SQUID: Shaft Quantitative Inspection Device

Assesses cleanliness and competency of the bottom of drilled shaft or bored piles.

Pile Dynamics, Inc.

SQUID performs a quantitative assessment of the bottom surface. It measures both the thickness of soft material or debris that might be covering the bearing strata and the strength of the bearing layer. It outputs strength versus penetration in numerical and graphical form.

An important part of bored pile construction is the cleaning and inspection of the bottom of the hole prior to the placement of reinforcement and concrete. To achieve cleaning once drilling is complete, a cleanout bucket is typically used to remove any material unsuitable for end bearing support. Bottom inspection is then performed, often by lowering a camera down the bore hole, a procedure that gives a rough idea of the thickness of any debris left at the bottom. SQUID provides an alternative, more accurate inspection process; it takes accurate displacement and penetrometer measurements, providing an objective, quantitative assessment.

Standard Features:

- SQUID Body includes quick attachment adaptors for different sized drill stem or Kelly bars
- Three independent displacement versus pressure (from cone penetrometers) measurements
- SQUID Tablet receives data wirelessly

Insertion of SQUID by drill rig into the bore hole

SQUID attached to Kelly bar, ready for test

The SQUID Measures:

- Independent displacement of three penetrometers into the soil layer. The displacement measurement begins with the first encounter of the layer.
- Thickness of the debris layer at various locations along the borehole bottom.
- Bearing pressure of three independent standard size (10 cm^2) cone penetrometers.

Quality Assurance for Deep Foundations

Specifications

SQUID Tablet

- Size: 320 x 250 x 68 mm (12.6 x 9.8 x 2.7 in)
- Weight: 5 Kg (11 lbs)
- Temperature Range: 0 to 40°C operating; -20 to 65°C storage
- Display: 26.4 cm (10.4 in), sunlight readable, resolution 1024 x 768; capacitive touch screen
- Video Outputs: HDMI, VGA
- Battery Power: 4 hour continuous data collection 12 V battery + back-up battery standard
- Charging Time: 6 Hours max; 120/240 charger input voltage
- Operating System: Microsoft Windows® 7
- Data storage and ports: 60 GB SSD internal drive; Ethernet port; 4 USB ports
- Optional External Accessories: USB keyboard and mouse
- Remote Operation: SQUID Tablet is equipped for high speed internet access and remote operation
- Technical Support: SQUID Tablet is equipped for remote error checking and updating
- Units of Operation: Traditional US, SI, or Metric
- Full one year warranty on parts and labor

SQUID Penetrometers

- Material: Stainless Steel
- Number of Penetrometers: 3 standard
- Penetrometer Tip: area 10 cm² (1.55 in²) standard, larger tips optional; replaceable
- Maximum Penetrometer Pressure: 100 MPa (14 ksi/2000 ksf)
- Penetrometer Pressure Measurement Resolution: 0.1 MPa (14 psi/2 ksf)
- Maximum Depth of Penetration: 150 mm (6 in)

Wireless Transmitter

- Transmission Range: 100 m
- Frequency: 2.4 GHz
- Output Power: 18 dBm
- Mounting: On cable reel
- Temperature Range: -10 to 55°C operating; -20 to 70°C storage

SQUID Contact Plate(s)

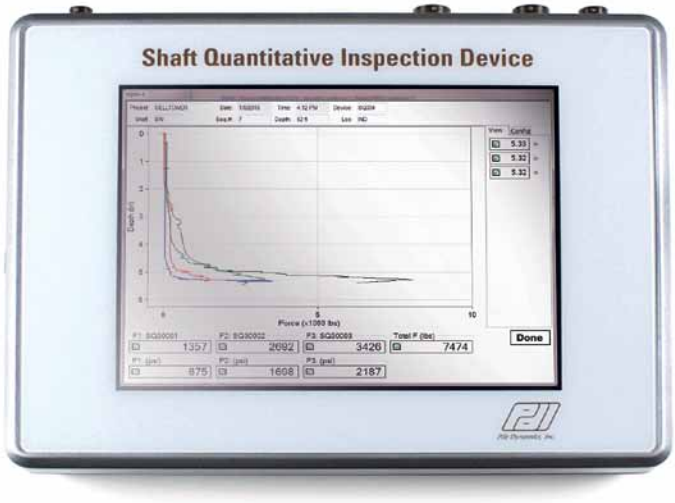
- Size: 152 mm (6 in) OD; 46 mm (1.8 in) ID; thickness 25.4 mm (1 in)
- Each Contact Plate Assembly Weight: in air 6.75 kg (14.9 lbs); in water: 5.85 kg (12.9 lbs)
- Contact Plate Pressure (free to move): in air 4 kPa (0.58 psi/0.083 ksf); in water 3.5 kPa (0.50 psi/0.072 ksf)
- Contact Plate Displacement Measurement Resolution: 0.004 mm (0.0002")
- Maximum Contact Plate Movement: 150 mm (6 in)

SQUID Body

- Size (height x hexagon largest diagonal): 629 x 647 mm (24.75 x 25.5 inches)
- Weight: 188 kg (415 lbs) *(including penetrometers and contact plates)*
- Material: Stainless Steel and Aluminum
- Standard Kelly Bar Connector Sizes: 101.6 mm² (4 in²), 152.4 mm² (6 in²), 203.2 mm² (8 in²)
- Cable Length: 61 m (200 ft) standard; 152m (500ft) cable length optional
- Temperature Range: -20 to 55°C operating; -40 to +85°C Storage
- Applied Force Limit: 135 kN (30 kips)

SQUID does not require testing personnel to work near the excavation. The attachment to the end of the drill stem or Kelly bar is a relatively quick and safe procedure which can be easily done by site personnel. The drill rig lowers the SQUID to the bottom of the drilled hole. Once encountering resistance, the contact plates remain on top of the debris layer, while the SQUID penetrometers move through this layer and then into the bearing material. With the drill rig providing a downward force it is possible to measure, within certain limits, the maximum soil strength and compare that value with design assumptions. At the same time the displacement of the penetrometer cone tip relative to each contact plate position on top of the debris layer is monitored.

The signals of the three displacements and the three penetrometer cone pressures are digitally processed and wirelessly sent to the SQUID Tablet. The inspector, engineer or contractor can then make an immediate decision as to the borehole acceptance, additional clean-out requirement or additional drilling. The decision makers may be at a safe location on site or connected via internet to the SQUID Tablet, in their office.



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