

should never be smaller than the discharge outlet of the pump, and to the first lateral branch or branches is usually one or two sizes larger than such outlet. Differences in pressure due to elevation should also be taken into consideration. Pressure is usually stated in pounds per square inch. A head, or difference in level of 1 foot, equals .43 pounds pressure; a head of 10 feet equals 4.3 pounds pressure; a head of 100 feet equals 43 pounds pressure. If, for example, the highest green is about 100 feet above the pump, the pump must be capable of delivering the maximum quantity of water required at one time and maintain a pressure of at least 43 pounds, plus 50 pounds at the highest connection, plus the pipe friction loss in the main and laterals through which the flow occurs. If the pipe sizes and lengths are such as to give a friction loss of 10 pounds, the required pressure at the pump as indicated by a gage on the pump discharge would therefore be about 103 pounds. The suction lift, including friction loss in the suction pipe, should be included to make up the total head against which the pump must operate. This is usually less than 10 pounds. The supply of water to any green is readily regulated by throttling the gate or nozzle openings.

Clubs usually require also a certain quantity of water under pressure for the clubhouse and fire protection. A common practice is to install one or more hydropneumatic tanks into which water and air are forced by an electrically driven pump arranged to start when the pressure in the tank falls to about 30 pounds and to stop when the pressure reaches 50 or 60 pounds. For watering the course some clubs find it advisable to pump into an elevated tank or reservoir from which the delivery is by gravity flow. In other cases a centrifugal pump forces water directly into the distribution lines. Sometimes the source of supply is an artificial reservoir or a natural lake, pond, or stream. Sometimes one or more wells are necessary. In all cases the pumping equipment should be such as is adapted to the conditions and the requirements.

Provided little or no fairway watering will be done, a maximum demand in most instances of 15,000 gallons per hour, or 250 gallons per minute, suffices. If fairway watering is anticipated, larger pumping and storage capacity will probably be required to meet the demands. Assuming the supply is available or has been developed, a club may proceed to the purchase of pumping equipment guaranteed by the manufacturer as being capable of delivering a specified quantity of water against a given head.

Keep a plan of your water system.—Remember that the best water system devised is likely to require some additions or modifications in future years. If an accurate plan of the mains and laterals is preserved it may avoid much added expense and inconvenience in later years. Frequently it is decided to connect a new lateral, and unless plans are available much digging may be necessary before the nearest main is discovered. All this is expensive and disturbs play. The personnel of a golf club often changes, and if the water system plans are trusted to memory they may soon be lost. Be sure to have a carefully prepared diagram; then file it where it will be preserved and available at any time.