DATASHEET

JACKOUT PRESSURE CELL

MODEL EPS-30V-J-Φ

INTRODUCTION

Total stress measurement in soil can be categorized as follows:

- Measurement within a soil mass
- Measurement at the face of a structural element

Encardio-rite model EPS-30V-J-Φ jack-out pressure cell falls in the latter category. The name of cell is derived from the use of hydraulic jack during installation by activating it to keep the cell in position while the concrete is poured in. The pressure cell is used for monitoring changes in stress base slabs and diaphragm/slurry walls etc. The pressure cell is extensively used:

- Where concrete is cast directly against soil, i.e. cast in place structures
- As a safety measure to monitor earth pressure in excess of designed limits
- For verification of design assumptions and to provide data and information for safer and more economical future designs

Model EPS-30V-J jack-out pressure cell is designed to measure the total stress i.e. the effective stress due to the soil together with the pore water pressure in the voids between soil grains. It is suitable for measuring static or slowly varying stresses only. It is a robust sensor designed to effectively function under condition of rough handling and concreting.

FEATURES

- Accurate, robust and easy to install.
- Long term stability with high reliability.
- Low volumetric displacement.
- Fluid filled for high rigidity, accurate and fast response.
- All stainless steel construction.
- Remote digital readout and data logging available.

DESCRIPTION

The jack-out total pressure cell basically consists of a circular flat capsule, connected to a specially designed pressure sensor by electron beam welding, concentric with the back plate of pressure capsule. The space confining the hydraulic fluid is entirely metal. No 'O' rings are used, the external construction being welded. This helps in increasing the cell stiffness thus materially improving the performance of the cell.

Like any closed hydraulic system, pressure cell is sensitive to temperature effects. Any change in temperature of surrounding concrete can give an unauthentic reading, magnitude of which depends upon elasticity of surrounding concrete and relative coefficient of expansions of materials in contact & filled fluid inside the pressure cell. The sensor has an in-built thermistor to assist in separating these unauthentic temperature effects from actual pressure changes.

Fluid filled pressure capsule

The pressure capsule consists of two stainless steel discs welded around the periphery leaving a narrow space between the two. This narrow gap between plates is filled with fluid using a special process which ensures that all the air is excluded from the fluid.

One of the discs is a thin flexible diaphragm of around 3 mm thickness, which is the active face and is installed flush with the soil. The other disc is a thick rigid plate of around 12 mm thickness, which is the inactive face and is installed on the concrete side through another thick support plate. To prevent uneven stress on the cell, the jack acts on the support plate, rather than directly on the cell.

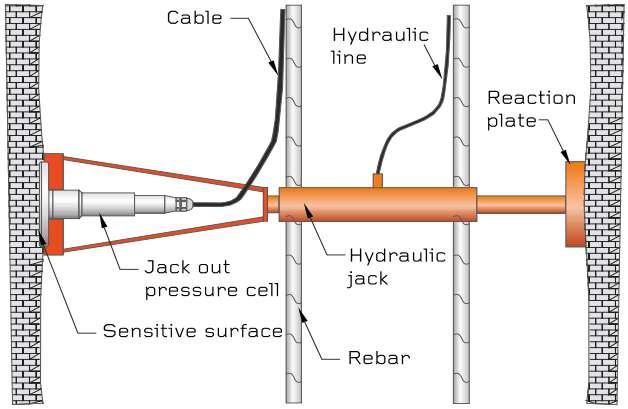
Vibrating wire pressure sensor

The stainless steel pressure sensor incorporates the latest vibrating wire technology and has an inherently high sensitivity. Each pressure sensor is individually temperature compensated to 0.03%/°C.

OPERATING PRINCIPLE

The pressure applied by the earth or concrete acts on the pressure capsule and is transmitted through the fluid to the pressure sensor that converts it into an electrical signal in form of frequency.

The pressure cell basically consists of a magnetic, high tensile strength stretched wire, one end of which is anchored and the other end fixed to a diaphragm which deflects in proportion to the applied pressure. Any deflection of the diaphragm changes the tension of the wire, thus affecting the resonant frequency of vibrating wire.



The frequency output can be accurately measured by any vibrating wire readout unit. The data can also be automatically collected at desired frequency, stored and transmitted to remote server by a suitable datalogger.

Care should be taken to have the sensitive surface of the cell absolutely flush with the soil at the concrete/soil interface. This is achieved by activating a hydraulic jack to keep the cell in position while the concrete is poured in. The hydraulic pressure on the jack is maintained somewhat higher than the stress generated by the freshly poured in concrete at the level at which the jack-out pressure cell is mounted. This will prevent the poured concrete from seeping into the soil and cell interface.

SPECIFICATIONS

Sensor type	Vibrating wire
Range (MPa)	0.5, 1.0, 2.0, 3.5, 5.0, specify
Accuracy of pressure sensor	± 0.5 % fs standard ± 0.1 % fs optional
Temperature limit: Operational	-20° to 80°C
Over range limit	150 % of range
Overall dimension	125 mm Φ x 190 mm height 200 mm Φ x 190 mm height
Thermistor	YSI 44005 or equivalent (3 kOhms at 25°C)
Enclosure	Stainless steel

ORDERING INFORMATION

Model EPS-30V-J-Range-Pressure pad size-Cable housing type (cable ϕ 3.5-8 mm or 9-14 mm)

**All specifications are subject to change without prior notice*

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