

Gamma Cone Penetrometer

INTRODUCTION

The gamma cone penetrometer combines standard cone measurements of cone resistance (qc) and sleeve friction (fs) with a natural gamma measurement of radiation from the ground. Figure 1 presents the layout of a standard 15 cm² with the gamma sensor offset by 68mm from the cone tip.

INSTRUMENT DETAILS

The gamma sensor is a 50mm x 25mm sodium iodide scintillating crystal with photo-multiplier. The sensor has wide spectrum sensitivity from 100Kev to 2Mev. The natural gamma radiation from all naturally occurring radioisotopes and common pollutant gamma emitters will be detected. All cones are calibrated in Fugro Gamma Cone units, which are equivalent to approximately 3 x API gamma units and based on a test hole facility. Results from each cone can be compared and correlated to other gamma measurements

INTERPRETATION

The gamma log from the cone can be interpreted in standard wireline logging terms. The potassium content of the most commonly occur clay groups illite and kaolinite and the absence of potassium in most sands, especially shelly or quartzitic sands, allows the simple use of the gamma count as a geological clay log.

The gamma 'geological clay' log obtained from the measurements can be compared to the cone penetrometer 'engineering clay' log, determined from the friction ratio. The comparison allows the identification of low potassium clays e.g. smectite and also chalks, limestone or marls where they are weathered to engineering clay. High gamma micaceous sands, more prone to liquefaction than other sands, can also be identified.

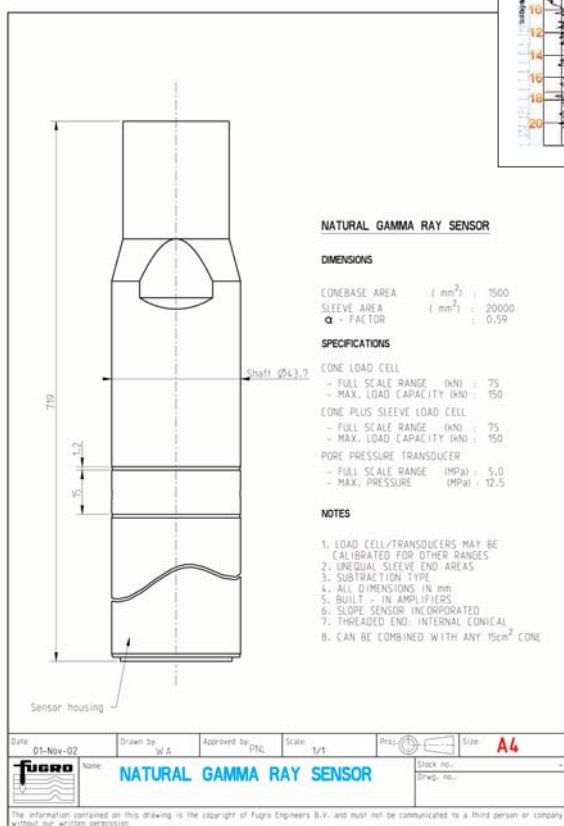
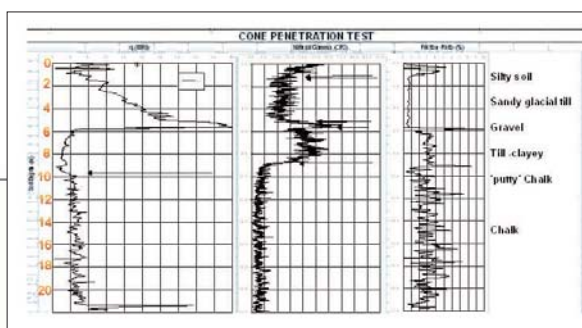
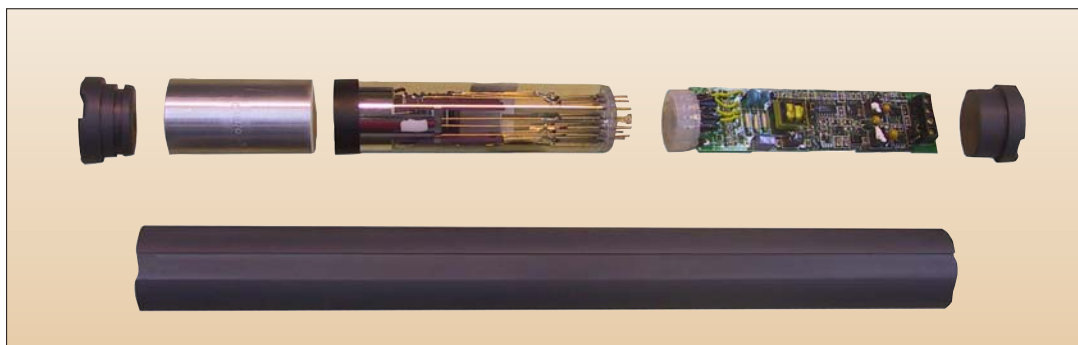
The calibration relationship between the gamma cone and standard wireline gamma tools allows the gamma cone to be used down-hole through-the-bit to obtain a natural gamma log of the undisturbed strata. This log can be compared to a continuous gamma log obtained within piping and any swelling effect on the borehole gamma log eliminated.



Fig. 1. Fugro Piezo-cone Penetrometer

EXAMPLE

Figure 2 is an example of a gamma cone log. The very low levels of radiation are shown in the high purity chalk below 9m. The highest gamma readings are in the clay band between 6m and 9m. The top of the weathered chalk shows as a clay on the friction ratio but can be determined as chalk from the very low gamma reading from 9m to 10m.



The specification of the equipment in this data sheet may be subject to modifications without prior notice

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