



FACT SHEET

**Pagani
TG63-150
TG73-200**

**Static and dynamic
Penetrometer Testing**

More cost effective CPT_u,
S-CPT_u, SPT and DPSH testing
in the most challenging locations

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A configuration for any situation

The GeoGroup Pagani CPTu and S-CPTu testing machines enable **STATIC** and **DYNAMIC PENETROMETRIC TESTS** to be conducted more cost effectively and in previously inaccessible environments.

The Pangani TG73-200

The TG73-200 offers **STATIC** and **DYNAMIC PENETROMETRIC TESTS** in a **SINGLE HEAVY-DUTY RIG**. It can be configured to perform CPTu, S-CPTu, SPT and DPSH tests.

This machine is fitted with a **ROTARY HEAD** which makes it possible to overcome particularly hard layers by auguring. This enables static and dynamic tests to gather information through hard layers at which traditional CPTu machines would refuse. On reaching a hard layer with the GeoGroup Pagani equipment, the CPTu head is removed, switched for a low speed rotary head and the hard layer is augured and cased to a maximum depth of 20m or until the auger reaches refusal. After auguring through the hard layer, the head is switched back again and the same equipment continues with the testing.



This UNIQUE CAPABILITY reduces costs and time taken on site. No machine is left standing while another is working, because no swapping of equipment is required to advance through hard layers.

STATIC & DYNAMIC PENETROMETER TESTING IN ANY SITUATION

The Pangani TG63-150

The TG63-150 offers a smaller, easily transportable, more manoeuvrable STATIC CPTu testing rig for easy testing in difficult access locations. The TG63-150 can be configured to perform CPTu & S-CPTu tests

The EASE OF ACCESS and SIMPLICITY OF USE offered by the Pagani CPTu machines make extracting static and dynamic test data possible from environments which would previously have been too expensive to test. This combined with the ability to drill through hard layers with the same machine make the time and hence cost savings exponential.



Features

- An automatic telescopic anchoring system which allows for a drastic reduction in positioning and anchoring times and enables the anchoring of the machine even in the most challenging soils.
- Simple handling by a single operator.
- A rubber, hydraulic tracked, carriage which offers excellent manoeuvrability, even on the worst terrain.
- Three stabilisers and a reclinable mast, which ensure that the machines can operate even on very steep slopes, always keeping the penetration and anchoring axis in an exact vertical position.
- Ability to take soil samples
- Fully automated state of the art data acquisition unit lowest total project cost possible.



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Both the Pagani TG63-150 and the Pagani TG73-200 can easily be configured for static tests using a mechanical cone (CPTm) or a piezocone probe (CPTu), which can also be combined with a seismic cone (S-CPTu) to give a better understanding of the soil and sub-soil.

Dynamic Penetration Tests

Dynamic Penetration testing is used to measure the strength of in-situ soil and the thickness and location of subsurface soil layers by measuring resistance to penetration. The test is conducted by driving a conical tip into the ground by a standard amount of force from a hammer then, using the distance that the cone moves with each blow, working out the soil density and properties at that level.

Specifications

	Hammer	Fall Height	Rods	Cone	
DPSH	63.5kg (140 pound)	750 mm (29.5 inch)	Diameter 32 mm (1.26 inch)	20 cm ² 3.2 inch ²	90°



STATIC & DYNAMIC PENETROMETER TESTING IN ANY SITUATION

CPT Tests

Static penetration testing (mechanical type) consists of measuring the resistance of the mechanical bit, as it is driven into the ground. The electric cone simultaneously records measurements for cone resistance and sleeve friction at a continuous rate of penetration.

Testing with the Begemann mechanical bit, produces these values:

- Qc (tip resistance)
- Fs (skin friction)
- Qt (total resistance)

The values are measured via a load cell, test results are then shown on the display screen of the electronic acquisition board.

CPT Test Specifications

 <p>TG63 - 150</p>	<p>Maximum thrust capacity (kN) - (pounds)</p>	150 - 33721
	<p>Maximum extraction capacity (kN) - (pounds)</p>	160 - 35969
	<p>Test speed (cm/s) - (foot/s)</p>	2 – 0.065
	<p>Selector for CPTm tests with load cell and electronic board for manual data acquisition. Maximum thrust readable from the load cell (kN) - (pounds)</p>	150 - 33721
 <p>TG73 - 200</p>	<p>Maximum thrust capacity (kN) - (pounds)</p>	200 - 44961
	<p>Maximum extraction capacity (kN) - (pounds)</p>	250 - 56202
	<p>Test speed (cm/s) - (foot/s)</p>	2 – 0.065
	<p>Selector for CPTm tests with load cell and electronic board for manual data acquisition. Maximum thrust readable from the load cell (kN) - (pounds)</p>	200 - 55961



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CPTu Tests

Use of a piezocone with a pore water pressure sensor enables the determination of hydraulic soil properties (such as hydraulic conductivity–permeability) in addition to standard CPT parameters, which further aids in the identification of soil type and soil stratification. In addition the GeoGroup piezocones can take a temperature reading while probing.

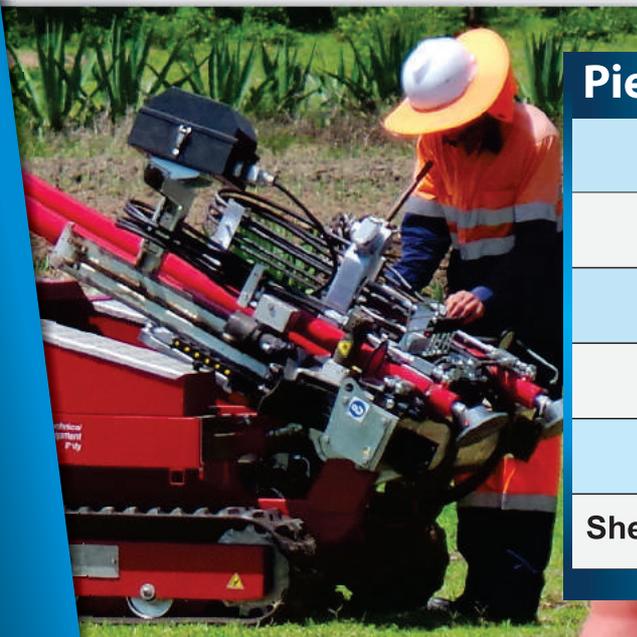
The GeoGroup Piezocone allows the acquisition of Q_c (tip resistance), F_s (skin friction), u_2 (pore pressure), tilt, driving speed and temperature data at each centimetre depth during the continuous driving, compared to at each 20cm depth that can be obtained with the mechanical cone (Begemann).

S-CPTu Tests

Using the seismic piezocone, tests are able to obtain the standard CPTu test data (Q_c , F_s , u_2 parameters) and also the shear and vertical wave propagation velocity which are used to help determine the elastic properties of the soil medium.

Electronic Piezocone Specifications

- Four fully calibrated 10 cm² electronic piezocones. Pore water pressure can be measured by using a solid slot filter, best suited for unsaturated conditions, or using a porous copper filter for the most accurate response in saturated soils.
- One downhole S-CPTu module capable of measuring shear wave velocity



Piezocone Technical Specifications

Cone resistance (Q_c)	Up to 50 MPa
Sleeve resistance (F_s)	Up to 1600 kPa
Pore water (U_2)	Up to 2500 kPa
Tilt (°)	Up to 20°
Temperature (°)	Up to 100°C
Shear wave velocity (m/s)	3 axis accelerometer

STATIC & DYNAMIC PENETROMETER TESTING IN ANY SITUATION

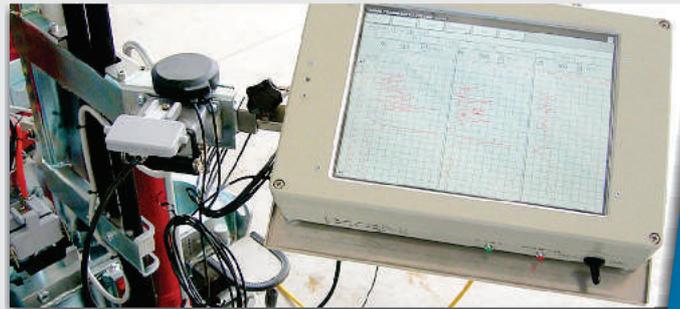
Data Acquisition:

The digital acquisition system allows operators to perform CPTu & S-CPTu tests simply and quickly without the assistance of a computer in the field.

The TGAS08 digital acquisition system is a ruggedised, windows-based computer acquisition unit system which is resistant to rain, high and low temperatures and offers excellent screen visibility even in direct sunlight.

It comprises of:

- Computer
- Depth encoder
- GPS Antenna
- CPTUACQ Software



The TGAS08 is equipped with a GPS location module to obtain positioning information and a GPRS module for sending test results directly to a computer located anywhere via a simple email. If there is no GSM network coverage, data can be downloaded directly on to a standard USB stick.

Real-time display of acquired data (Qc, Qt, Fs, u, uo, u-uo, speed, tilt and depth) means that all tests can be easily monitored and managed either in the field or at a GPRS connected computer located anywhere.

Data Processing

To prepare the measured data for subsequent interpretation and analysis it needs to be post processed.

Summary of the CPTu data processing workflow:

1. Raw measured data generated during a test is transferred from the data acquisition computer via USB or GPRS transfer.
2. The data file is then post-processed using CPTU-ACQ software to give the tip resistance, skin friction and depth resistance, the RP / RL ratio (Begemann ratio 1965) and the RP / RL ratio (Schmertmann ratio 1978-FR%) as well as positioning, date and other relevant test metadata. This data can be printed or exported in a customised format as ASCII, EXCEL, PDF and DXF files.
3. The data file generated by the CPTU-ACQ software can be imported into commercially available software for interpretation e.g. CPeT-IT, Novo CPT etc.



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The GeoGroup



GeoGroup comprises of a group of companies, each a leader in it's own field, providing a range of services to the geotechnical, civil, mining and energy industries.

Data Interpretation

Geomechanics uses Geologismiki's CPeT-IT code to interpret CPTu data.

Based on our research CPET-IT is the best commercially available CPTu interpretation software on the market. The software takes the CPTu data and performs basic interpretation in terms of soil behaviour type (SBT) and various geotechnical parameters using current published empirical correlations based on the comprehensive review by Lunne Robertson and Powell (1997). The following parameters can be derived:

- Equivalent N60
- Unit weight
- Undrained shear strength
- Soil sensitivity
- Stress history (OCR)
- In-situ stress ratio
- State parameter
- Friction angle
- Stiffness and modulus
- Permeability
- Consolidation characteristics from dissipation data

The final CPTu digital log can be fully customised to show whatever correlations are required and to allow any preferred changes to correlation factors e.g. Nkt



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