



Exploration & Production

GENERAL SPECIFICATION

SURVEYS

GS EP GEO 214

**Onshore geophysical site survey -
Electric Geophysical Survey**

00	01/2012	First issue
Rev.	Date	Notes

Owner: DEV/TEC

Managing entity: DEV/TEC/GEO



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1. Scope

The content of this General Technical Specification indicates the minimum standards required by Company for Electrical Resistivity Tomography (ERT) geophysical survey. However, should Company consider that any aspect of the work requires more detailed investigation, Company Reserves the right to apply further Particular Technical Specifications.

All Equipment and Materials necessary to complete the survey in accordance with this Contract shall be supplied by Contractor. Such Equipment and Materials shall include all spare parts and spare Equipment units as may be necessary to provide normal and continuous operations, and shall be in good operating condition prior to start of mobilization.

Such Equipment shall be properly maintained in such a way as to assure accuracy within the tolerances set by the manufacturer for such Equipment. Contractor undertakes to provide a statement of the surveying accuracy of this Equipment.

The Work defined in these Specifications shall be performed in accordance with the Agreement.

The Work shall include the following phases:

- **Data acquisition phase**
- **Data processing phase:** This phase is to be carried out in conjunction with data acquisition in order to be sure that survey objectives are reached
- **Interpretation phase.**

Reports shall include measured and computed data and interpreted maps as per objectives of the Particular Technical Specifications.

The final product shall be an Expert Report.

The scope of the Work is included in the Particular Technical Specifications.

2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Standards

Reference	Title
ASTM D 6431 - 99 (2010)	Standard guide for Using the Direct Current Resistivity Method for Subsurface Investigation
ISO 1000	Specification of SI units and recommendations for the use of their multiples and of certain other units

Professional Documents

Reference	Title
Not applicable	



Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
Not applicable	

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS EP GEO 210	Onshore Geophysical Site Survey - Cross hole geophysical survey
GS EP GEO 211	Onshore Geophysical Site Survey - Seismic refraction geophysical survey
GS EP GEO 212	Onshore Geophysical Site Survey - Multichannel surface waves geophysical survey
GS EP GEO 213	Onshore geophysical site survey - Micro-Gravity Geophysical Survey
GS EP GEO 215	Onshore geophysical site survey - Radar Geophysical Survey
GS EP GEO 216	Onshore geophysical site survey - Electro-Magnetic Geophysical Survey
GS EP GEO 401	GIS requirements for engineering site surveys and studies
GS EP GPA 202	Seismic HSE for Land Activities
GS EP POS 003	Onshore Land Surveying and Positioning Works
GS EP POS 004	The Use of Differential Global Positioning System

3. ERT survey objectives and methodology

3.1 ERT survey objectives

Electrical Resistivity Tomography is a geophysical survey technique, giving high-resolution imaging of electrical properties of the subsurface soils and rocks.

Fields of application are wide and concern either hydro-geological, environmental or civil engineering surveys as:

- Delineation of pollution plumes, limits of landfills
- Landslide geometry characterization
- Localisation of dams, dikes or embankment leakages
- Water level characterization
- Aquifer characterization
- Location and extension of fractured zones in bedrock
- Location of quarries and deposits for railway or roads construction (mapping of sand and gravels lenses in a clay environment)
- Cathodic Protection.

3.2 Methodology

The ERT method is based on the measurement of the apparent soil resistivity using a linear array of equally spaced electrodes planted in the ground surface. The idea of using multi-electrode arrays was first suggested in 1981. The array is multiplexed to a resistivity-meter which gathers all apparent resistivity measurements between different dipoles to create an apparent resistivity sections (see Figure 1).

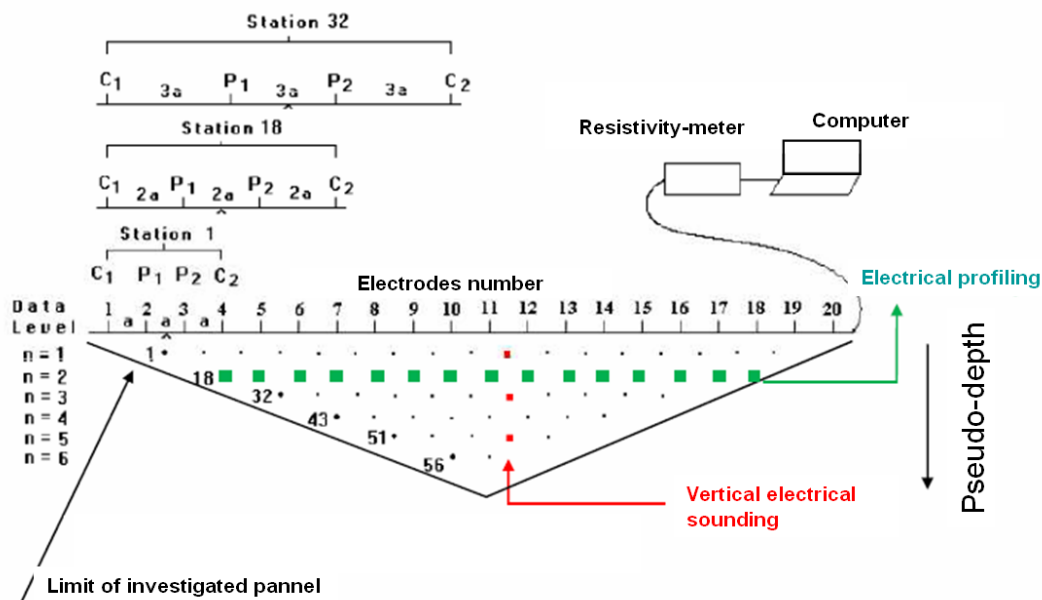


Figure 1 - Electrical Resistivity Tomography lay out

The final true resistivity section is obtained using an inversion algorithm, which will calculate the best soil resistivity model fitting with the measured data, representing apparent resistivity.

ERT may also be applied as a monitoring method to follow soil resistivity variations with time.