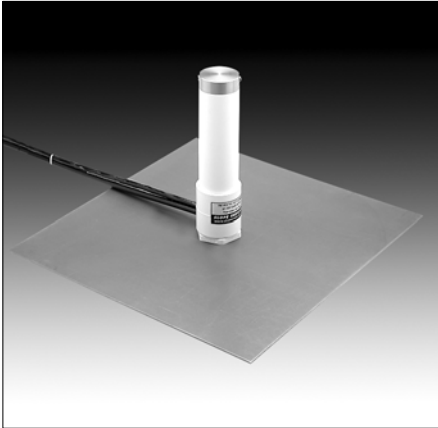
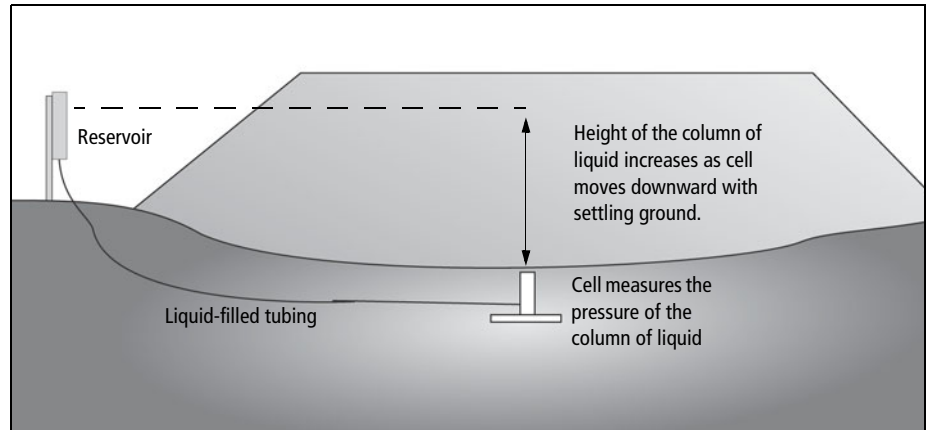


# VW Settlement Cells



Vented VW settlement cell with settlement plate.



Settlement cells provide settlement measurements with no interference to construction activities.

## Applications

VW settlement cells are used to monitor settlements in soil. Typical applications include:

- Monitoring settlement in fills.
- Monitoring settlement due to dewatering or preloading.
- Monitoring settlement or heave in embankments.
- Monitoring subsidence due to tunneling.
- Monitoring consolidation of soil under storage tanks.



Non-Vented VW Settlement Cell

## Operation

The main components of a VW settlement cell are a reservoir, liquid-filled tubing, and a pressure transducer.

The reservoir is located on stable ground, away from the construction area. The liquid-filled tubing runs from the reservoir down to the pressure transducer, which is embedded in fill or installed in a borehole.

The transducer measures the pressure created by the column of liquid in the tubing. As the transducer settles with the surrounding ground, the height of the column is increased and the transducer measures higher pressure.

Settlements are calculated by converting the change in pressure to millimeters or inches of liquid head.

## Advantages

**Remote Readout:** The reservoir and readout station can be located away from the construction area. The cell and tubing are buried and do not interfere with construction activities.

**Three Ranges:** Use the 22 psi vented settlement cell to monitor smaller settlements with greater precision. Use the 50 and 100 psi non-vented cells to monitor larger settlements.

**Manual or Automated Monitoring:** The VW settlement cell can be read manually with a portable indicator, or automatically with a data logger.

## SYSTEM CONFIGURATION

**Vented Settlement Cells:** Components include the vented cell, settlement plate, vented signal cable, tubing, reservoir, desiccant chamber, non-vented signal cable, and readout or datalogger.

**Non-Vented Cells:** Components include the non-vented cell, settlement plate, tubing, signal cable, reservoir, readout or data logger, and a barometer.

**Tubing and Signal Cable:** Tubing and signal cable run from the buried cell to the reservoir at the surface. Lateral runs up to 300 m (1000') are possible if tubing is buried to minimize temperature changes and deviations from the upward slope of the tubing are kept very small.

**Reservoir:** The small reservoir is suitable for single-cell installation. Its liquid level must be maintained regularly. A constant level reservoir is available for long-term, unattended monitoring. Both types of reservoir should be protected from the direct heat of the sun.

**Desiccant Chamber:** Required for vented cells only. Prevents moisture from entering cable and vent tubing.

**Barometer:** Required for non-vented cells only. Non-vented settlement cells are sensitive to atmospheric pressure, which can vary as much as 0.5 psi during the course of a day. This is equivalent to 350 mm or 14" of water head. Barometer readings are required to correct settlement readings for changes in atmospheric pressure. Barometer readings must be obtained on site at the same time as the settlement reading. Barometer readings from weather radios and airports are not adequate for this purpose. If your system will be read manually, order the field barometer. If your system is automated, order the barometer for data loggers. It has an accuracy better than  $\pm 20$  mm ( $\pm 0.8$  inches) of water head at temperatures from  $-25$  to  $50$  °C.

**Readouts:** The VW Data Recorder is recommended for manual readings. The CR10 data logger or VW MiniLogger can be used for automated readings. See separate data sheets for features and specifications.

**Performance Specifications:** Range is the maximum vertical distance between the buried cell and the reservoir. Resolution is based on readings obtained with a VW Data Recorder. Calibration accuracy is determined during calibration. Repeatability depends on proper installation of cell, tubing, and reservoir, maintenance of deaired fluid, and application of any appropriate corrections.

## VENTED VW SETTLEMENT CELL

**Vented VW Settlement Cell . . . . . 52612420**

**Sensor Type:** Vented vibrating wire sensor with built-in thermistor or RTD. Sensor automatically compensates for changes in barometric pressure.

**Range:** 14 m (47').

**Resolution:** 0.025% FS.

**Calibration Accuracy:**  $\pm 0.1\%$  FS.

**Repeatability:**  $\pm 0.25\%$  FS to  $\pm 1\%$  FS.

**Dimensions:** 64 x 280 mm (2.5 x 11")

**Materials:** Stainless steel and PVC plastic.

## SETTLEMENT PLATE

**Settlement Plate . . . . . 51410100**

460 x 460 mm (18 x 18") steel plate helps maintain required upright orientation of cell.

## TUBING AND SIGNAL CABLE

**Tubing . . . . . 51416950**

Twin 1/4-inch tubes inside polyethylene jacket. Tubes are filled with de-aired liquid and terminated with quick-connect sockets for connection to reservoir. Specify length.

**Vented Signal Cable . . . . . 50614410**

Shielded cable with four 22-gauge tinned-copper conductors, 0.25" vent tube, and polyurethane jacket. For use between cell and desiccant chamber. Specify length.

**Splice Kit for Vented Cable . . . . . 50614415**

Contains components required to splice five conductors and vent tube.

**Non-Vented Signal Cable . . . . . 50613524**

Shielded cable with four 22-gauge tinned-copper conductors for use between desiccant chamber and readout or data logger. Specify length.

## DESICCANT CHAMBER

**Desiccant Chamber . . . . . 52612495**

Prevents moisture from entering cable and vent tubing. Desiccant can be renewed in an oven. For one cell. 108 x 108 x 64 mm (4.25 x 4.25 x 2.5").

**Extra Desiccant Pack . . . . . 02540003**

Anhydrous calcium sulfate in moisture proof container. Sufficient for one chamber.

## RESERVOIR

**Small Reservoir . . . . . 51419500**

Accommodates one settlement cell. Includes mounting hardware, two quick-connect plugs, and small bottle of de-aired liquid.

## NON-VENTED SETTLEMENT CELLS

**50 psi VW Settlement Cell . . . . . 52612020**

**100 psi VW Settlement Cell . . . . . 52612030**

**Sensor Type:** Non-vented vibrating wire sensor with built-in thermistor or RTD. Barometer readings are required to compensate for changes in barometric pressure.

**Range:** 33 m (108') with 50 psi cell; 66 m (216') with 100 psi cell.

**Resolution:** 0.025% FS.

**Calibration Accuracy:**  $\pm 0.1\%$  FS.

**Repeatability:**  $\pm 0.25\%$  FS to  $\pm 1\%$  FS.

**Dimensions:** 64 x 179 mm (2.5 x 7").

**Materials:** Stainless steel.

## SETTLEMENT PLATE

**Settlement Plate . . . . . 52630512**

229 x 229 mm (9 x 9") steel plate, used in fills.

## TUBING AND SIGNAL CABLE

**Tubing . . . . . 51416950**

Twin 1/4-inch tubes inside polyethylene jacket. Tubes are filled with de-aired liquid and terminated with quick-connect sockets for connection to reservoir. Specify length.

**Non-Vented Signal Cable . . . . . 50613524**

Shielded cable with four 22-gauge tinned-copper conductors and polyurethane jacket. Does not include connector. Specify length.

## RESERVOIR

**Small Reservoir . . . . . 51419500**

Accommodates one settlement cell. Includes mounting hardware, two quick-connect plugs, and small bottle of de-aired liquid.

## BAROMETERS

**Field Barometer . . . . . 52612070**

**Barometer for Datalogger . . . . . 52612080**

## INSTALLATION ACCESSORIES

**De-Aired Liquid . . . . . 51419552**

One quart of ethylene glycol-water 50% mixture for maintaining fluid level in reservoir. Mixture has a relative density of 1.065.

**Constant-Level Reservoir . . . . . 92630550**

**Connection Manifold . . . . . 92630552**

The constant-level reservoir consists of a vented reference tank, a supply tank, an overflow pump, and a connection manifold. Pump uses AC power. Manifold connects eight cells to the reservoir. Supplied in two weatherproof enclosures 460 x 510 x 254 mm (18 x 20 x 10").