



ENCARDIO RITE



POROUS TUBE PIEZOMETER

MODEL EPP-10

INTRODUCTION

The installation of piezometers in earth fills and their foundations provides important and significant quantitative data on the magnitude and distribution of pore pressure and their variations with time. Piezometers are also extensively used to monitor variations in ground water level. It also gives the pattern of seepage, zones of potential piping and the effectiveness of seepage control measures undertaken. In case the piezometers are correctly installed, proper evaluation of pore pressure will give the following information:

- ◆ Indicate potentially dangerous conditions that may adversely affect the stability of a structure and its appurtenant structures
- ◆ Help monitor, after construction, the behavior of structure and their foundations and appurtenant structures.
- ◆ Provide basic data for improvement of design practices and criteria that will promote safer and economical construction of earth and rock fill dams and appurtenant structures.
- ◆ The help evaluating effectiveness of grout curtains.
- ◆ Variations in ground water levels.



FEATURES

- ◆ Reliable, accurate and simple to read.
- ◆ Proven technology.
- ◆ Can be installed after the construction of the dam is completed by drilling a proper bore hole at the desired location to the original depth.
- ◆ Is not limited to depth of water being within 5 meter from the observation station as in the case of twin tube piezometers.
- ◆ Stand pipe of durable heavy duty PVC construction.
- ◆ Flat cable used in water level sounder is high tensile, virtually non-expandable, water proof and corrosion resistant.
- ◆ The water level sounder is portable, light weight and easy to carry.
- ◆ Low cost, rugged and easy to install.
- ◆ Locking arrangement provided.

APPLICATIONS

- ◆ To determine the uplift and pore pressure gradients in foundations.
- ◆ Measuring the elevation of ground water in stand pipes, bore holes and wells
- ◆ To determine the flow pattern through earth/rock fill dams, their abutments and foundations and to delineate the phreatic line.
- ◆ Hydrological investigation, construction control, stability investigation and monitoring of earth dams, foundations, shallow underground works and surface excavations.

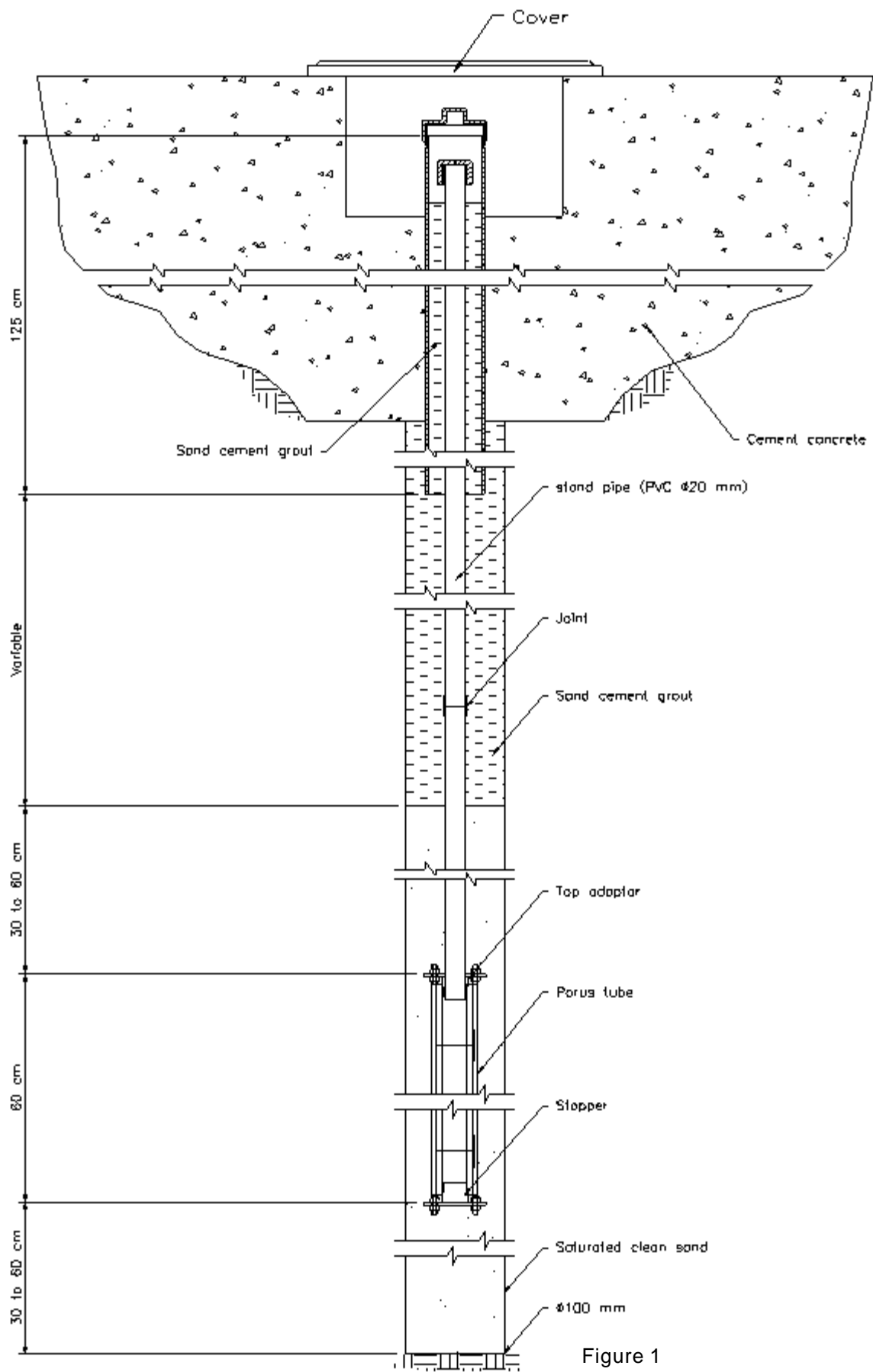


Figure 1

POROUS TUBE PIEZOMETER

The porous tube piezometer is a device for measuring pore water pressures primarily in a foundation though it can also be used to measure pore pressure in an embankment. It is more sensitive to foundation pressures or ground water fluctuations and is more resistant to plugging due to silting than the conventional observation well which it replaces. The porous tube piezometers may not indicate the correct pressures where sufficient flow of water into the standpipe of the piezometer is not available as in partially saturated soils.

Even though the foundation pore pressure can be measured by the conventional twin tube hydraulic type foundation piezometer, there are locations not easily accessible to these piezometers, in view of the depths at which the tips are required to be installed and of the necessity of terminal facilities. This is specially true in case where the depth of water level is more than 5 m below the observation room. Every porous tube piezometer being an independent installation, the porous tube piezometer can be installed at such locations. Because of its simplicity, and reliability, the porous tube piezometer can be used by taking advantage of the drainage tunnels and grouting culverts to provide permanent access to the top of the holes. Since porous tube piezometers can be installed after completion of construction, obstruction to construction equipment can also be avoided.

OPERATING PRINCIPLE

The intake point of the piezometer consists of a porous carborundum/alundum tube of annular cross-section. The bottom end of the porous tube is plugged with a suitable rubber stopper. The porous tube is set in a hole which is either drilled or jetted into the foundation to a predetermined elevation to intercept ground water or pore pressure in the foundation. The porous tube is surrounded by sand and has a plastic riser pipe extending to the surface.

The pressure of the pore water surrounding the porous tube causes a flow through the piezometer until the pressures are equalized by the head of water in the standpipe (plastic tube). The elevation of water in the

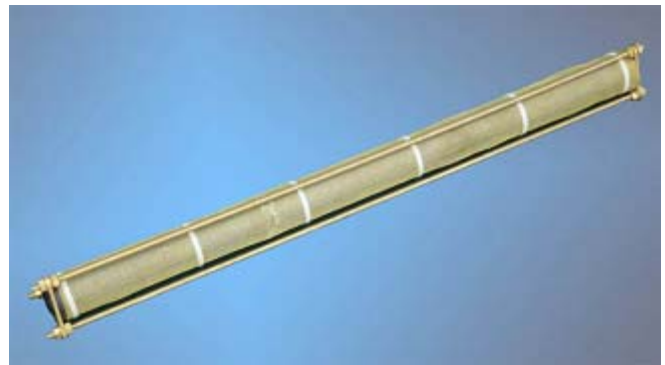
plastic tube is determined by an electrical sounding device lowered from the ground surface. The Encardio-rite water level sounder uses a special non expandable measuring tape with integral twin wires for current transmission. The two conductor cable serves to lower the probe and also to connect the probe to the output circuit board.

Figure 1 gives typical assembly and installation layout of the porous tube piezometer.

DESCRIPTION OF EQUIPMENT

EPP-10/1 Porous tube

This is a porous carborundum or alundum tube of annular cross-section, 37 mm outer dia x 6 mm wall thickness and about 60 cm long. Three porous tubes of 20 cm length are coupled together with proper tie rods and rubber gasket seals to form a 60 cm piezometer tip. The length of the porous tube and the sand backfill (see figure 1) may be varied with the subsurface conditions encountered at site. The porosity of the porous tube is chosen according to site conditions. Unless specifically requested, the porous tube filter has a grain size of 40 micron.



EPP-10/2 Stopper

The bottom end of the porous tube is sealed with a suitable rubber plug.

EPP-10/3 Top Adapter

It is required to be fitted on the upper end of the porous tube assembly to connect the standpipe to the porous tube. It is essentially a rubber bushing. probe.

EPP-10/4 Standpipe

Durable rigid PVC tubing having an outside diameter of 20 mm and a wall thickness of 1.50 mm in maximum available lengths is provided. The inside diameter of the tubing is suitable for easy insertion of the sounder

EPP-10/5 Joint for PVC Tubing

These are required for jointing the available lengths of PVC tubing. The joints are suitable to ensure no leakage and are smooth and flush inside to prevent lodging of air bubbles and smooth passing of the sounder. The joiner or coupler for PVC tubing is made of rigid PVC having an internal rubber sleeve. Suitable adhesive/resin are used for jointing lengths of PVC tubing.

EPP-10/6 Water level sounder

The Encardio-rite model EPP-10/6 water level indicator is designed to measure the elevation of ground water in bore holes, stand pipes and wells. It is robust, light and convenient to use.

The water level indicator is lowered from the surface with the help of the connecting flat cable for taking observations. The cable is made of high tensile virtually non-expandable, non-stretch, insulated flat steel tape. The length of the cable is commensurate with the depth up to which the observation is required to be made.

The unit is battery operated complete with an on-off switch, buzzer, LED, flat cable connected to a probe, winding reel and carrying handle. The probe has a diameter of 12.7 mm. The 3 mm long tapered tip of the probe, insulated from the main housing by a teflon spacer, is protected with a threaded metallic cover.

The probe gives sound and light signal when water in the borehole/well makes a contact with the tip.

The moisture resistant electronics and standard 9 V PP-3 size battery are housed in a hub on the cable reel. The hub can be easily removed to replace the battery or check the electronics without disassembling the entire cable reel.

The EPP-10/6 is standardised in tape lengths of 30, 50 and 100 m, with resolution of 1 mm. The unit is available in tape lengths upto 300 m.

Model #	Tape length	Net wt.
EPP-10/6-30	30 m	3.2 kg
EPP-10/6-50	50 m	3.9 kg
EPP-10/6-100	100 m	4.8 kg

EPP-10/7 Brass hexagonal head pipe cap

The brass hexagonal head pipe cap is fixed to the top of the PVC tube at the top.

EPP-10/8 Pipe cap (50 mm nominal bore)

This provides a cover to the porous tube piezometer assembly. A locking arrangement is provided.

EPP-10/9 Threaded steel pipe (50 mm nominal bore)

The threaded steel pipe is grouted in concrete and along with the pipe cap protects the complete porous tube piezometer assembly.

EPP-10/10 Male connector

The male connector has a male thread and is fixed at the top of the PVC tube such that EPP-10/7 can be screwed on to it.

All specifications are subject to change without prior notice.

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