9	+1
	(2) - 5"	7	+1
1750	6"	12-1/2	+1-1/2
	(2) - 6"	3	+1/2
2000	(2) - 5"	8	+1-1/2
	(2) - 6"	4	+1/2

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E- Calculating Pump Discharge Pressure for Service Test (PDP)

- 1- Work performed on the Discharge side of the pump is indicated on the pump discharge gauge.
- 2- Work performed on the Suction side of the pump is determined by computing the following formula (work is measured in PSI)

$$\text{Pressure Correction} = \frac{\text{Height of lift (ft.)} + \text{Intake Hose Friction Loss (from table)}}{2.3 \text{ (constant to convert feet to PSI)}}$$

- 3- To determine the Pump Discharge Pressure (PDP) used for a service test, the Pressure Correction must be subtracted from the Net Pump Pressure (NPP)

$$\text{PDP} = \text{Net Pump Pressure (NPP)} - \text{Pressure Correction (suction work)}$$

- 4- Pressure Correction for the three performance tests are:

100% rated GPM	Pressure Correction as calculated
70% rated GPM	Pressure Correction Minus 1 PSI
50% rated GPM	Pressure Correction Minus 2 PSI

Example: A 1000 GPM pumper is to be Service Tested.
What are the desired readings on the pump discharge gauge for the following test?

The pumper has (2) 10 foot lengths of 5" hard suction hose. After priming the pump the Vacuum Gauge reads 8.5 in.

Steps:

- 1- Find the lift 8.5 in. x 1.13 feet = 9.6 feet
- 2- Find the Friction Loss in the two (2) lengths of hard suction hose (use friction loss chart for hard suction hose). = 9.5 feet
- 3- **Pressure Correction** = $\frac{9.6 \text{ feet} + 9.5 \text{ feet}}{2.3 \text{ feet}}$

- 4- Solve for Pump Discharge Pressure (PDP):

	NPP	Pressure Correction	PDP
100% Test at	150 PSI	8.3 PSI	142 PSI
70% Test at	200 PSI	8.3 - 1 for % gauge error	193 PSI
50% Test at	250 PSI	8.3 - 2 for % gauge error	244 PSI

CORRECT USE OF THE HAND HELD PITOT:

Using Akron Brass's Hand Held Pitot for taking a flow reading is not difficult, but it is essential that it is used properly if accurate readings are to be obtained. Akron Brass's Hydrant or Apparatus Flow Test Kit's may also be used.

A good method of holding the hand held pitot tube is to stand on the right hand side of the water stream with the pitot in your right hand, and your thumb above the air/water bleed button. Hook three fingers of the left hand over the handle of the pitot between the pitot blade and gauge. As you insert the blade into any water stream use extreme caution as the pitot will kick back on the employee. It takes practice to be able to hold the tip of the blade in the center of the water stream. You must steady the Hand Held Pitot or the force of the water will make it impossible to get an accurate reading.

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The procedure for using the Akron Brass Hand Held Pitot with Gauge are as follows:

- 1- After obtaining a secure grasp of the pitot tube, press the air/water bleed button with your thumb as the pitot tube is being placed in the water stream. This removes all the air from the static pressure circuit of the pitot. Because the 3-1/2 inch pressure gauge is liquid filled, your needle fluctuation is basically nonexistent.
- 2- The pitot blade tip opening should be placed in the center of the water stream and held away from the hydrant outlet or nozzle tip, approximately one-half the diameter of the opening, i.e. for a 2-1/2 inch (65 mm) outlet the distance would be 1-1/4 inches (32 mm).
- 3- Read the pressure gauge and record the pressure reading. Next, look up the PSI or (kPa) reading in the attached table for gallons per minute (GPM) flow.
- 4- After the test is complete, press the air/water bleed button to allow all water to drain before storing the hand held pitot in its case.

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ANNUAL PUMP SERVICE TEST

Name: _____

Date: _____
Tested By: _____

Apparatus Information:

Year:	Make:	Model:	Serial#:	Unit #:
Engine Make:	Engine Model:	Engine Serial #:	Engine Hours:	Mileage:
Pump Make:	Pump Model:	Pump Serial #:	Pump Hours:	Pump Capacity:
Pump Location:	Gear Ratio:	Transmission Gear Used:		

Test Conditions:

Dry Pump Primed Seconds:	Atmospheric Pressure:	Pump Elevation Above Source:
Hard Suction Size:	Air Temperature:	Water Temperature:
Hard Suction Length:	Engine Oil Pressure:	Engine Water Temperature:
Location of Test Site:		

FIRST TEST 150 PSIG NET PUMP PRESSURE (NPP) 100% TEST 20 MINUTE DURATION

Time	Tach. Reading	Pump PSI Reading	Pump in. Reading	Pitot Gauge Reading	Pump Mode	Tip Size	Hose Layout		
							No:	Size:	Lengths:
Start									
:05									
:10									
:15									
:20									
Coolant Temperature:		Transmission Temperature:				GPM:			

SECOND TEST 165 PSIG NET PUMP PRESSURE (NPP) 10% OVERLOAD 5 MINUTE DURATION

Time	Tach. Reading	Pump PSI Reading	Pump in. Reading	Pitot Gauge Reading	Pump Mode	Tip Size	Hose Layout		
							No:	Size:	Lengths:
Start									
:05									
Coolant Temperature:		Transmission Temperature:				GPM:			

THIRD TEST 200 PSIG NET PUMP PRESSURE (NPP) 70% TEST 10 MINUTE DURATION

Time	Tach. Reading	Pump PSI Reading	Pump in. Reading	Pitot Gauge Reading	Pump Mode	Tip Size	Hose Layout		
							No:	Size:	Lengths:
Start									
:05									
:10									
Coolant Temperature:		Transmission Temperature:				GPM:			

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APPARATUS SERVICE TESTING TYPICAL HOSE LAYOUT & TIP SIZES							
PUMP SIZE [GPM]	PUMP PRESSURE [PSI]	FLOW [GPM]	HOSE LAYOUT USING 2-1/2" HOSE	PITOT PRESSURE [PSI]	ACTUAL FLOW [GPM]	TIP SIZE	SUCTION HOSE
250	150	250	One (1) 50' Line	45	250	1-1/8"	4"
	200	175	One (1) 50' Line	60	176	7/8"	4"
	250	125	One (1) 50' Line	70	125	3/4"	4"
500	150	500	One (1) 50' Line	62	501	1-1/2"	4"
	200	350	One (1) 50' Line	64	351	1-1/4"	4"
	250	250	One (1) 50' Line	90	251	1"	4"
750	150	750	Two (2) 100' Lines	72	750	1-3/4"	4-1/2"
	200	525	One (1) 100' Line	70	529	1-1/2"	4-1/2"
	250	375	One (1) 100' Line	74	377	1-1/4"	4-1/2"
1000	150	1,000	Three (3) 100' Lines	74	1,000	2"	5"
	200	700	Two (2) 100' Lines	64	703	1-3/4"	5"
	250	500	One (1) 100' Line	62	501	1-1/2"	5"
1250	150	1,250	Three (3) 100' Lines & One (1) 50' Line	72	1,259	2-1/4"	6"
	200	875	Three (3) 100' Lines	56	880	2"	6"
	250	625	Two (2) 100' Lines	50	626	1-3/4"	6"
1500	150	1,500	Three (3) 100' Lines & One (1) 50' Line	66	1,509	2-1/2"	6"
	200	1,050	Three (3) 100' Lines	82	1,057	2"	6"
	250	750	Two (2) 100' Lines	72	750	1-3/4"	6"
1750	150	1,750	Four (4) 100' Lines into Two (2) 2" Tips*	56	1,760	2"	DUAL 6"
	200	1,250	Four (4) 100' Lines into Two (2) 1-3/4" Tips*	50	1,252	1-3/4"	DUAL 6"
	250	875	Three (3) 100' Lines	56	880	2"	DUAL 6"
2000	150	2,000	Four (4) 100' Lines into Two (2) 2" Tips*	74	2,000	2"	DUAL 6"
	200	1,400	Four (4) 100' Lines into Two (2) 1-3/4" Tips*	64	1,406	1-3/4"	DUAL 6"
	250	1,000	Four (4) 100' Lines into Two (2) 1-1/2" Tips*	62	1,002	1-1/2"	DUAL 6"
2250	150	2,250	Six (6) 100' Lines into Two (2) 2-1/4" Tips*	58	2,264	2-1/4"	DUAL 6"
	200	1,575	Six (6) 100' Lines into Two (2) 1-3/4" Tips*	80	1,580	1-3/4"	DUAL 6"
	250	1,125	Six (6) 100' Lines into Two (2) 1-1/2" Tips*	80	1,128	1-1/2"	DUAL 6"
2500	150	2,500	Six (6) 100' Lines into Two (2) 2-1/4" Tips*	72	2,518	2-1/4"	DUAL 6"
	200	1,750	Six (6) 100' Lines into Two (2) 2" Tips*	56	1,760	2"	DUAL 6"
	250	1,250	Three (3) 100' Lines & One (1) 50' Line	72	1,259	2-1/4"	DUAL 6"

*REQUIRE TWO (2) DELUGE SETS, TWO (2) FLOW KITS, AND DUAL 6" SUCTION HOSES

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APPARATUS SERVICE TESTING TYPICAL HOSE LAYOUT & TIP SIZES							
PUMP SIZE [LPM]	PUMP PRESSURE [BAR]	FLOW [LPM]	HOSE LAYOUT USING 2-1/2" HOSE	PITOT PRESSURE [BAR]	ACTUAL FLOW [LPM]	TIP SIZE	SUCTION HOSE
946	10.34	946	One (1) 50'Line	3.10	946	1-1/8"	4"
	13.79	662	One (1) 50'Line	4.14	666	7/8"	4"
	17.24	473	One (1) 50'Line	4.83	473	3/4"	4"
1,893	10.34	1,893	One (1) 50'Line	4.27	1,896	1-1/2"	4"
	13.79	1,325	One (1) 50'Line	4.41	1,329	1-1/4"	4"
	17.24	946	One (1) 50'Line	6.21	950	1"	4"
2,839	10.34	2,839	Two (2) 100'Lines	4.96	2,839	1-3/4"	4-1/2"
	13.79	1,987	One (1) 100'Line	4.83	2,002	1-1/2"	4-1/2"
	17.24	1,420	One (1) 100'Line	5.10	1,427	1-1/4"	4-1/2"
3,785	10.34	3,785	Three (3) 100'Lines	5.10	3,785	2"	5"
	13.79	2,650	Two (2) 100'Lines	4.41	2,661	1-3/4"	5"
	17.24	1,893	One (1) 100'Line	4.27	1,896	1-1/2"	5"
4,732	10.34	4,732	Three (3) 100'Lines & One (1) 50'Line	4.96	4,766	2-1/4"	6"
	13.79	3,312	Three (3) 100'Lines	3.86	3,331	2"	6"
	17.24	2,366	Two (2) 100'Lines	3.45	2,370	1-3/4"	6"
5,678	10.34	5,678	Three (3) 100'Lines & One (1) 50'Line	4.55	5,712	2-1/2"	6"
	13.79	3,975	Three (3) 100'Lines	5.65	4,001	2"	6"
	17.24	2,839	Two (2) 100'Lines	4.96	2,839	1-3/4"	6"
6,624	10.34	6,624	Four (4) 100'Lines into Two (2) 2"Tips*	3.86	6,662	2"	DUAL 6"
	13.79	4,732	Four (4) 100'Lines into Two (2) 1-3/4"Tips*	3.45	4,739	1-3/4"	DUAL 6"
	17.24	3,312	Three (3) 100'Lines	3.86	3,331	2"	DUAL 6"
7,571	10.34	7,571	Four (4) 100'Lines into Two (2) 2"Tips*	5.10	7,571	2"	DUAL 6"
	13.79	5,300	Four (4) 100'Lines into Two (2) 1-3/4"Tips*	4.41	5,322	1-3/4"	DUAL 6"
	17.24	3,785	Four (4) 100'Lines into Two (2) 1-1/2"Tips*	4.27	3,793	1-1/2"	DUAL 6"
8,517	10.34	8,517	Six (6) 100'Lines into Two (2) 2-1/4"Tips*	4.00	8,570	2-1/4"	DUAL 6"
	13.79	5,962	Six (6) 100'Lines into Two (2) 1-3/4"Tips*	5.52	5,981	1-3/4"	DUAL 6"
	17.24	4,259	Six (6) 100'Lines into Two (2) 1-1/2"Tips*	5.52	4,270	1-1/2"	DUAL 6"
9,464	10.34	9,464	Six (6) 100'Lines into Two (2) 2-1/4"Tips*	4.96	9,532	2-1/4"	DUAL 6"
	13.79	6,624	Six (6) 100'Lines into Two (2) 2"Tips*	3.86	6,662	2"	DUAL 6"
	17.24	4,732	Three (3) 100'Lines & One (1) 50'Line	4.96	4,766	2-1/4"	DUAL 6"

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Warranty Statement

WARRANTY AND DISCLAIMER*: We warrant Akron Brass products for a period of five (5) years* after purchase against defects in materials or workmanship. Akron Brass will repair or replace product which fails to satisfy this warranty. Repair or replacement shall be at the discretion of Akron Brass. Products must be promptly returned to Akron Brass for warranty service. We will not be responsible for: wear and tear; any improper installation, use, maintenance or storage; negligence of the owner or user; repair or modification after delivery; failure to follow our instructions or recommendations; or anything else beyond our control. WE MAKE NO WARRANTIES, EXPRESS OR IMPLIED, OTHER THAN THOSE INCLUDED IN THIS WARRANTY STATEMENT, AND WE DISCLAIM ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. Further, we will not be responsible for any consequential, incidental or indirect damages (including, but not limited to, any loss of profits) from any cause whatsoever. No person has authority to change this warranty. Unless otherwise provided herein. Akron Brass industrial electronic components & the Severe-Duty Monitor have a one (1) year warranty. Select Akron Brass handline nozzles and valves carry a ten (10) year warranty. Weldon products have a two (2) year warranty from date of manufacture (excluding consumable components). Select Weldon LED products carry a five (5) year warranty. Honda products have the manufacturers' warranty and Akron Brass disclaims any warranty in respect of those products.

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Revision History

Revision	Reason Updated
08/2018	UL update
12/2019	Obsolete parts update, added LPM/BAR table

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