



**Draw Test And Flow Rates**

**Conducting a Draw Test**

Whenever the complaint is heard, “Not Enough Hot Water”, on newly installed or older water heaters, there is an way to determine if the water heater is working correctly. The procedure is called a *draw test*. A residential water heater will deliver 70% of tank capacity at the thermostat setting minus 20 degrees. What does this mean? If the thermostat is set on 120 degrees, the unit should deliver 70% of tank volume at a temperature between 100 degrees and 120 degrees. A draw test will certify that the water heater, and all of it’s component parts are working properly.

What does 70% of tank capacity mean? It means 70% of the gallons capacity listed on the rating plate. For example:

Tank Capacity	70% rule	# of 5 gallon buckets	Plus # of gallons
30	21	4	1
40	28	5	3
50	35	7	0
65	45.5	9	.5
75	52.5	10	2.5
80	56	11	1
100	70	14	0
120	84	16	4

To conduct a draw test, be sure the water heater thermostat(s) are satisfied and the heater is fully recovered. Using a thermometer, draw about a cup full of water from the T&P discharge tube and measure the temperature. This water should be within 10 degrees of the thermostat setting. Since hot water rises, it may be a little more than 10 degrees hotter; that is OK. If it is more than 10 degrees colder than the thermostat setting, something else is wrong and should be investigated first.

Next, using a five gallon bucket, draw pure hot water from the heater. You probably want to use the kitchen sink or the bath tub. After filling the 5 gallon bucket, immediately measure the water temperature. Record the water temperature and pour the hot water down the drain. Now fill the bucket again, measuring and recording the temperature of the water. Continue until you have drawn 70% of the tank capacity. Speed is not that important here. What is important is accurate draws and temperature measurements.

You should get extremely close to the 70% rule. (See chart above for the number of 5 gallon buckets and extra gallons of water.) The water temperature on the last bucket should be within 20 degrees of the thermostat setting. If not investigate the cause.

Remember, the draw test is used to determine if the water heater is functioning properly. If the heater passes the draw test, look for other causes of Not Enough Hot Water. Other causes could be wasteful shower heads, plumbing crossovers, undersized water heater, or too much demand on the heater at one time.

**Testing show head flow rate**

Flow rate is simply the gallons per minute (GPM) of water a faucet will allow at full force. Flow rate of a shower head or other faucet fixture is important in determining the consumption patterns of a user. Using a bucket and a watch having a second hand, draw cold shower water at full volume for 15 seconds. Using the chart below and a quart measure, determine the number of quarts drawn in the 15 second period.



Draw Test And Flow Rates

NUMBER OF QUARTS IN 15 SECONDS		GALLONS PER MINUTE FLOW (GPM)
1		1
2	CONSERVATIVE	2
3		3
4		4
5		5
6	MODERATE	6
7		7
8		8
9	WASTEFUL	9
10		10

For example, a homeowner has a 40 gallon water heater set to 120° F. That will allow approximately 36\* gallons of hot shower water at 110°. If the homeowner has a conservative flow rate of 3 GPM, the shower will last 12 minutes. If the homeowner has a wasteful flow rate of 9 GPM, the shower will last 4 minutes. Very often the homeowner will complain of *NOT ENOUGH HOT WATER*, and blame the water heater. Actually, the water heater is fine -- the homeowner has a wasteful consumption pattern and possibly an undersized water heater.

Water Heater Gallons	Gallons of hot water available at 120 degree thermostat	*Gallons available within 10 degrees of thermostat	Shower Time Available (minutes) based of gallons per minute flow of shower head		
			3 GPM	6 GPM	9 GPM
30	21	27	9	4 1/2	3
40	28	36	12	6	4
50	35	45	15	7 1/2	5
66	46	59	20	10	6 2/3
80	56	72	24	12	8
120	84	108	36	18	12

\* gallons available is initially slightly higher than the 70% rule due to the heating action of the water heater during usage. Eventually demand will consume the hot water faster than the unit can heat.