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GP 78-30

Subsea Testing, Handover and Commissioning

Group Practice

**BP GROUP
ENGINEERING TECHNICAL PRACTICES**

Foreword

This issue of Engineering Technical Practice (ETP) GP 78-30 is a change of title from “Subsea Production Operations - Guidance for Integrity Management Program” to the present “Subsea Testing, Handover and Commissioning”.

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Table of Contents

	Page
1. Introduction.....	5
1.1. General.....	5
1.2. Objectives.....	5
1.3. Scope	5
2. Definitions.....	6
3. Acronyms.....	9
4. Minimum conditions of satisfaction for subsea system handover	10
4.1. People	10
4.2. Process and procedures	11
4.3. Performance	12
4.4. Plant	12
5. Roles and responsibilities	12
5.1. Commissioning authority (Subsea commissioning manager)	12
5.2. Construction authority (Subsea installation manager and/or construction manager) .	13
5.3. Design authority or engineering manager (Subsea facilities or engineering manager)	14
5.4. OA	14
5.5. Certification manager.....	15
5.6. Certification project engineer.....	15
5.7. Certification technician.....	15
5.8. Commissioning/certification administrator/coordinator	15
5.9. Inspector.....	16
5.10. Operator	16
6. Safety	16
7. Certification philosophy.....	17
7.1. General.....	17
7.2. GOC	18
7.3. System principles.....	20
7.4. Certification database	22
7.5. GOC process	23
7.6. Exceptions	25
8. Testing and certification	25
8.1. General.....	25
8.2. FAT, EFAT, and SIT	25
8.3. Vendor documentation.....	25
8.4. Pre-Installation testing	25
8.5. Post-installation testing	26
8.6. As build & survey requirements.....	28
8.7. Mechanical completion.....	28



8.8. Commissioning	28
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1. Introduction

1.1. General

- a. This GP is part of a larger suite of GPs that define BP's integrity, reliability, and quality management philosophy for subsea projects. This GP is intended to apply specifically to subsea projects, but may have application elsewhere.
- b. This GP is written in two inter-related sections:
 - 1. The first section describes the GOC (Guidance on Certification) process which is the mandated BP process for documenting inspection and test requirements for subsea systems required to achieve successful commissioning and start-up of new subsea facilities.
 - 2. The second section relates to the minimum standard of testing required to achieve mechanical completion and commissioning of subsea systems.

1.2. Objectives

- a. The object of this GP is to provide guidance on all aspects associated with the following:
 - 1. Excellent safety performance.
 - 2. Successful subsea post-installation testing.
 - 3. Commissioning.
 - 4. Handover to operations of subsea facilities including:
 - a) Principles of the handover process.
 - b) Implementation of the process.
 - c) Organizational roles and responsibilities.
 - d) Documentation of the process.
- b. This document should be used to prepare a handover and commissioning plan for subsea projects and provide assurance at each stage of the Major Projects common process (MPcp).
- c. At the MPcp decision gate, the Gatekeeper should be able to use this GP to assess the DSP in relation to subsea commissioning readiness.

1.3. Scope

- a. This GP defines the philosophy and provides guidance for the testing and certification of subsea systems post-installation.
- b. It has been written to provide the project and Gatekeeper with sufficient information to determine if the project has satisfied the requirements of the strategy within the DSP.
- c. This GP covers inspection and testing activities from Mechanical Completion, acceptance from the Construction Authority to Commissioning and handover to the Operating Authority, including the following aspects:
 - 1. Minimum testing and certification of subsea components and systems through the application of the BP Guidance on Certification (GOC) System.
 - 2. How Mechanical Completion, handover from the installation contractor, commissioning and start-up of subsea systems can be safely, effectively, and consistently performed on all projects with subsea systems.



3. How each phase of testing, commissioning, and handover is controlled, and the interfaces between them managed, to ensure appropriate certification and documentation of this process.
4. Capture of equipment test and performance data through the installation and commissioning phases.
5. Demonstration of subsea technical integrity.
- d. This GP applies to the following subsea facilities:
 1. Well completion and guide base.
 2. Subsea tree system, with integral choke, control system, and work-over equipment.
 3. Well jumpers spools and connectors.
 4. Production/service, Water Injection, Gas Injection and system manifold, associated foundation, and levelling system.
 5. Production, Water Injection, and Gas Injection system Flowlines.
 6. Production, Water Injection, Gas Injection system, Risers up to and including pig launchers/receivers and pipeline limit/interfaces on topsides.
 7. Subsea Production Control System including topsides equipment.
 8. Subsea Distribution System including Umbilicals, UTAs, TUTAs, and their connectors.
 9. Down Hole Pressure and Temperature Instrumentation.
 10. Fibre Optic Down Hole Instrumentation.
 11. Surface Controlled Subsurface Safety Valve.
 12. Down Hole Flow Control Equipment.

2. Definitions

For the purposes of this GP, the following terms and definitions apply:

Certification

Certification ensures that the technical assurance of the intent of the design and build is met. Certification provides a management control system for the inspection and test activities associated with the fabrication, construction, pre-commissioning, commissioning and maintenance and/or preservation of systems being worked upon and handed over for operation.

The benchmark certification tool within BP is Guidance On Certification (GOC).

Brownfield project

Subsea tie-back to an existing operating facility

Commissioning

Following Mechanical Completion, commissioning should occur in two phases, performed by the combination of static testing (often referred to as pre-commissioning) and dynamic testing with the intent to demonstrate that the equipment and systems meet their design intent.

Static commissioning often referred to as pre-commissioning or functional check-out, is concerned with the construction and installation quality of a system, as demonstrated by appropriate mechanical testing and leak testing. It is carried out after mechanical completion is achieved, but before dynamic testing begins. This is generally limited to individual devices and equipment.



Completion of static commissioning means:

1. The system has mechanical integrity sufficient for its field service
2. Energized testing of electrical and subsea control systems has been successfully completed.

Completions

This refers to the combined approach to construction, commissioning and handover to manage the delivery of a system that is ready to operate.

Handover certification package (HCP)

HCP also commonly known as system handover book, contains certification requirements for the system that will be handed over to the operating authority.

Hook-up

The construction work scope associated with the completion of the final tie-ins carried out in the final operating location prior to completion of commissioning.

Inspection and testing (I&T)

1. I&T applies to non energized activities during the construction phase of a project that leads to mechanical completion of system or systems.
2. I&T includes checking, verification, calibration, inspection and testing of construction work performed by the vendor to confirm compliance with applicable rules, regulations, standards and design and construction drawings.

Limits of system handover

Limits of system handover (LOSH) are achieved by:

1. Dividing the scope of work into standalone operational (functional) systems that perform specific quantifiable duties.
2. Identifying associated interfaces, piping specification changes and isolation boundaries between these systems and other connected systems.

Mechanical Completion

Assurance of MC is the verification of the correct fabrication, construction, installation, preservation and testing in accordance with the approved specification, codes and statutory requirements for that system/sub-system.

MC is concerned with the construction status of the system, quality of installation work and compliance with approved specifications drawings, codes, safety standards and statutory requirements.

Reaching MC means

1. System or subsystem is installed
2. All post installation measurements, inspections and tests are complete
3. Initial alignments complete
4. Following non energized testing, the system is ready for safe and effective commissioning

Preservation

Preventative maintenance performed on equipment before it is placed in service.



Punch List

A list of outstanding items, or defects, relating to the original scope of work, that should be completed or repaired.

Start-up

Start-up is the introduction of process fluids and proving that the facilities meet design operating conditions in a controlled manner.

The initial objective of start-up is to attain steady hydrocarbon production at an initial flow-rate sufficient to establish export and to reach self sufficiency in fuel gas. Thereafter the facilities may be brought progressively up to designed conditions throughput to ensure they meet their performance envelopes. It is recognized that the process may –due to the availability of well stock – take a time period for which it may be inappropriate to retain project organization involvement.

Completion of start-up means:

1. Facilities have been proven to function with process fluids, over a pre-agreed range of conditions and duration, sufficient to demonstrate that they have been provided in accordance with the project intent.
2. All outstanding or remedial work associated with provision and use of the facilities has been completed. In exceptional cases where remedial works are still outstanding, the work scope, timing and resourcing of these have been agreed.

System commissioning

This is the operation of a system(s) in service, where simulated process fluids are used, when necessary, in order to demonstrate their performance. System commissioning is concerned with putting a piece of equipment or a system into service, prior to the introduction of hydrocarbons, to demonstrate that it is fit for the intended purpose.

Completion of system commissioning means:

1. The system is ready for use in the field. In the case of process systems, this means the system is ready for the introduction of hydrocarbons

The system commissioning work scope will reflect the inclusion in certain systems of hook-up spools which may be trial fitted during onshore commissioning but will, in any event, require re-fitting and testing offshore. For systems that have been through FAT or SIT, system commissioning is particularly concerned with demonstrating that the equipment functions correctly as part of a bigger system.

System handover

This is the formal acceptance by the Operator of the functional system, following the satisfactory completion of commissioning, prior to the introduction of hydrocarbons.

Technical Integrity

This is the condition of a plant that meets its design criteria and intended purpose – criteria which are set by the design team. Where deviations from these exist, they have been identified, assessed and any changes to ensure the safe and efficient operations have been implemented.

It is the responsibility of the project construction and commissioning teams to demonstrate that technical integrity has been established for the facilities being handed over to the Operator. Any modifications required to make the facilities perform as per design will be raised by Operations as late punch list items, to be resolved by the project.



3. Acronyms

For the purposes of this technical practice, the following acronyms are used.

ACE	Advanced control environment.
CP	Cathodic protection.
CRO	Control room operator.
DIS	Data input sheet.
DSP	Decision support package.
EA	Engineering authority.
EFAT	Extended factory acceptance testing.
EQ	Engineering query.
ESD	Emergency shutdown.
FAT	Factory acceptance testing.
GOC	Guidance on Certification.
HCP	Handover certification package.
HMI	Human machine interface.
HP	High pressure.
HPU	Hydraulic power unit.
HVAC	Heating ventilation and air conditioning.
I&T	Inspection and test.
IRN	Inspection release note.
ITS	Inspection and test summary.
JSA	Job safety analysis.
LP	Low pressure.
LOSH	Limits of system handover.
MC1	Mechanical completion certificate.
MOC	Management of change.
MSDS	Material safety data sheets.
NDE	Non destructive examination.
OA	Operating authority.

