

## Applications

The measurement of water levels in soil or rock, including:

- Construction control and stability monitoring of embankments, dams and reservoirs.
- Stability investigations of natural and cut slopes.
- Control of de-watering and drainage operations.
- Hydrological investigations and water supply.
- Pollution and environmental studies.
- Construction control of shallow underground works.
- Permeability measurements.

### Operating Principle

A standpipe tube with a porous piezometer tip connected at its lower end is installed in a borehole. Alternative types may be driven or pushed into soft soil, and different tip designs are available to suit various types of ground.

# Standpipe Piezometer

For borehole installations, bentonite and grout are used to seal the borehole above the tip. Groundwater can enter the tube only via the tip. Depth to the water level is measured with a water level meter. The water pressure corresponds to the height of the water surface in the standpipe above the piezometer tip. A bourdon pressure gauge connected to the top of the standpipe will be required to measure artesian heads.

### Advantages and Limitations

- Ideal piezometer to ascertain the piezometric level during routine site investigation.
- Simple low cost system.
- In favourable circumstances standpipes can be installed and head readings taken in boreholes to depths in excess of 200m, with effective and accurate installation of the filter and backfill grout.

- Drive-in piezometers can be installed to depths in excess of 10m in soft soils (shear strength less than 20 kPa).
- Response to head variations is comparatively slow, generally used for long term readings in high permeability ground (greater than approximately  $10^{-6}$  m/s).
- Water Level Meter readings are feasible only in near-vertical downward installations; other inclinations are feasible using a Bourdon gauge readout.
- Standpipes may be undesirable in construction areas due to their vulnerability to damage from construction traffic.
- Semi-rigid standpipe tubing may kink or break in zones of extreme ground movement for example land slips.



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**DATA SHEET  
W1**

# Specification

## W1-1 Piezometer Tips

**W1-1.1 and 1.2 Casagrande Ceramic Piezometer Tip** comprising cylindrical element with rigid plastic end fittings, fitted with plastic connector to fit PVC standpipe tube. Coarse ceramic element 300mm long x 50mm diameter (W1-1.1) 150mm long x 50mm diameter (W1-1.2) overall diameter 54mm, pore diameter 60 micron, permeability  $3 \times 10^{-4}$  m/s (low air entry). For installation using appropriate standpipe, in boreholes in saturated soils and rocks.

**W1-1.3 Casagrande Porous Plastic Piezometer Tip** comprising cylindrical element protected by perforated rigid plastic tube with rigid plastic end fittings to fit PVC standpipe tube. Porous plastic element 19mm diameter, standard length 300mm (non standard lengths up to 3m), overall diameter 32mm, pore diameter 60 micron, permeability  $3 \times 10^{-4}$  m/s (low air entry). For installation, using appropriate standpipe, in boreholes in saturated soils and rocks.

**W1-1.5 and 1.6 Casagrande Drive-In Piezometer Tip** comprising cylindrical porous plastic element protected by a perforated galvanised mild steel pipe with plated mild steel end cone and with coupling to fit galvanised mild steel standpipe tubing as tabulated. Porous plastic element 19mm diameter, length 300mm. Overall diameter 43mm, pore diameter 60 micron, permeability  $3 \times 10^{-4}$  m/s (low air entry). Installed with the steel standpipe by driving into soft saturated soils.

## W1-2 Standpipe Tubing and Tube Fittings

**W1-2.1 Heavy Gauge Rigid PVC Standpipe Tubing** 19mm i.d., 26mm o.d., threaded, supplied in 3 metre lengths with one threaded coupling per length.

**W1-2.2 Coupling**, threaded-threaded, to fit tubing 2.1.

**W1-2.3 Coupling**, plain-threaded, to fit tubing 2.1

**W1-2.4 End Cap**, to fit plain PVC tubing 2.1.

**W1-2.5 End Cap**, to fit threaded PVC tubing 2.1.

**W6-4.1 PVC Cement**, ¼ litre.

**W1-2.7 and 2.8 Galvanised Mild Steel Standpipe Tubing**, 25mm i.d., 35mm o.d., for 2.7 and 19mm i.d., 26mm o.d., for 2.8, threaded, supplied in 1 metre lengths with one threaded coupling per length.

**W1-2.9 Coupling**, steel, threaded to fit tubing 2.7.

**W1-2.10 Coupling**, steel, threaded, to fit tubing 2.8.

**W1-2.11 End Cap**, steel, to fit tubing 2.7.

**W1-2.12 End Cap**, steel, to fit tubing 2.8.

**W1-2.13 Protective Cover**, 50mm nom.bore, 500mm long galvanised mild steel tube with screw cap to protect piezometer standpipes.

**W1-2.14 Protective Cover**, 50mm nom.bore, 500mm long galvanised mild steel tube with plain cap, bolt and padlock to protect piezometer standpipes.

## W1-3 Installation Accessories

**W1-3.1 Punner** comprising horseshoe shaped plate with connector for tubing 3.4 for compacting bentonite and sand filter material in boreholes up to 200mm diameter. Max o.d. of punner 115mm.

**W1-3.4 Galvanised Mild Steel Tubing**, 19mm i.d., threaded, supplied in 3 metre lengths with one threaded coupling per length, to suit punner 3.1.

**W1-3.5 Jar Plate** for connecting to steel standpipes when using driving monkey to install drive-in piezometers whilst protecting inner thread. 3.5.1 for tubing 2.8. 3.5.2 for tubing 2.7

**W1-3.6 Driving Monkey** for installing drive-in piezometers 1.5 to 1.8 inclusive, comprising 25kg steel weight, 25cm long, with four lifting handles.

**W1-3.7 Bentonite Pellets**, to drop through water and swell forming a borehole plug. Supplied in 25kg sealed waterproof bags, one bag sufficient to form eight plugs 0.3 to 0.4m long in 150mm diameter boreholes.

## W1-5 Spare and Accessories

**W1-5.5 Bourdon Gauge Connecting Kit** for reading artesian pressures in piezometer standpipes, comprising threaded cap, brass quick release socket and dust cap to connect to Bourdon Gauge. 5.5.1 for tubes 2.3 and 2.8. 5.5.2 for tubes 2.7.

**W1-5.7 Bourdon Gauge** complete with brass quick release plug and dust cap for fitting to bourdon gauge connecting kits 5.5.1 and 5.5.2. Accuracy  $\pm 1\%$ . Pressure range 0 to 20m water.

