



The simplest form of piezometric measurement is the monitoring of water levels in cased boreholes (internal diameter of casing 20 to 60 mm). The height of the water level in the rising tube (= piezometer) is measured with an electric water level gauge. The device is mounted on the end of the casing and the gauge body lowered into the tube. Once the electrode integrated in the plumb touches the surface of the water, an electric circuit is closed and a pilot lamp comes on. The depth is read off the scale on the cable. The height of the tube end is determined in advance by a levelling measurement.

To prevent the reading being influenced by surface water, the gap between the borehole and the gauge tube is sealed off near the surface by clay pellets or an injected material; at the bottom of the borehole, which is filled with filter gravel, the gauge is perforated. Gauge tubes which are sunk through layers with perched ground water are able to measure artesian pressure if the tube gap is sealed off against higher water-conducting layers and the piezometric height does not project above the end of the tube. If this is the case, the tube end must be closed and the pressure measured with a manometer. A measuring setup of this type can also be used in mining to obtain information about the water pressure in the area surrounding a tunnel or cavern (see Fig. 1). To do so, a borehole with a diameter of 60 mm is sunk at the point to be measured and a tunnel piezometer installed in the borehole.

The same approach is taken to measure the foundation water pressure on the foundation bed of a dam. Perforated sampling bowls are embedded in filter gravel in the foundation rock. To prevent the sampling bowls becoming clogged, particularly during later injection work, they are equipped with a flushing system (see Fig. 2).

Where there are several decks of ground and rock water, measurements can be taken with several rising tubes in one borehole, provided the aquifer is permeable enough. Attention must be paid to separating the individual aquifers carefully with clay pellets. This work is conducted with rising tubes with an internal diameter of 20 mm, which end at their bottom point in a filter tube.

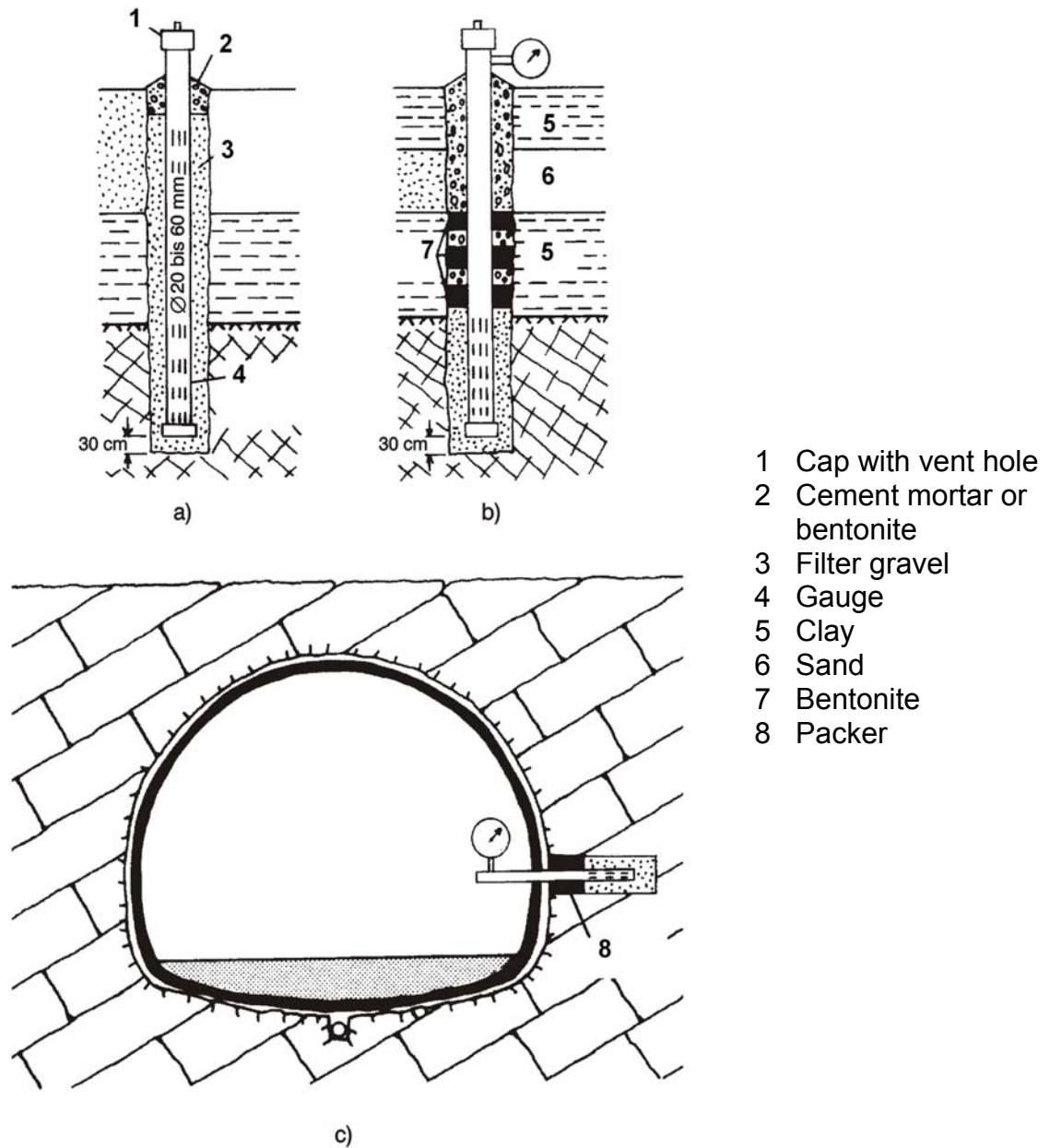


Fig. 1

Schematic presentation of piezometric measurements

- a) Water level monitoring in the gauge tube
- b) Water level monitoring in a limited horizon (modified for artesian pressures)
- c) Water pressure measurement in a tunnel using a tunnel piezometer

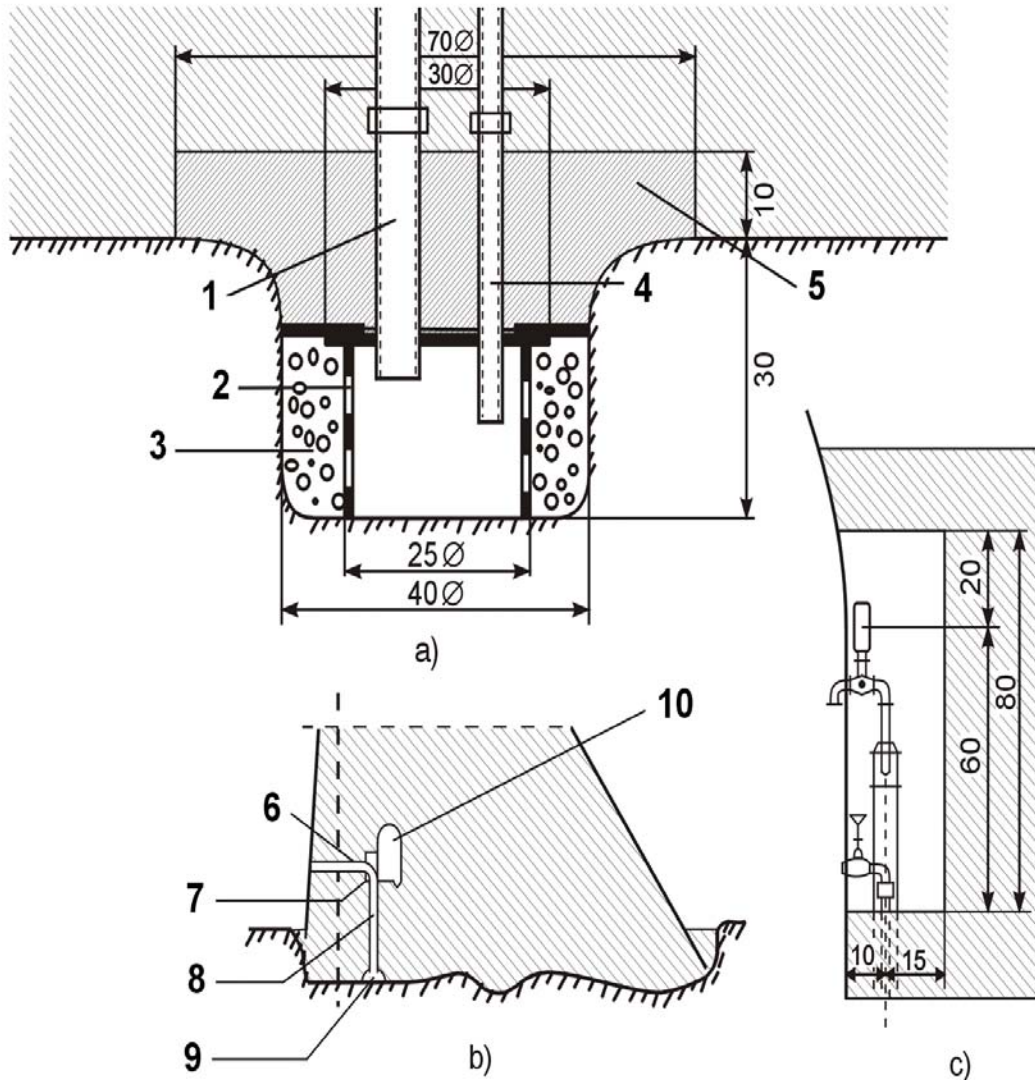


Fig. 2 Measurement of foundation water pressure under a gravity dam  
 a) Sampling bowl  
 b) Measurement setup in the dam wall  
 c) Instrument niche with manometer at the sampling tube and flushing line (bottom)

- 1 Sampling tube, 2 Sampling bowl, 3 Filter gravel, 4 Flushing tube,  
 5 Concrete shield, 6 Flushing water supply line, 7 Measuring niche;  
 8 Sampling tube, 9 Sampling bowl, 10 Dam corridor