RITE GEOSYSTEMS

ENCARDIO RITE
METASENSING FOR MEGA STRUCTURES

DATA SHEET

POROUS TUBE PIEZOMETER

MODEL EPP-10

INTRODUCTION

Monitoring of ground water table has assumed great significance in view of depleting ground water reserves. The basic measurement of ground water level can be done by installing Porous tube piezometers.

FEATURES

- Reliable, accurate and simple to read, with audio and visual signals.
- 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.
- Monitoring 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.
- Tape locking arrangement provided.

APPLICATION

- 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 phreactic line.
- Hydrological investigation, construction control, stability investigation and monitoring of earth dams, foundations, shallow underground works and surface excavations.
- Ideal for simple ground water level monitoring.

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 its variations with time. Piezometer are also extensively used to monitor variations in pore pressure. 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.

DESCRIPTION

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 especially 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 on next page gives typical assembly and installation layout of the porous tube piezometer.

DESCRIPTION OF EQUIPMENT

EPP-10/1 Porous tube

The EPP-10/1 piezometer tip is a porous carborundum or alundum tube of annular cross-section, 37 mm outer dia, 25 mm i.d. with 6 mm wall thickness available in 20, 40 and 60 cm lengths covered with geo-textile material. For 40 cm length two porous tubes and for 60 cm length three porous tubes of 20 cm length are coupled together to form a 40/60 cm long piezometer tip. The length of the porous tube and the sand backfill (see figure on next page) 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

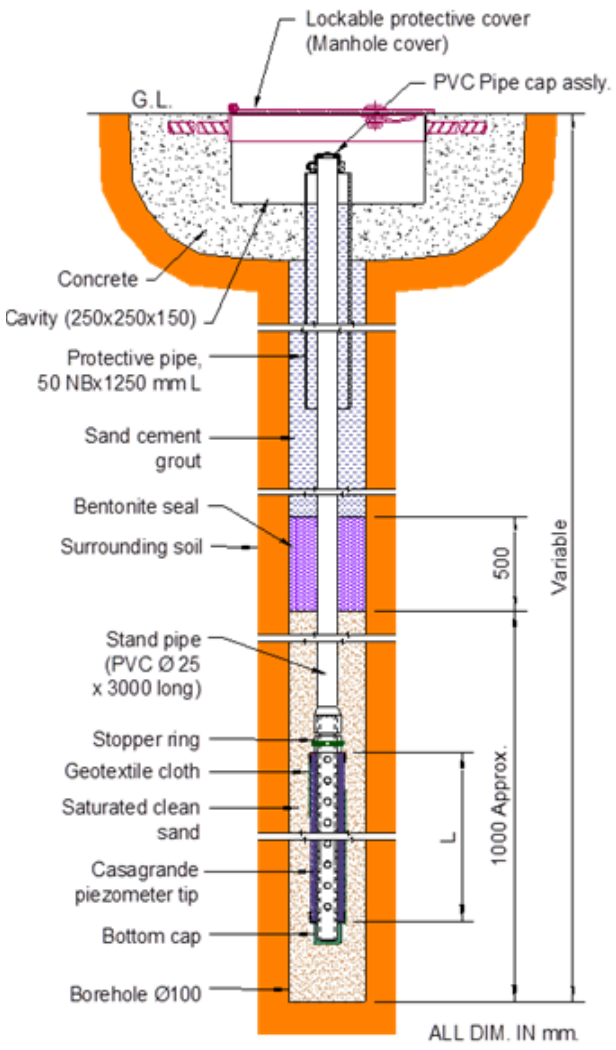
The bottom end of the porous tube is sealed with a built in suitable rubber plug.

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.

EPP-10/4 Standpipe

Durable rigid PVC tubing having an outside diameter of 25 mm and a wall thickness of 1.50 mm in maximum 3 meters of available lengths is provided, however for longer lengths tubes can be coupled together. 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 is used for jointing lengths of PVC tubing.

EPP-10/6 Water level sounder

The model EPP-10/6 water level sounder is designed to measure the elevation of ground water in boreholes, stand pipes and wells. It is robust, light weight and convenient to use. The water level sounder probe is lowered from the surface with the help of the connecting flat cable for taking observations. The cable is made up of high tensile virtually non-expandable, non-stretch, PE insulated flat steel tape 10 mm wide x 2 mm thick. The length of the cable is commensurate with the depth up to which the observation is required to be made.

The tape has 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. The permanent marking on tape is available in meter with a resolution of 1 mm or feet with a resolution of 0.1". The unit is battery operated complete with an on-off switch, buzzer, LED for power on and signal, flat cable connected to a probe, winding reel and carrying handle.

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.

EPP-10/7 Pipe cap assembly

The pipe cap assembly is fixed to the top of the PVC tube at the top.

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

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

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

The protective GI pipe 50NB x 1250 L is grouted in concrete and the top cap protects the complete porous tube piezometer assembly.

EPP10/10 Lockable protective manhole cover

A MS lockable protective manhole cover is provided with the system to protect the installation from moving vehicles and other damages at site.

ORDERING CODE:

EPP-10/6-L-X [L= length, X = unit (m or ft)]

SPECIFICATIONS

EPP-10 Porous Tube	
Porous tip (L)	Casagrande tip, 37 mm o.d., 25 mm i.d., 20, 40, 60 cm long covered with geo-textile
Standpipe	25 mm o.d., with wall thickness 1.5 mm PVC pipe in suitable length
EPP-10/6 Water level sounder	
Length 'L' (m)	30, 50, 100, 150, 200, 300
Resolution	1 mm standard
Length 'L'(ft)	50, 100, 150, 300, 500
Resolution	0.1" standard
Cable/Tape	1High tensile virtually non-expand-able, non-stretch, PE insulated flat steel tape
Tape/Cable Size	10 mm wide x 2 mm thick
Probe	Stainless steel 12.7 mm dia.
Power Supply	9 V PP-3 size battery
Audio Signal	Sound buzzer
Visual Signal	Green LED light signal

Model EPP-10 porous tube & EPP-10/6 water level sounder is available with above specifications.