

DEP SPECIFICATION

**SURVEY AND POSITIONING FOR OFFSHORE
STRUCTURES, SUBSEA AND PIPELINE PROJECTS**

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DESIGN AND ENGINEERING PRACTICE



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All administrative queries should be directed to the DEP Administrator in Shell GSI.

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1. INTRODUCTION

1.1 SCOPE

This DEP defines the survey and positioning specifications for offshore structures, subsea and pipeline projects.

The minimum technical requirements for surveys in support of offshore construction activities are defined in this specification together with the reporting and data delivery requirements. It is not within the scope of this DEP to provide instruction or guidance on selection of equipment or methodology.

Requirements relating to Annual Pipeline Inspection (API) survey are not covered in this DEP. Further, this DEP precludes the early stage requirements for pre-engineering survey, such as desktop studies, scouting, archaeological and pipeline route surveys (geophysical and geotechnical samplings) to determine the suitability of the selected route or site, and any mandatory surveys required by the national and/or local regulations.

This DEP is a major revision of the DEP of the same number dated February 2017 see (1.5) regarding the changes.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by Shell GSI, the distribution of this DEP is confined to Shell companies and, where necessary, to Contractors and Manufacturers/Suppliers nominated by them. Any authorised access to DEPs does not for that reason constitute an authorisation to any documents, data or information to which the DEPs may refer.

This DEP is intended for use in facilities related to offshore oil and gas production, and in particular civil, offshore and pipeline projects. This DEP may also be applied in other similar facilities.

When DEPs are applied, a Management of Change (MOC) process shall be implemented; this is of particular importance when existing facilities are to be modified.

If national and/or local regulations exist in which some of the requirements could be more stringent than in this DEP, the Contractor shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements will be acceptable with regards to the safety, environmental, economic and legal aspects.

In all cases, the Contractor shall inform the Principal of any deviation from the requirements of this DEP which is considered to be necessary in order to comply with national and/or local regulations. The Principal may then negotiate with the Authorities concerned, the objective being to obtain agreement to follow this DEP as closely as possible.

1.3 DEFINITIONS

1.3.1 General definitions

The **Contractor** is the party that carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project or operation of a facility. The Principal may undertake all or part of the duties of the Contractor.

The **Manufacturer/Supplier** is the party that manufactures or supplies equipment and services to perform the duties specified by the Contractor.

The **Principal** is the party that initiates the project and ultimately pays for it. The Principal may also include an agent or consultant authorised to act for, and on behalf of, the Principal.

The word **shall** indicates a requirement.

The word **should** indicates a recommendation.

The word **may** indicates a permitted option.

1.3.2 Specific definitions

Term	Definition
Accuracy	The difference between the precise observed value and the true value of a measured quantity
Key survey personnel	Survey personnel appointed and named by the Contractor with verified and approved Job-specific specialized competencies relevant to the project's survey work
Line	Generic term used interchangeably to specify any linear feature (e.g., pipelines, flowlines, power cables, hydraulic cables, spoolpieces and umbilicals).
Pipelay	Generic term for installation of rigid pipelines, flexibles, or umbilicals
Precision	Refers to how closely the repeated measurements or observations come to duplicating measured or observed values.
Structure	Generic term used interchangeably to specify any construction item with distinct dimensions typically positioned and oriented by a defined common reference point (e.g., platforms, manifolds and subsea distribution units).
Work	The activities to be executed by the Contractor as defined in the Invitation to Tender or Contract Scope of Work.

1.3.3 Abbreviations

Term	Definition
ASCII	American Standard Code for Information Interchange
CAD	Computer Aided Design
CP	Cathodic Protection
CSV	Comma-Separated Values
DPR	Daily Progress Report
DTM	Digital Terrain Model
GIS	Geographic Information System
GNSS	Global Navigation Satellite Systems
HIRA	Hazard Identification Risk Assessment
IMCA	International Marine Contractors Association
ITP	Inspection and Test Plan
KP	Kilometre Post
LBL	Long Baseline

Term	Definition
MP	Mile Post
OAS	Obstacle Avoidance Sonar
OOS	Out Of Straightness
PEP	Project Execution Plan
PPS	Pulse Per Second
QHSSEP	Quality, Health, Safety, Security and Environmental Plan
RTK	Real Time Kinematic
SIT	Silicone Intensified Target
TDM	Touch Down Monitoring
WD	Water Depth

1.4 CROSS-REFERENCES

Where cross-references to other parts of this DEP are made, the referenced section or clause number is shown in brackets (). Other documents referenced by this DEP are listed in (8).

1.5 SUMMARY OF MAIN CHANGES

This DEP is a full revision of the DEP of the same number dated February 2017. The following are the main, non-editorial changes.

Section/Clause	Change
General	Revised and expanded to provide a generic set of survey specifications to cover all aspects of offshore construction survey for depths (>10 m) on a global level. Minimum requirements pertaining to survey system tolerances and accuracies are defined in the absence of project specific requirements outlined within the Contract Scope of Work.
All	Restructured and clarified requirements, enforced use of shall / should / may for normative statements.

1.6 COMMENTS ON THIS DEP

Comments on this DEP may be submitted to the Administrator using one of the following options:

Shell DEPs Online (Users with access to Shell DEPs Online)	Enter the Shell DEPs Online system at https://www.shelldeps.com Select a DEP and then go to the details screen for that DEP. Click on the "Give feedback" link, fill in the online form and submit.
DEP Feedback System (Users with access to Shell Wide Web)	Enter comments directly in the DEP Feedback System which is accessible from the Technical Standards Portal http://swwww.shell.com/standards . Select "Submit DEP Feedback", fill in the online form and submit.
DEP Standard Form (other users)	Use DEP Standard Form 00.00.05.80-Gen. to record feedback and email the form to the Administrator at standards@shell.com .

Feedback that has been registered in the DEP Feedback System by using one of the above options will be reviewed by the DEP Custodian for potential improvements to the DEP.

1.7 DUAL UNITS

This DEP contains both the International System (SI) units, as well as the corresponding US Customary (USC) units, which are given following the SI units in brackets. When agreed by the Principal, the indicated USC values/units may be used.

1.8 NON NORMATIVE TEXT (COMMENTARY)

Text shown in italic style in this DEP indicates text that is non-normative and is provided as explanation or background information only.

Non-normative text is normally indented slightly to the right of the relevant DEP clause.

2. GENERAL REQUIREMENTS

2.1 PROJECT EXECUTION PLAN (PEP)

1. The Contractor shall prepare and submit to the Principal a Project Execution Plan (PEP) that describes how key HSSE risks are mitigated and controlled during the execution of the survey.
2. The PEP shall comprise the following:
 - a. QHSSEP, including:
 - i. Contingency and emergency response plan;
 - ii. Safety management system interface plan (bridging document)
 - iii. Project-specific hazard management plan
 - b. Mobilisation plan, including the ITP
 - i. Specifically included in the ITP shall be an Electrical Test Plan for temporary electrical equipment installed on the deck of any vessel.
 - c. Project description and operational survey procedure.

2.2 OPERATIONAL SURVEY PROCEDURE

1. The content of the operational survey procedure shall include the following, as applicable:
 - a. pre-mobilisation planning;
 - b. geodetic control procedures, parameters and calculations;
 - c. sparing philosophy; (e.g., list of spares)
 - d. positioning systems selection and details;
 - e. equipment selection, rationale and specifications;
 - f. vertical control procedures and establishment of vertical datum;
 - g. water level and tidal determination procedures;
 - h. limits of survey (geographical boundary and water depth);
 - i. scope of work instructions for data acquisition and online quality control;
 - j. procedures and work instructions for data processing, interpretation, reporting and offline quality control;
 - k. data deliverables and format;
 - l. activity specific error-budgets;
 - m. organisation chart of key personnel, including responsibilities and lines of communication;
 - n. HIRA and generic risk assessments;
 - o. Management of Change procedure (including example format);
 - p. permits, license and notification requirements and procedures.
2. The content of the operational survey procedure should include the following, as applicable:
 - a. supplied data;
 - b. data management procedure;
 - c. data flow diagram;

- d. content and structure of all reports and charts;
- e. digital video package deliverable format;
- f. detailed acceptance trials programme;
- g. project crew change schedule;
- h. detailed schedule (mobilisation through to reporting);

2.3 INSPECTION AND TEST PLAN

1. The ITP shall detail the process for calibration, verification and acceptance of all project equipment, including the following:
 - a. details of any previous calibrations;
 - b. calibration procedure, including the calibration site;
 - c. expected calibration results;
 - d. acceptance criteria;
 - e. calibration verification procedure.
2. Included within the ITP should be an acceptance trial witnessed by the Principal demonstrating equipment and vessel readiness.

3. SURVEY EQUIPMENT

3.1 GENERAL REQUIREMENTS

1. The Contractor shall have a survey assurance procedure for mobilisation and operations.
 - a. The Contractor shall have procedures in place for standard survey operations and calibrations in accordance with the relevant IMCA guidelines and within the Contractor in-house management system.
 - b. The Contractor shall have a valid equipment certification and calibration records for all primary and secondary survey positioning systems and sensors.
2. The positioning system shall have active redundancy with identified primary and secondary sensors that meets or exceeds required accuracy.
3. The system shall be configured so that real-time quality control of all positions and measurements can be performed.
4. All records, logs and data collected during the mobilisation, trials and operations shall be available to the Principal.
5. The Contractor shall demonstrate that the navigation/acquisition software will display, process and analyse all online data within the agreed time frames for the specified level of accuracy.
 - a. The Contractor shall demonstrate that the software package has the necessary routines to provide for quality control of the positioning systems and all other input data.
 - b. The Contractor shall demonstrate the capability of the hardware, software and emergency back-up power to save and recover all data captured up to the time of main power interruption or failure.
6. All surveying equipment should be operated in accordance within Manufacturer's/Supplier's specifications and industry's best practice guidelines (e.g., IMCA, OGP).

3.2 ONLINE NAVIGATION AND ACQUISITION SYSTEMS

1. The online navigation and data acquisition system shall perform the following tasks:
 - a. Combine surface navigation and subsea positioning techniques to provide the user with real time navigation and positioning information;
 - b. Interfacing with all surface and subsea sensors;
 - c. Process and display information associated with each survey sensor both visually and numerically on the navigation display;
 - d. Display multiple vessel/vehicle positions in relation to seabed features;
 - e. Output position and project annotation to video systems;
 - f. Real-time quality verification of all survey data;
 - g. Real-time generation of DTMs during bathymetric data acquisition and display of colour-coded sounding density or surface difference plots;
 - h. Distribution of the online navigation display to key locations on the vessel;
 - i. High accuracy time tagging of all sensor data (1 PPS);
2. The Contractor's positioning system shall be motion compensated within their online navigation system to a common reference point.

4. PERSONNEL AND COMPETENCE

4.1 GENERAL

1. A list of all key project personnel and their alternates, including competency assessments and supporting documentation (logbooks, CVs, training matrices, certifications) shall be submitted for approval by the Principal prior to mobilisation.

4.2 COMPETENCE ASSURANCE AND ASSESSMENT

1. The Contractor shall have a competence assurance and assessment program that aligns with industry standards for offshore surveying (such as IMCA C 004 or similar) with respect to implementing an appraisal system for their workforce where performance appraisal and competence assessment are key elements.
2. The competence assurance and assessment program shall include the following:
 - a. The process to collect results of the competence assessments.
 - b. The process to collect evidence of an individual's performance, knowledge and attitude that is reviewed against specified competencies including the following:
 - i. Core or common competences of essential competence for all personnel working at any level in the industry and common to all job functions.
 - ii. Key competences for job-specific competence verified/approved by assessors following specified criteria.
 - iii. Logging and competence record system that captures personal details, qualifications, certificates, training, specialist experience and details of all competence assessments.
 - c. Auditing arrangements in place to check compliance and ensure that all assessors apply the criteria in a consistent and appropriate manner.