The functions of a pressure tank are to:

(1) protect and prolong the life of the pump by preventing rapid cycling of the pump motor;
(2) provide water under pressure for delivery between pump cycles; and
(3) provide additional water storage under pressure to assist the pump in meeting the total demands of a system if the pump or well is incapable of supplying the required capacity.

**Selecting a Pressure Tank**

When selecting a pressure tank, certain information must be known:

(1) system demand;
(2) pump capacity; and
(3) well capacity.

The **system demand** is a function of water usage and location, expressed as gallon(s) per minute (gpm) and pound(s) per square inch gauge (psig), respectively. Usage or flow (gpm) can be determined using one of several methods (refer to Table IV.1.1 for typical demands):

a) The fixture method determines the system demand by totaling the number of fixtures in the home, including outside hose bibs, and multiplying this number by 1 gallon per minute (gpm). For example, 10 fixtures x 1 gpm = 10 gpm.

b) The peak demand method determines system demand considering that more than one fixture will be in use under peak demand. The number of fixtures being used at the same time is determined and multiplied by 3 gpm. For example, 4 fixtures x 3 gpm = 12 gpm.

c) An alternate method determines system demand by calculating the number of bathrooms (half baths are considered as 1) and multiplying by 4 gpm. For a home with 2 ½ bathrooms, multiply 3 x 4 gpm = 12 gpm.

Use the largest system demand determined by the above methods. For determining system demand for water systems supplying farms, and public or commercial buildings such as schools or motels, see Book I, Chapter 3, of the *Water Systems Handbook*. 
The pump capacity should be selected according to the system demand. If a pump exists, the capacity must be determined.

The well capacity should be documented when the well has been declared ready for use and will often be referred to in gallons per hour (gph). If the well capacity is unknown, it should be determined by measuring the well water level. The water level must be lowered via pumping, measured, then allowed to recover to the static water level. A record of the time required to return to static water level along with the well pipe size can be used to calculate the well capacity (recovery). An alternate method of determining if the well capacity is sufficient for system demand is to draw water from the well at or above the peak demand and determine if the well can sustain the peak demand flow.

A typical water system will have adequate well capacity and pump capacity to meet or exceed the system demand. The system will commonly function using a differential pressure switch to control the system pressure at or above the minimum required system pressure.

**Total Tank Volume**

Selecting the pressure tank total volume for typical systems will consider the pump capacity. Total tank volume is not a measure of tank acceptance volume, which is typically considered to be available water volume or tank drawdown. Total tank volume is a measure of the total tank size required to provide the required available water. The total tank volume will vary depending on tank type.
a) Referring to Table IV.1.2, select the pump capacity, tank type and pressure switch settings to determine the total tank volume.

b) When it is desired to have a pressure switch setting different from those included in the table, the total tank volume can be determined as follows:

\[
\text{Total tank volume} = \frac{\text{Minimum Drawdown (from Table VI.1.2)}}{\text{Acceptance Factor}}
\]

(Acceptance Factor is the factor of the total tank volume that will provide available water).

Acceptance Factor is calculated using the pressure tank precharge pressure (2 psig below the pump cut-in pressure). The pressure tank will operate between the pressures set by the pressure switch. The tank precharge pressure should be set at 2 psig below the low pressure cut-in to prevent a noticeable drop in pressure at the fixture.

\[
\text{Acceptance Factor} = 1 - \frac{(P_1 \text{ cut-in} - 2) + 14.7}{(P_2 \text{ cut-out} + 14.7)}
\]

Well water naturally better... Contact your local water well professional
When the Well or Pump Cannot Meet Peak Demand

In cases where the well cannot meet the peak system demand, additional pump protection may be required in the form of floats or power monitors. For more information on low-producing wells, reference the *Water Systems Handbook*.

In cases where the pump cannot meet the peak system demand, a supplemental drawdown may be obtained from the pressure tank. (See figure above). Supplemental drawdown can be added to the pressure tank by adjusting the tank and system pressures in order to supplement the system during times of peak demand. When the pump can meet the system demand, it will operate between the pressure switch settings. When the pump cannot meet the system demand, the pressure will drop below the cut-in pressure. The supplemental drawdown is supplied by the tank at a pressure between the tank precharge and the cut-in pressure.

The supplemental drawdown required is determined from peak demand:

\[
\text{Supplemental Drawdown (Gallons)} = \left[ \text{Peak Demand (gpm)} - \text{Pump Capacity (gpm)} \right] \times \left[ \text{Peak Demand Time (minutes)} \right]
\]

The total required drawdown is determined by referring to Table IV.1.2 to obtain the minimum drawdown:

\[
\text{Total Required Drawdown (Gallons)} = [\text{Minimal Drawdown} + \text{Supplemental Drawdown}]
\]

\[
\text{Total Tank Volume} = \text{Total Drawdown} / \text{Acceptance Factor}
\]

where the

\[
\text{Acceptance Factor} = 1 - \frac{(P1 \text{ pressure tank precharge} + 14.7)}{(P2 \text{ cut-out} + 14.7)}
\]

Consult the manufacturer for additional assistance in determining proper tank sizing and pressure settings.
For more information on sizing a pressure tank


For more information on your drinking water
The following websites provide up-to-date information on efforts to protect drinking water supplies and steps you can take as a private well owner. In addition, you may contact the wellcare® hotline at 1-888-395-1033.

U.S. Environmental Protection Agency     www.epa.gov

Other information about wells and well water can be found in the following wellcare® information sheets:

General Information about Wells:
- Determining the Depth of a Well
- Determining the Yield of a Well
- Ground Water
- Selecting a Well Contractor
- Sizing a Pressure Tank
- Sizing a Well Pump
- Wells
- Your Well & Septic System
- Coping with Low Water Levels
- Managing a Flooded Well
- Protecting Your Wellhead
- Protecting Your Well
- Well Maintenance
- Wells and Fire Protection
- Wells: What to do When Power Fails
- What To Do if the Well Runs Dry
- Boiling Your Drinking Water
- Disinfecting Your Well
- Drinking Water Testing
- Drinking Water Treatments
- Home Drinking Water Treatment Devices
- Testing Water for Gardening and Lawn Irrigation
- Understanding Drinking Water Test Results
- Buying a Home with a Well
- Closing an Abandoned Well
- Dillon’s Rule
- Ground Water Withdrawals
- Real Estate Professionals: Buying or Selling a Home with a Well
- Sanitarians – Closing a Well
- Sanitarians – Inspecting a Well
- Sanitarians – Wells & Septic Systems
- Shared Well Agreement
- Sharing a Well
- Water Conservation
- Who Owns the Water

Well Components:
- Your Pitless Adapter
- Valves
- Your Well Cap
- Your Well Casing
- Your Well Pump
- Your Well Tank

Possible Contaminants You May Find in Your Well Water:
- Arsenic
- Bacteria
- Benzene
- Chlorine Disinfectants & Their Byproducts
- Chromium
- Copper
- Emerging Water Contaminants
- Hardness in Drinking Water
- Iron
- Lead
- Mercury
- MTBE
- Nitrate and Nitrite
- Perchlorate
- Pesticides
- pH in Drinking Water
- Radon
- Sodium
- Sulfur
- Trichloroethylene (TCE)
- Total Dissolved Solids (TDS)
- Turbidity in Drinking Water
- Uranium
- Volatile Organic Compounds (VOCs)
For more information about wells and other wellcare® publications

wellcare® is a program of the Water Systems Council (WSC). WSC is a national nonprofit organization dedicated to promoting the wider use of wells as modern and affordable safe drinking water systems and to protecting ground water resources nationwide. This publication is one in a series of wellcare® information sheets. There were more than 60 available at the time this document was published. They can be downloaded FREE from the WSC website at www.watersystemscouncil.org. Well owners and others with questions about wells or ground water can also contact the wellcare® hotline at 888-395-1033 or visit www.wellcarehotline.org

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