



Exploration & Production

GENERAL SPECIFICATION

GEOMATICS

GS EP POS 003

Onshore Land Surveying and Positioning Works

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1. Scope

The objective of this Specification is to ensure that requirements of Company are met with regard to the field surveying and mapping of structures and natural features (including those of the establishment of control in three dimensions) during onshore project operations. This Specification is designed to be complementary to the project Scope of Work which outlines the nature and the requirements of the entire project. **This Specification does not cover mining surveying, setting out of structures, or seismic projects. The setting out of structures will be included in the project Scope of Work where applicable whereas the setting out of seismic survey projects will be included in the Specifications relative to seismic works.**

Contractor shall carry out the field surveying and mapping for the project with professional competence in accordance with the standards of the professions of the industry and to the satisfaction of Company. Contractor shall perform the positioning tasks with qualified personnel and equipment which is in perfect working order. Contractor shall retain its equipment and personnel for the exclusive use of Company for the duration of the survey.

The objective of this Specification is to define and assure accurate three dimensional surveying and mapping for Company's onshore operations. This Specification is to be used in conjunction with the other documents referred to in section 2 as well as the Scope of Work.

2. Basic reference documents

2.1 General

2.1.1 Choice of reference documents

Where national regulations exist, their provisions and those of the standards and codes to which they refer shall apply, supplementing or amending the provisions of this document.

If there are no national regulations covering all or part of the subject of this document, the reference documents shall be strictly applied, as supplemented by the provisions of this document.

2.1.2 Recognition of reference documents

Only the main reference documents are mentioned; the Contractor shall be responsible for complying with all secondary reference documents dealing with the subject of this document.

Unless otherwise indicated in the detailed contractual conditions, all the reference documents to be used, as well as their supplements shall be the latest editions.

Standards

Reference	Title
ISO/TS 29001 : 2010	Quality management system requirements for the design, development, production, installation and service of products for the petroleum, petrochemical and natural gas industries, based on ISO 9001:2010
British Standard BS 5750	Series of Quality Systems Standards



Professional Documents

Reference	Title
OGP Surveying and Positioning Guidance Note Number 7, part 2	Coordinate Conversions and Transformations including Formula

Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
Not applicable	

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS EP POS 004	The Use Of Differential Global Positioning System
GS EP POS 007	Airborne Laser Scanning Survey (LiDAR)
GS EP POS 008	Aerial Photogrammetric Survey
GS EP GEO 401	GIS requirements for Engineering Site Surveys and Studies

3. Definition of works

3.1 Purpose of the land surveying work

The objective is to provide survey and mapping information to enable the field developments of Company to be carried out.

3.2 End product

The Survey Contractor shall provide the following from the surveying work:

- A network of precisely co-ordinated and monumented control points at the required density within the areas defined in the Scope of Work



- Detail surveys of the areas defined in the Scope of Work. The scales will differ according to area and specification
- Maps, digital data and survey reports.

3.3 Project scales

The scales to be used will differ according to the detail surveyed. They shall be those itemised on the following page unless otherwise specified:

Site	Scale		Comments
	Horizontal	Vertical	
Enclosed structures such as degassing stations, gathering stations etc...	1/1,000		
Pipeline Route Surveys.	From 1/5000 to 1/1000	1/100	All road embankment, river, railway and etc crossing vertical profiles to be plotted (see Crossings).
Route Survey Crossings.	1/200	1/100	Vertical profiles to be plotted at centreline and at extremities of corridor. Bathymetry is required for river crossing.
Urban Areas.	1/500		This applies to areas of urban concentration where larger scales are inadequate for the plotting of real scale conventional features.
Low density installations e.g. Tank farms.	1/2000		
« Green Field » Sites marked for construction.	1/2000		
Oil field area.	1/25000		Includes all Oil field structures e.g. Christmas Trees.

3.4 Work method

The following methods may be used:

- Terrestrial survey (Total Station, Terrestrial scanning, etc.)
- GPS (fast static, post processed, Real Time Kinematic)
- Airborne Laser scanning (Lidar), refer to **GS EP POS 007**.
- Aerial Photogrammetry, refer to **GS EP POS 008**.

The applicable Work methods required by Company will be specified in the technical specification.

3.5 Completion Schedule

The work (where applicable) shall be completed according to the following schedule (in that order), where the dates shall be provided by Company.

1. Submission of Quality Plan

2. IGS Survey, when required
3. Monumentation of PGM
4. Control Survey
5. Geodetic Control Survey Report
6. Detail Surveys
7. Submission of test data
8. Submission of final hard copy maps, digital data and reports

3.6 Company provisions

Company shall provide prior to the survey the followings documents:

- Design co-ordinates of the proposed works. Pipeline and other linear routes shall be defined by centreline co-ordinates. Structures shall be defined by peripheral co-ordinates and other significant points.
- Plan showing the sites and survey limits.
- Co-ordinates of oil field areas to be surveyed.
- Co-ordinates of existing control points to be used (if available).
- Geodetic parameters to be used including any datum shift parameters (if available).
- Any project constraints such as other activities or access restrictions.
- Any existing Company plans and maps.
- Security clearances, office or site opening hours, close down periods on site, hours during which survey activity will be restricted and health and safety requirements (However Contractor shall inform Company in advance of proposed access requirement dates to installations and also when completed).
- Project contacts within Company including a minimum of Company Representative for project matters, the daily Company contact and the Finance Department to whom invoices are to be addressed.
- Any local authorities or representatives that have to be contacted.
- Survey schedule and submission of results dates.
- Where appropriate, an on-site briefing with the survey team shall take place.

4. Contractor requirements

4.1 General

The Contractor shall be managed by an effective Quality System that ensures conformance to agreed requirements and provides adequate confidence that the product or service fulfils requirements for quality. Conformance shall be required to the documents described in Section 4.2. The land survey Contractor shall be registered with a recognised body.



The Quality System shall comprise the:

- Quality Manual
- Management Procedures
- Work Procedure
- Health and Safety Procedure
- Records, Reference and Support Documentation

These shall be in the English language and available for inspection by Company.

4.2 Quality Plan

The Contractor shall propose a comprehensive Quality Plan covering all aspects of the services and which satisfactorily relates the Quality System to the Scope of Work to the satisfaction of the Company.

The Quality Plan shall contain the minimum of:

- A description of the Contractor organisation which specifies those individuals responsible for achieving compliance with the technical and quality requirements of the Work.
- The Work Procedure used for each survey activity.
- A list of the objective documentation to be produced as proof of achievement of the requirements.
- The criteria used to measure the acceptance of acquired data including algorithms where applicable.
- Accuracy of the services to be carried out by Sub-Contractor and the methods used by Contractor to assess and control these services.

4.3 Quality Audits

The Company shall reserve the right to assess the technical capacity of and review the effectiveness of Quality Systems implemented by the Contractor and its Sub-Contractor's. This may be performed by means of surveillance, review and audit methods at the discretion of the Company.

The Contractor shall maintain similar methods to assess and review their Sub-Contractor's. The records should be available to the Company.

4.4 Work Procedure

The Work Procedure shall set out the specific work practices, resources and sequence of activities relevant to the Contract.

The Work Procedure shall be submitted to Company at least one month before mobilisation. The Work Procedure shall describe the Contractor's methods by which it shall ensure conformance to requirements and surveying tolerances. With close reference to the Contractor's procedures and work instructions, the Work Procedure shall detail the Contractor's surveying systems, methods, techniques and general procedures by which the surveying objectives will be met. The Contractor shall be responsible for the importation and exportation of all specified



surveying equipment including computer hardware and software and that they are all calibrated and operational.

The Work Procedure shall include at the very minimum the following:

- Comprehensive descriptions of all proposed work methods, survey equipment and systems. Where the systems are sub-contracted, then performance figures shall be provided as well as details of Contractor's audits on the Sub-Contractor. Major types of surveying equipment and data processing systems shall be itemised.
- List of proposed survey area co-ordinates, PGM locations, accuracies together with the agreed geodetic parameters.
- List of calibrations to be carried out as well as the methodology and procedures to be used. Historical data from previous calibrations will be provided where applicable.
- Description of all real time and off-line data processing methods. The methodology of the computations shall be described as well as the statistical output and testing involved to ensure that all significant errors are readily detected. Any proposed changes to existing systems or software shall be detailed.
- All other quality controls and measures that concern the acquisition and processing of survey data shall be described.
- Percentage of and type of spare equipment and contingency for the replacement or repair of defective material.
- Details of the survey team, including names and brief CV's. Company reserves the right to interview senior staff in order to verify that they have the required competence.
- Project planning and schedules.
- Health and safety policy and procedures
- Survey Contractor's Project Manager.

Contractor shall prove to Company that the proposed combination of survey equipment and procedures is capable of achieving the required accuracy and that sufficient redundancy exists to ensure valid statistical results and to complete the survey work within the prescribed period of time. It must be ensured that a reasonable level of equipment breakdown will not delay the completion of the survey work.

4.5 Health and Safety requirements

Contractor shall be responsible for ensuring that survey personnel have the required health and safety training and relevant certificates (e.g. H₂S).

Company reserves the right to request changes and to add further specified procedures if considered necessary.

5. Survey requirements

5.1 Coordinate Reference System

The survey shall be performed using the project Coordinate Reference System. The geodetic parameters shall provided by Company prior to the survey. This includes horizontal, vertical systems parameters and the Geoid model when applicable.