

# Earth Pressure Cell

## Applications

Earth Pressure Cells provide a direct means of measuring total pressures, i.e. the combination of effective soil stress and pore water pressure, in or on...

- Bridge abutments
- Fills and embankments
- Retaining wall surfaces
- Sheet piling

They may also be used to measure earth bearing pressures on foundation slabs and footings and at the tips of piles.



• The Model 4815 Earth Pressure Cell.

## Operating Principle

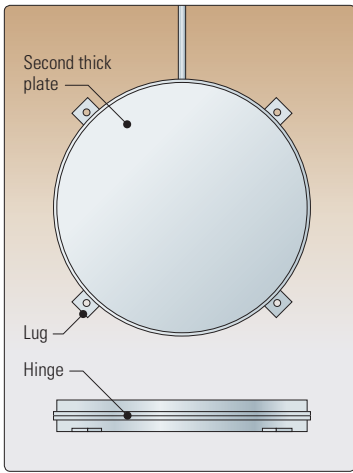
Earth Pressure Cells are constructed from two stainless steel plates welded together around their periphery and separated by a narrow gap filled with hydraulic fluid. External pressures squeeze the two plates together creating an equal pressure in the internal fluid. A length of stainless steel tubing connects the fluid filled cavity to a pressure transducer that converts the fluid pressure into an electrical signal transmitted by cable to the readout location.

The Model 4815 Earth Pressure Cell effectively reduces the severity of point loading when used in granular materials and uses two thick plates welded together at a flexible hinge that helps provide more uniform pressure distribution.

## Advantages & Limitations

The 4815 Earth Pressure Cells use vibrating wire pressure transducers and thus have the advantages of long term stability, reliable performance with long cables and insensitivity to moisture intrusion. The Model 4815 includes a thermistor for temperature measurements and a gas discharge tube for lightning protection.

Typical of all closed hydraulic systems, earth pressure cells are sensitive to temperature changes which cause the internal fluid to expand at a different rate than the surrounding soil giving rise to spurious fluid pressure changes. The magnitude of the effect depends to a greater extent on the elasticity of the surrounding soil, i.e., on the degree of compaction and confinement, and is difficult to predict and correct for. The built-in thermistor is helpful in separating these spurious effects from real earth pressure changes.



- Model 4815 pressure cell, with two thick plates, for use in granular materials.

## Technical Specifications

Transducer Type	Vibrating Wire
Output	2000-3000 Hz
Standard Ranges <sup>1</sup>	350, 700 kPa; 1, 2, 3, 5 MPa
Over Range	150% F.S. (max)
Resolution	±0.025% F.S.
Accuracy <sup>2</sup>	±0.1% F.S.
Linearity	< 0.5% F.S.
Thermal Effect on Zero	< 0.05% F.S.
Typical Long-Term Drift	< 0.02% F.S./yr
Cell Dimensions <sup>3</sup> (H × D)	26 × 230 mm
Transducer Dimensions (L × D)	150 × 25 mm
Excitation Voltage	2.5-12 V swept square wave
Excitation Frequency	1400-3500 Hz
Material	Stainless Steel
Temperature Range <sup>1</sup>	-20 °C to +80 °C

**Note: PSI = kPa × 0.14503, or MPa × 145.03**

<sup>1</sup>Other ranges available on request.

<sup>2</sup>Stated accuracy is for the pressure transducer alone. The total system accuracy (pressure transducer + pressure cell) is subject to site-specific variables.

<sup>3</sup>Other sizes available on request.