



## COMPANY TECHNICAL STANDARD (OTP) OPERATIONAL TEST PROCEDURE GUIDELINE

28884.COS.AVV.STD  
Rev. 00 – October 2019

<b>ABSTRACT</b>	This document provides the Company guideline to prepare the Operational Test Procedure to be used during execution of commissioning activities.
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00	October 2019	First Issue	Martin Sirtori (COPX)  Alberta Rossetto (PRO/COM)	Filippo Vailati (OPCO) Marco Barbieri (TA&E) Amalia Bianco (OPSO) Ayman Khater (COIMS) Gabriele Gallo (SICEL)	Alberto Lancia (CIMS)  Michele Caramuta (OE&C)
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## REVISION TRACKING

**Rev. 00:** Actual revision is of 29 pages

**Date:** October 2019

## INFORMATION REQUEST

Eni personnel can access company standard repository at:

<http://www.eandp.eni.it/TSServices/TAE/company-documents-standards>

External user shall refer to the Project Engineer Manager.

For information about the content of this standard, please refer to persons mentioned on first page or to Company Standard Team ([mbxc&st@eni.com](mailto:mbxc&st@eni.com)).

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## **1 GUIDELINE SCOPE AND GENERAL INFORMATION**

### **1.1 SCOPE AND PURPOSE**

Scope of this document is to provide the Company guideline to write the document "Operational Test Procedure (OTP)", with purpose to verify the dynamic/operating functionality of each system providing, at the same time, a proper tool for monitoring the progress of the activities.

### **1.2 DISTRIBUTION AND INTENDED AUDIENCE**

The distribution of this document is limited to Eni employees and contractors awarding for Development Projects.

### **1.3 REFERENCES DOCUMENTS AND NORMATIVES**

The latest edition of each publication shall generally be used, together with any amendments/supplements/revisions thereto, however new revisions/updates during an activity or project will not be considered unless there are associated safety/environmental impacts.

	Ref. Code	Title
01	msg-svi-eni spa	Energy and Environmental Industrial Project Development
02	opi-svi-017-eni-spa	Facilities Commissioning
03	opi-sg-hse-044-ups	Minimum Safety Standard on the Control of Hazardous Energy (Lockout/Tagout)
04	opi-sg-hse-042-ups	Minimum Safety Standard on Permit to Work System
05	28025.COS.AVV.STD	Lockout and Tagout Guideline
06	28910.COS.AVV.STD	Livening up notice guideline
07	27952.COS.AVV.STD	FACILITIES COMMISSIONING SPECIFICATION
08	27970.COS.AVV.STD	COMMISSIONING INSPECTION TEST PLANS & INSPECTION TEST REPORTS
09	27950.COS.QUA.STD	Facilities Construction QC & Commissioning Management
10	27951.COS.QUA.STD	Construction QC & Mechanical Completion Specification

To be noted that msg (management system guidelines), opi (operating instruction) and pro (procedure) are for Eni Internal use only and not distributed to contractors.

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## 1.4 TERMS AND DEFINITIONS

### 1.4.1 General Definitions

The Company Standards shall comply with the use of the Company Terminology.

All acronyms and abbreviations used in the document are summarized in section 1.4.2.

- i. The Company is Eni Spa;
- ii. The word **shall** is used to indicate that a provision is mandatory;
- iii. The word **should** is used to indicate that a provision is not mandatory, but recommended as good practice.

### 1.4.2 Specific Terms, Definitions, Acronyms and Abbreviations

DCS	Distributed Control System
DR	Deviation Request
EMS	Electrical Management System
ESD	Emergency Shut Down
F&G	Fire and Gas
GIS	Gas Insulated Substation
HSE	Health Safety Environment
HV	Hand Valve
HVAC	Heating Ventilation Air Conditioning
ICSS	Integrated Control & Safety System
LOTO	Log Out Tag Out
LV	Low Voltage
MCC	Motor Control Center
MOC	Management of Change
MV	Medium Voltage
NCR	Non Conformity Report
OTP	Operational Test Procedure

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P&ID	Process & Instrument Diagram
PAGA	Public Announcement/General Alarm
PCS	Process Control System
PPE	Personal Protective Equipment
PTW	Permit To Work
SDV	Shut Down Valve
SIF	Safety Instrumented Function
SLD	Single Line Diagram
SOW	Scope of Work
TBT	Tool Box Talk
TSO	Tight Shut Off
UPS	Uninterruptible Power Supply
XV	Actuated valve

### **1.5 ORDER OF PRECEDENCE**

In conjunction with this specification, the codes, standards and regulations listed in section 1.3 shall be applicable. Reference to any Standard or Code shall mean the latest edition of that Standard or Code including addenda, supplements or revisions, unless otherwise stated in this document.

The order of precedence shall be as follows: (descending order)

- i. Local Regulations of the Country where the equipment is installed;
- ii. Project Specifications and Data Sheets;
- iii. Company General Specifications;
- iv. International Codes & Standards

International Standards are at the lower level of hierarchy, their contents, assumed as reference, is developed and detailed within the Company Specifications considering the specific application and the area of business in which Eni SpA is operating. On top of those there are the Local Regulations, the Project Specifications than the Company Specifications. Any applicable local mandatory rule prevails on this specification. Should there be a perceived conflict between this standard and other referenced standards, or lack of clear definition as to the applicability of any specification or standard, the Facilities Technical Units owner of the Standard, shall seek guidance to the Standard Team.

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## **2 OTP DOCUMENT MANAGEMENT**

### **2.1 DOCUMENT TITLE AND DOCUMENT NUMBER**

The OTP shall be an official document with Title and Document Number assigned according to the Project document management procedure. OTP shall be officially issued into the Project document management system (e.g. EDAM).

### **2.2 OTP OWNER**

An OTP owner, normally a commissioning superintendent, shall be assigned to each OTP and generally he is the same who prepared the OTP itself collecting also the contributes from other disciplines.

Being that the OTP generally involves multidisciplinary commissioning resources, the owner is responsible for the execution of the OTP tests and is the single point of contact for Operation interfacing.

### **2.3 DOCUMENT DISTRIBUTION**

OTP tests shall be executed jointly with the Operations appointed persons and the tests result shall be finally accepted by Operations, that's why is important that the OTP documents are shared for comments with Operations team prior to start tests execution.

### **2.4 OTP ASSIGNMENT TO SYSTEMS AND SUBSYSTEMS**

Each OTP refers to a specific "Commissionable System", as defined by the Facility's Systemization approved by Company.

It is a good and recommended practice to assign to all the Systems and Subsystems of the Facility, the relevant OTP, in order to be sure that all the commissioning scope is covered in terms of tests to be done and reports; where OTP for a specific system is not applicable, it shall be as well clearly identified.

When the Facility execution is split into different phases, a priority can be assigned to the completion of each System, the same priority is assigned to each OTP.

Here below an example of OTP assignment to the Systems.

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**OPERATIONAL TEST PROCEDURE**  
**(Typical System and Phase allocation)**

OPERATIONAL TEST PROCEDURE (OTP)					OTP BY PAHSE			
ID	OTP Description		System Number (example)	System Description	Onshore	Anchorage	Offshore Pre First Oil	Offshore Post First Oil
01	System Commissioning Procedure - Port Deck Crane		System 11	Mechanical Handling	X			
02	System Commissioning Procedure - Stbd. Deck Crane		System 11	Mechanical Handling	X			
03	System Commissioning Procedure - Elevator		System 11	Mechanical Handling	X			
04	System Commissioning Procedure - Provision Crane Port		System 11	Mechanical Handling	X			
05	System Commissioning Procedure - Provision Crane Stbd		System 11	Mechanical Handling	X			
06	System Commissioning Procedure - Hose handling Crane		System 11	Mechanical Handling	X			
07	System Commissioning Procedure - Engine Room Overhead Crane		System 11	Mechanical Handling	X			
09	System Commissioning Procedure - Accommodation		System 15	Accommodation	X			
11	System Commissioning Procedure - HP Flash Gas Compressor Train -A		System 23	Gas Compression (Flash Gas & Compression )		X		
12	System Commissioning Procedure - HP Flash Gas Compressor Train –B		System 23	Gas Compression (Flash Gas & Compression )		X		
13	System Commissioning Procedure - MP/LP Flash Gas Compressor Train -A		System 23	Gas Compression (Flash Gas & Compression )			X	
14	System Commissioning Procedure - MP/LP Flash Gas Compressor Train -B		System 23	Gas Compression (Flash Gas & Compression )			X	
15	System Commissioning Procedure - Gas Injection Compressor Train –A		System 23	Gas Compression (Flash Gas & Compression )				X
16	System Commissioning Procedure - Gas Injection Compressor Train –B		System 23	Gas Compression (Flash Gas & Compression )				X
17	System Commissioning Procedure - Booster Compressor		System 23	Gas Compression (Flash Gas & Compression )		X	X	
18	System Commissioning Procedure - Gas Treatment / Dehydration		System 24	Gas Treatment / Dehydration		X		
19	System Commissioning Procedure - Separation systems		System 26	Separation Systems		X		
20	System Commissioning Procedure - Water Treatment and Injection		System 29	Water Treatment and Injection			X	
21	System Commissioning Procedure - Metering		System 31	Offloading system		X		
22	System Commissioning Procedure - Hawser HPU		System 31	Offloading system	X			
24	System Commissioning Procedure - Cargo Storage & Handling		System 33	Cargo System		X		
25	System Commissioning Procedure - Subsea Chemical Injection Transfer		System 36	Subsea Chemical Injection		X	X	
26	System Commissioning Procedure - Chemical Injection systems		System 35	Chemical Injection	X	X		
27	System Commissioning Procedure - Sub Sea chemical Injection systems		System 36	Subsea Chemical Injection	X	X	X	
28	System Commissioning Procedure - MEG System		System 37	MEG System			X	

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ID	OTP Description	System Number (example)	System Description	Onshore	Anchorage	Offshore Pre First Oil	Offshore Post First Oil
29	System Commissioning Procedure - Diesel system	System 38	Diesel Flushing		X		
30	System Commissioning Procedure - Heating Medium system	System 41	Heating medium		X		
31	System Commissioning Procedure - HP Flare Knock out systems	System 43	Flare	X			
32	System Commissioning Procedure - Flare Ignition system	System 43	Flare	X			
33	System Commissioning Procedure - LP Flare Knock out systems	System 43	Flare	X			
34	System Commissioning Procedure - Flare Recovery system	System 43	Flare	X			
35	System Commissioning Procedure - Produced Water System	System 44	Produced water		X		
36	System Commissioning Procedure - Bilge system	System 45	Bilge System	X			
37	System Commissioning Procedure - Fuel Gas system	System 47	Fuel gas			X	X
38	System Commissioning Procedure - Sea Water Lift pumps	System 51	Seawater Systems		X	X	
39	System Commissioning Procedure - Sea Water services to Hull	System 51	Seawater Systems	X			
40	System Commissioning Procedure - Sea Water services to Topsides	System 51	Seawater Systems		X		
41	System Commissioning Procedure - Chlorination system Hull	System 51	Seawater Systems	X			
42	System Commissioning Procedure - Water Ballast system	System 52	Ballast		X		
43	System Commissioning Procedure - Freshwater Maker and Distribution Hull	System 53	Fresh water		X	X	
44	System Commissioning Procedure - Fresh Water cooling systems	System 53	Fresh water	X			
45	System Commissioning Procedure - Fresh Water Distribution Topsides	System 53	Fresh water	X			
46	System Commissioning Procedure - Cooling Medium system	System 53	Fresh water	X			
47	System Commissioning Procedure - Potable Water systems	System 54	Potable Water	X			
48	System Commissioning Procedure - Boiler & Steam Distribution Systems	System 55	Boiler / Steam Systems (Marine)	X	X		
49	System Commissioning Procedure - Hazardous Open Drain system	System 56	Open Drains	X			
50	System Commissioning Procedure - Non Hazardous Open Drain system	System 56	Open Drains	X			
51	System Commissioning Procedure - Closed Drain System	System 57	Closed drains	X			
53	System Commissioning Procedure - MGO system	System 62	Diesel & Fuel Oil	X			
54	System Commissioning Procedure - Service Air System	System 63	Service Air	X			
55	System Commissioning Procedure - Inert Gas System	System 64	Inert Gas System		X		
56	System Commissioning Procedure - Hydraulic HPU System	System 65	Hydraulic	X			
57	System Commissioning Procedure - Riser Pull in system	System 65	Hydraulic	X			
58	System Commissioning Procedure - Sewage System	System 66	Sewage Treatment	X			
59	System Commissioning Procedure - Instrument Air System	System 67	Instrument Air	X			
60	System Commissioning Procedure - Nitrogen System	System 68	Nitrogen	X			
61	System Commissioning Procedure - Lub Oil System	System 69	Lube Oil	X			

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ID	OTP Description	System Number (example)	System Description	Onshore	Anchorage	Offshore Pre First Oil	Offshore Post First Oil
62	System Commissioning Procedure - Fire Pumps	System 71	Firewater		X		
63	System Commissioning Procedure - Fire Water distribution	System 71	Firewater		X		
64	System Commissioning Procedure - Foam Distribution	System 71	Firewater		X		
65	System Commissioning Procedure - Deluge distribution	System 71	Firewater		X	X	
66	System Commissioning Procedure - Survival craft	System 72	Life saving Appliances/Safety Equipment	X			
67	System Commissioning Procedure - Fire & Gas Detection system	System 73	Fire & Gas	X		X	
68	System Commissioning Procedure - ProcessShutdown system	System 78	Process/ Emergency Shutdown System	X		X	
69	System Commissioning Procedure - Emergency shutdown	System 79	ESD (Emergency Shut Down)	X		X	
70	System Commissioning Procedure - Power Generation Hull	System 81	HV Power Generation	X			
71	System Commissioning Procedure - Power Generation Topsides	System 81	HV Power Generation	X			
72	System Commissioning Procedure - HV Power Distribution	System 81	HV Power Generation	X			
73	System Commissioning Procedure - 690 V Power Distribution	System 82	Power Distribution LV / Heat tracing	X			
74	System Commissioning Procedure - Heat Tracing system	System 82	Power Distribution LV / Heat tracing			X	
75	System Commissioning Procedure - Topside Normal Lighting and Small Power	System 82	Power Distribution LV / Heat tracing	X			
76	System Commissioning Procedure - Marine Normal Lighting and Small Power	System 82	Power Distribution LV / Heat tracing	X			
77	System Commissioning Procedure - 440v Marine Power Distribution	System 82	Power Distribution LV / Heat tracing	X			
78	System Commissioning Procedure - Emergency Generator	System 84	Emergency Lighting & Small Power, Power Distrib. LV	X			
79	System Commissioning Procedure - 440V Emergency Power Distribution	System 84	Emergency Lighting & Small Power, Power Distrib. LV	X			
80	System Commissioning Procedure - Marine Emergency Lighting & Small Power	System 84	Emergency Lighting & Small Power, Power Distrib. LV	X			
81	System Commissioning Procedure - Topside Emergency Lighting & Small Power	System 84	Emergency Lighting & Small Power, Power Distrib. LV	X			
82	System Commissioning Procedure - Marine UPS	System 85	UPS & Batteries	X			
83	System Commissioning Procedure - Topsides UPS	System 85	UPS & Batteries	X			
84	System Commissioning Procedure - Satellite	System 86	PAGA/Telecommunications	X		X	
85	System Commissioning Procedure - PAGA system	System 86	PAGA/Telecommunications	X			
86	System Commissioning Procedure - Mulitmedia /LAN/PABX system	System 86	PAGA/Telecommunications	X		X	
87	System Commissioning Procedure - IPTV & Entertainment System	System 86	PAGA/Telecommunications	X		X	
88	System Commissioning Procedure - CCTV System	System 86	PAGA/Telecommunications	X			
89	System Commissioning Procedure - Radio & Misc. Telecom System	System 86	PAGA/Telecommunications	X			
90	System Commissioning Procedure - Process Control system	System 87	Process Control System	X			
91	System Commissioning Procedure - Power Management System	System 88	VCS/Tank level & Draught Measure	X			
92	System Commissioning Procedure - Vessel Control system	System 88	VCS/Tank level & Draught Measure	X			
93	System Commissioning Procedure - Tank Gauging	System 88	VCS/Tank level & Draught Measure	X	X		

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ID	OTP Description	System Number (example)	System Description	Onshore	Anchorage	Offshore Pre First Oil	Offshore Post First Oil
94	System Commissioning Procedure - Propulsion & Steering systems	System 92	Ships Handling	X	X		
95	System Commissioning Procedure - Mooring systems	System 65	Hydraulic	X			
96	System Commissioning Procedure - Ventilation System	System 97	HVAC & Refrigeration system	X			
97	System Commissioning Procedure - HVAC & Refrig Aft Accom	System 97	HVAC & Refrigeration system	X			
98	System Commissioning Procedure - HVAC & Refrig Fwd Accom	System 97	HVAC & Refrigeration system	X			
99	System Commissioning Procedure - E- House/Laboratory HVAC system	System 97	HVAC & Refrigeration system	X			
100	System Commissioning Procedure - Corrosion and Antifouling	System 98	Corrosion Protection	X			

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### **3 OTP TYPICAL INDEX & CONTENT**

#### **3.1 INDEX**

OTP suggested typical index is the following:

1. INTRODUCTION
  - 1.1. OBJECTIVES
  - 1.2. ABBREVIATIONS
  - 1.3. STEPS SUMMARY
2. SYSTEM DATA
  - 2.1. SYSTEM DESCRIPTION
  - 2.2. EQUIPMENT LIST
  - 2.3. SYSTEM BOUNDARIES
  - 2.4. SUB-SYSTEM LIST
  - 2.5. SYSTEM DEPENDANCIES
  - 2.6. SYSTEM DOCUMENTATION
3. SYSTEM GENERAL PRE-REQUISITES
  - 3.1. SYSTEM READINESS
  - 3.2. SAFETY
  - 3.3. VENDOR ASSISTANCE
  - 3.4. COMMISSIONING SPARES AND CONSUMABLE
    - 3.4.1.Oil&First Fill
    - 3.4.2.Temporary Systems
    - 3.4.3.Materials and Consumables
    - 3.4.4.Test Equipment and special tools
4. COMMISSIONING PROCEDURES (without feedstock HC / onshore)
  - 4.1. TEST DESCRIPTION
  - 4.2. TEST PREPARATION AND PRELIMINARY CHECKS
    - 4.2.1.Electrical
    - 4.2.2.Mechanical & Process
    - 4.2.3.Instrumentation
  - 4.3. OPERATIONAL TEST
    - 4.3.1.Mechanical & Process
    - 4.3.2.Electrical
    - 4.3.3.Instrument
  - 4.4. CERTIFICATION
  - 4.5. POST TEST CONDITION
    - 4.5.1.Reinstatement
5. COMMISSIONING PROCEDURES (with feedstock HC / offshore)
  - 5.1. TEST DESCRIPTION
  - 5.2. TEST PREPARATION AND PRELIMINARY CHECKS

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- 5.2.1.Electrical
- 5.2.2.Mechanical & Process
- 5.2.3.Instrumentation
- 5.3. OPERATIONAL TEST
  - 5.3.1.Mechanical & Process
  - 5.3.2.Electrical
  - 5.3.3.Instrument
- 5.4. CERTIFICATION
- 5.5. POST TEST CONDITION
  - 5.5.1.Reinstatement
- 6. TESTING WITNESS AND ACCEPTANCE CERTIFICATE
- 7. APPENDIX
- 8. ATTACHMENTS

### 3.2 CONTENT

OTP suggested typical content is the following:

1. INTRODUCTION
  - 1.1. OBJECTIVES

Brief description about scope of the dynamic testing of the system, inclusive of a brief description about the relevant method statement. OTP's sections describing the testing procedures shall be arranged in a step by step check list form. Each step shall include the details relevant to the individual tags of any item/switch/breaker/equipment to be operated.

- 1.2. ABBREVIATIONS AND TERMS

List of abbreviations and acronyms used in the document.

- 1.3. STEPS SUMMARY

The Operational Test is executed like a step by step procedure, allowing a systematic approach and an easy monitoring of the progress. In this section shall be included a table summarizing the total number of steps to be executed, giving the figure of the OTP size and the numbers for monitoring management, even though a tool like Completion and Commissioning Management System. Here below an example of the summary table.

SECTION	SUB-SECTION	NUMBER OF STEPS
<b>SYSTEM GENERAL PRE-REQUISITES</b>	SYSTEM GENERAL PRE-REQUISITES	5
<b>COMMISSIONING without HC feedstock</b>	PRELIMINARY CHECKS	10
	OPERATIONAL TEST	40
	POST TEST CONDITION	10
<b>COMMISSIONING with HC feedstock</b>	PRELIMINARY CHECKS	7
	OPERATIONAL TEST	30
	POST TEST CONDITION	6
<b>TOTAL NUMBER OF STEPS</b>		<b>108</b>

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## 2. SYSTEM DATA

### 2.1. SYSTEM DESCRIPTION

Description of the System subject to the operational test including sub-system list, functional data, operating parameters, operating fluids, rated capacity, etc.

### 2.2. EQUIPMENT LIST

List of the main equipment being part of the involved System including main equipment, assemblies and components within the System, with relevant design and operating data

### 2.3. SYSTEM BOUNDARIES

Identification of the System limits, marked-up P&ID and isolations required can be attached to the OTP.

### 2.4. SUB-SYSTEM LIST

List of all the Subsystems involved into the OTP execution.

### 2.5. SYSTEM DEPENDANCIES

List of the predecessors and successors Systems and Subsystems whose OTP execution is required prior to execute the present OTP and whose OTP can be executed only after the execution of the present one.

### 2.6. SYSTEM DOCUMENTATION

Engineering Reference Document List: list of those Engineering documents to be considered for proper comprehension and execution of the OTP.

Commissioning Supporting Document List: list of those documents specifically issued for Commissioning purpose (including Vendors documents).

## 3. SYSTEM GENERAL PRE-REQUISITES

### 3.1. SYSTEM READINESS

This section shall list and detail all the pre-requisites required for proceeding with the OTP's execution.

Pre-requisites shall include:

- Achievement of subject system's completion minimum requirements, i.e.:
  - o Achievement of Mechanical Completion by relevant sub-systems;
  - o No outstanding punch item "A";
  - o Required ITR-B completed;
  - o No outstanding NCR or DR relevant to the System.

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EXAMPLE

No.	Description	Sign/Date
1.	Check P&IDs, cable layouts, MCC design, termination etc. (where applicable) are at the latest revision and marked up with testing limits.	
2.	Ensure that MC certificate for the system has been issued and Signed.	
3.	Ensure that all dependence system are already commissioned and available for the purpose	
4.	Ensure that all associated commissioning static test, individual component function test and "B" ITRs have been completed and accepted]	
<u>5.</u>	Ensure that there is no punch items which prevent safe operation Operational Test	
<u>6.</u>	Ensure the communication between all parties involved is working properly and should maintain throughout the commissioning activity	
<u>7.</u>	Ensure that LOTO devices are in place	
<u>8.</u>	Confirm all relevant approved "red-lined" or marked "as-built" drawings have been reviewed and any impact taken into account.	
<u>9.</u>	Prior to commissioning work commencement, check for and confirm the availability of materials, tools, spare parts, manpower and scaffolding needed for the commissioning work.	
<b>System Commissioning Responsible Engineer:</b>		
<b>Signature:</b>		<b>Date:</b>

## 3.2. SAFETY

Definition of communication rules and means for granting proper control and coordination of activities related to OTP execution (i.e.: communication protocol and communication equipment, like portable radios, PAGA, etc.);

Accomplishment with HSE requirements specific for OTP execution (i.e.: JSA, PTW, LO/TO, testing area restrictions, SIMOPS, specific PPE requirement, MSDS, etc.).

Fire&Gas detection system working (if required), fire extinguishing system available (if required).

## 3.3. VENDOR ASSISTANCE

List and timing of the vendors required to execute the OTP.

## 3.4. COMMISSIONING SPARES AND CONSUMABLE

## 3.4.1.Oil&amp;First Fill

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Availability of consumables, like lubricants, hydraulic fluids, cooling fluids, seal barrier fluids, flushing/circulation fluids, service fluids, etc.

#### 3.4.2. Temporary Systems

Availability of auxiliary and/or utility systems required for performing the dynamic testing of the System in subject.

Availability of any required temporary equipment or service (i.e.: temporary power, fresh water, utility air, etc.).

#### 3.4.3. Materials and Consumables.

Availability of recommended commissioning spare parts.

#### 3.4.4. Test Equipment and special tools

Availability of any special tools and/or special test equipment required for OTP purpose.

### 4. COMMISSIONING PROCEDURES (without feedstock HC / onshore)

#### 4.1. TEST DESCRIPTION

This section shall include and describe all the tests which can be performed on the System before the hydrocarbon feedstock is introduced into the Facility.

In case of offshore installations (i.e.: offshore platform, FPSO, FPU, etc.) system testing not requiring hydrocarbon feedstock shall be completed onshore, before the load-out/sail away.

#### 4.2. TEST PREPARATION AND PRELIMINARY CHECKS

This section shall be arranged “by discipline” and shall describe the preparation and preliminary checks required for executing the dynamic commissioning of the system such as for example:

- System isolations in place;
- system's equipment for individual dynamic testing (i.e.: lube & hydraulic oil circuits flushing, filter cartridge/strainers installation/inspections, first filling of lube and hydraulic oils, coolants, etc.)
- ICSS blocks, forces and overrides required for testing purpose in place;
- Preparatory activities related to any auxiliary and utility systems done.

#### EXAMPLE

### **ENGINEERING COMPANY STANDARD**



No.	Description	Sign/Date								
<b><u>10.</u></b>	<p>By means of valid calibration certificates, verify that the pressure safety valves (PVSV"s) listed below have been tested, calibrated and reset within the last 60 days, otherwise the PVSVs must be removed re-tested, re-calibrated and reset.</p> <table><tr><td>332-0-PSV-001 A</td><td>332-0TA-003 Age Amine Tank</td></tr><tr><td>332-0-PSV-001 B</td><td>332-0TA-004 Fresh Amine Tank</td></tr><tr><td>332-0-PSV-011 A</td><td></td></tr><tr><td>332-0-PSV-011 B</td><td></td></tr></table>	332-0-PSV-001 A	332-0TA-003 Age Amine Tank	332-0-PSV-001 B	332-0TA-004 Fresh Amine Tank	332-0-PSV-011 A		332-0-PSV-011 B		
332-0-PSV-001 A	332-0TA-003 Age Amine Tank									
332-0-PSV-001 B	332-0TA-004 Fresh Amine Tank									
332-0-PSV-011 A										
332-0-PSV-011 B										
<b><u>11.</u></b>	Confirm that Loop Function Testing Control for all instrument items has been successfully completed									
<b><u>12.</u></b>	Confirm that the orifices plates have been inspected and dimensional checked as per data sheet and appropriate.									
<b><u>13.</u></b>	Confirm that System Control (Function) Testing of the system control scheme and the shutdown system had been completed in accordance with relevant commissioning procedure, control philosophy and cause and effect for the system									
<b><u>14.</u></b>	Confirm that the ["LUN Form"] forms "Livening Up Notice" are complete and authorized prior to energizing/pressurizing any pipework or mechanical equipment.									
<b><u>15.</u></b>	<p>Confirm that the motor/pump alignment and piping parallelism for the Pumps listed below had been done Successfully and relevant certificate had been signed.</p> <ul style="list-style-type: none"><li>• 3320PA003</li><li>• 3320PA004</li></ul>									
<b><u>16.</u></b>	<p>Confirm that the pumps listed below have the correct lubricants/greasing as per supplier data sheet.</p> <ul style="list-style-type: none"><li>• 3320PA003</li><li>• 3320PA004</li></ul>									
<b><u>17.</u></b>	<p>Confirm that the Solo-run for the motors listed below had been done Successfully and relevant certificate had been signed.</p> <ul style="list-style-type: none"><li>• 3320EPA003</li><li>• 3320EPA004</li></ul>									

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<b>18.</b>	Confirm that the system flushing had been done successfully and relevant certificate had been signed.	
<b>System Commissioning Responsible Engineer:</b>		
<b>Signature:</b>		<b>Date:</b>

## 4.2.1.Electrical

EXAMPLE

No.	Steps	Sign/Date
1.	Confirm that all switchboards, distribution boards, and panels required for the system or part of the system being tested have been function checked and energized	
2.	Equipment being subjected to electrical energizing/testing must be clearly identified with signs and markers prior to the commencement of work activities	
<b>Discipline Responsible Engineer:</b>		
<b>Signature:</b>		<b>Date:</b>

## 4.2.2.Mechanical &amp; Process

EXAMPLE

No.	Steps	Sign/Date
1.	Confirm that all Process equipment and loops required for the system or part of the system being tested have been function checked and operational.	
2.	Check coupling guard and flexible connections are correctly installed.	
3.	Verify all valves are installed in the right flow direction.	

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No.	Steps	Sign/Date
4.	Operate manually pneumatic and motor operated valves to check their free operation	
5.	Check all drain lines have the correct slope as per drawings and they are free from obstructions.	
6.	Check all bolts of flanged connections are tight.	
7.	Check all temporary pipe supports have been removed.	
8.	Verify all spring supports are properly set. Any temporary supports must be removed.	
<b>Discipline Responsible Engineer:</b>		
<b>Signature:</b>		<b>Date:</b>

## 4.2.3. Instrumentation

EXAMPLE

No.	Steps	Sign/Date
1.	Confirm all related instruments, junction boxes, relay panels and etc. has been energized and function tested in accordance with Project drawings and specifications.	
2.	The instruments Vendor's certificates and relevant data sheets (i.e. test, calibration, etc.) shall be available.	
3.	The S.A.T. of DCS/ PLC shall be completed including the communications with ESD/PLC by the vendor and certified by the EPC representative, Client and Vendor	
<b>Discipline Responsible Engineer:</b>		
<b>Signature:</b>		<b>Date:</b>

## 4.3. OPERATIONAL TEST

This section shall describe the individual step to perform the dynamic functional testing of the system.

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In case of specific Vendor's SAT procedure, these shall be endorsed and attached to the System's OTP.

As far as possible, for Process and Utility systems, their testing should include, as minimum, the following step:

- Test of system's trip, local shut down and emergency stop logics and sequences
- Validation of System related SIF
- Testing of operating sequences, logics and interlocks for each system's equipment and relevant auxiliaries, in particular:
  - o Start / Stop sequences
  - o Duty / Stand-By logics
  - o Automatic/Manual & Local/Remote control modes
  - o Hardware and Software interlocks;
  - o Changeover sequences
  - o Synchronization logics
- Dynamic testing of individual system's component (if any), including verification and logging of main operating parameters during load run test
- Testing of System's Control Narratives, including tuning/pre-tuning of relevant control loops;
- Verification of HMI settings (i.e. graphic pages, alarm indication, operator control interface, etc.);
- Verification of proper communication between system's control panel (if any) and ICSS;
- Clean-up Runs and Commissioning Runs of rotating machineries (where and as required).

While for Safety and Control Systems (i.e. ESD, F&G and DCS) the testing sequence should include (as minimum) the following step:

- Controllers redundancy check
- Controllers back-up batteries redundancy check
- I/O Modules redundancy check
- I/O Modules' bus communication redundancy check
- Safety Network redundancy check
- HMI graphic pages, historian service, sequence of event (SOE) service and alarms log service check
- Safety Logics check (safety Cause & Effect logics)

To be noted that, differently from safety logics, the control logics should not be tested as part of the OTP of any control system, but should be tested as part of the OTPs related to the individual controlled systems.

Control logics check should be performed, on each controlled system, accordingly to the approved Project Control Narrative, further than Vendor's Control Narratives (e.g.: packages), before starting any live/dynamic testing on the relevant system.

#### 4.3.1.Mechanical & Process

#### EXAMPLE

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No.	Steps	Commiss. sign	Operat. sign	Date
<b>System Sections</b>				
1.	System will be commissioning according to below listed steps <ul style="list-style-type: none"> <li>TGTU &amp; AGE AMINE STORAGE TANK</li> <li>TGTU &amp; AGE AMINE TRANSFER PUMP</li> <li>TGTU &amp; AGE FRESH AMINE STORAGE TANK</li> <li>TGTU &amp; AGE FRESH AMINE TRANSFER PUMP</li> </ul>			
2.	Use proper PPEs			
<b>332-0-PA-003 TGTU &amp; AGE AMINE TRANSFER PUMP</b>				
1.	Confirm circulation loop has been lined up as per the attached marked up P&ID (Attachment 1).			
2.	Open the manual isolation valve on the line (522-3"-NW-0-002) of Demineralized water from the distribution header.			
3.	During the water filling the levels (LT-01 & LG-01/02/03) must be aligned to verify the levels during water filling.			
4.	Verify LLLL & LLL is as per the system set points during filling operation.			
5.	Make 0.5 barg of N2 pressure inside the tank of Inert gas from line (600-2"-UN-0-055).			
6.	Confirm liquid level inside (3320TA003) is as per the test conditions (High liquid level) required for start-up of pumps (3320PA003).			
7.	Confirm suction strainer for the service water feed pump (3320PA003) is installed.			
8.	Make suction line free from any air pocket and pump to be vented any way applicable.			
9.	Check that there is no interlock which should be healthy to start the pump.			
10.	Keep the pump discharge valve on the line (332-4"-LA-0-024) fully closed and open minimum flow valve on the line (332-3"-LA-0-012) for close circulation operational test.			
11.	Monitor the level inside (3320TA003).			

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No.	Steps	Commiss. sign	Operat. sign	Date
12.	Confirm and ensure the following checks before start-up of pump. <ul style="list-style-type: none"> <li>• Check equipment for any physical damage.</li> <li>• Check that S.S nameplate with details are provided</li> <li>• Check pump to motor coupling guard is properly fixed</li> <li>• Check pump bearing lubrication / greasing</li> <li>• Check pump shaft seal / packing against leakage.</li> <li>• Check pump temporary suction strainer is installed</li> <li>• Check free rotation of the pump if possible</li> <li>• Check that earthing of equipment is provided</li> <li>• Check plugs are fitted to drain valves</li> <li>• Check bearing housing/gearbox lube oil for top up / refill</li> <li>• Check line up of Pressure Indicators, Pressure Transmitters</li> <li>• Check that pump is energized from MCC</li> <li>• Check priming of the pump and check associated valves</li> <li>• Check housekeeping of the skid</li> </ul>			
13.	Check the upper part of the tank (valves and devices) from any leakage and correct reading.			
14.	Initiate jog-start of the pump for 2 to 3 seconds. Confirm there is no excessive vibration, no abnormal sound, correct rotation direction, no leakage and discharge pressure is developed.			
15.	Restart the pump. If at time of startup any pressure fluctuation or abnormal sound comes, stop the pump, clean suction strainer, and restart the pump again.			
16.	Keep the pump running for two (2) hours or until its bearing temperature is stabilized whichever is longer.			
17.	Measure the bearing temperature, vibration, running current, suction and discharge pressure and fill in them on the Record Sheet every half an hour.			
18.	Verify the automatic sequences interlocks of pumps start-stop as consequence of the service water tank (3320TA003) levels.			
19.	Verify cause & effect, control narrative and system logic during the test.			
20.	Shut discharge valve slowly then stop the pump immediately after close the valve.			

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No.	Steps	Commiss. sign	Operat. sign	Date
<b>System Sections</b>				
<b>332-0-PA-004 TGTU &amp; AGE FRESH AMINE TRANSFER PUMP</b>				
1.	Confirm circulation loop has been lined up as per the attached marked up P&ID (Attachment 1).			
2.	Open the manual isolation valve on the line (332-3"-NW-0-001) of Demineralized water from the distribution header.			
3.	During the water filling the levels (LT-11 & LG-11/12/13) must be aligned to verify the levels during water filling.			
4.	Verify LLLL & LLL is as per the system set points during filling operation.			
5.	Make 0.5 barg of N2 pressure inside the tank of Inert gas from line (600-1½"-UN-0-021).			
6.	Confirm liquid level inside (3320TA004) is as per the test conditions (High liquid level) required for start-up of pumps (3320PA004).			
7.	Confirm suction strainer for the service water feed pump (3320PA004) is installed.			
8.	Make suction line free from any air pocket and pump to be vented any way applicable.			
9.	Check that there is no interlock which should be healthy to start the pump.			
10.	Keep the pump discharge valve on the line (332-3"-LA-0-003) fully closed and open minimum flow valve on the line (332-2"-LA-0-006) for close circulation operational test.			
11.	Monitor the level inside (3320TA004).			
12.	Confirm and ensure the following checks before start-up of pump. <ul style="list-style-type: none"> <li>• Check equipment for any physical damage.</li> <li>• Check that S.S nameplate with details are provided</li> <li>• Check pump to motor coupling guard is properly fixed</li> <li>• Check pump bearing lubrication / greasing</li> <li>• Check pump shaft seal / packing against leakage.</li> <li>• Check pump temporary suction strainer is installed</li> <li>• Check free rotation of the pump if possible</li> <li>• Check that earthing of equipment is provided</li> <li>• Check plugs are fitted to drain valves</li> <li>• Check bearing housing/gearbox lube oil for top up / refill</li> <li>• Check line up of Pressure Indicators, Pressure Transmitters</li> <li>• Check that pump is energized from MCC</li> </ul>			

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No.	Steps	Commiss. sign	Operat. sign	Date
	<ul style="list-style-type: none"> <li>• Check priming of the pump and check associated valves</li> <li>• Check housekeeping of the skid</li> <li>•</li> </ul>			
13.	Check the upper part of the tank (valves and devices) from any leakage and correct reading.			
14.	Initiate jog-start of the pump for 2 to 3 seconds. Confirm there is no excessive vibration, no abnormal sound, correct rotation direction, no leakage and discharge pressure is developed.			
15.	Restart the pump. If at time of startup any pressure fluctuation or abnormal sound comes, stop the pump, clean suction strainer, and restart the pump again.			
16.	Keep the pump running for two (2) hours or until its bearing temperature is stabilized whichever is longer.			
17.	Measure the bearing temperature, vibration, running current, suction and discharge pressure and fill in them on the Record Sheet every half an hour.			
18.	Verify the automatic sequences interlocks of pumps start-stop as consequence of the service water tank (3320TA004) levels.			
19.	Verify cause & effect, control narrative and system logic during the test.			
20.	Shut discharge valve slowly then stop the pump immediately after close the valve.			
<b>Systems Commissioning Responsible Engineer: (Print)</b>				
<b>Signature:</b>		<b>Date:</b>		
<b>Operations: (Print)</b>				
<b>Signature:</b>		<b>Date:</b>		

## 4.3.2.Electrical

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EXAMPLE

No.	Steps	Commiss. sign	Operat. sign	Date
1.	N/A			
<b>Systems Commissioning Responsible Engineer:</b>				
<b>Signature:</b>		<b>Date:</b>		
<b>Operations:</b>				
<b>Signature:</b>		<b>Date:</b>		

## 4.3.3.Instrument

EXAMPLE

No.	Steps	Commiss. sign	Operat. sign	Date
1.	N/A			
<b>Systems Commissioning Responsible Engineer:</b>				
<b>Signature:</b>		<b>Date:</b>		
<b>Operations:</b>				
<b>Signature:</b>		<b>Date:</b>		

## 4.4. CERTIFICATION

When the Operations Group, Commissioning and third parties are satisfied, the following certificates shall be compiled and included in the Commissioning dossier:

- Sub system Mechanical Completion Certificate (SMCC)
  - A sheet status index
- Sub system/System Ready for start-up certificate (RFSU)
  - B sheet status index
- Punch List

## 4.5. POST TEST CONDITION

## 4.5.1.Reinstatement

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This section shall describe both the reinstatement and preservation activities required after completion of the dynamic functional test of the system.

System reinstatement shall include those activities, within Commissioning scope, preparatory for start-up, or preservation, like flushing, chemical cleaning, dry-out, inerting / blanketing, etc., while preservation shall be required whenever the System is not going to be handed over and fully operated at the end of Commissioning without hydrocarbon feedstock.

EXAMPLE

No.	Steps	Comm. sign	Operat. sign	Date
1.	Remove all the temporary equipment and install the permanent gasket.			
2.	Remove any force on the DCS signals (if any)			
3.	Electrically isolate the energized equipment			
4.	Drain the water from the system			
<b>Systems Commissioning Responsible Engineer:</b>				
<b>Signature:</b>		<b>Date:</b>		
<b>Operations:</b>				
<b>Signature:</b>		<b>Date:</b>		

5. COMMISSIONING PROCEDURES (with feedstock HC / offshore)

5.1. TEST DESCRIPTION

This section shall include and describe all the tests which can be performed on the System only after the hydrocarbon feedstock is introduced into the Facility.

This section is not applicable for those Systems not requiring any Commissioning activity post hydrocarbon introduction.

5.2. PRELIMINARY CHECKS

5.2.1. Electrical

5.2.2. Mechanical & Process

5.2.3. Instrumentation

5.3. OPERATIONAL TEST

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5.3.1.Mechanical & Process

5.3.2.Electrical

5.3.3.Instrument

5.4. CERTIFICATION

5.5. POST TEST CONDITION

5.5.1.Reinstatement

## 6. TESTING WITNESS AND ACCEPTANCE CERTIFICATE

This section shall be signed by all the involved parties to certify the execution, witness and acceptance of the test.

The required signatures shall be customized according to the Project execution strategy.

### EXAMPLE

#### **Onshore Completion**

##### **Contractor Systems Commissioning Responsible Engineer**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Title: \_\_\_\_\_

Signature: \_\_\_\_\_

##### **Company System Commissioning Representative**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Title: \_\_\_\_\_

Signature: \_\_\_\_\_

##### **Company Operation Representative**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Title: \_\_\_\_\_

Signature: \_\_\_\_\_

##### **Third Party Representative (if applicable)**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Title: \_\_\_\_\_

Signature: \_\_\_\_\_

#### **Offshore Completion**

##### **Contractor Systems Commissioning Responsible Engineer**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Title: \_\_\_\_\_

Signature: \_\_\_\_\_

##### **Company System Commissioning Representative**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Title: \_\_\_\_\_

Signature: \_\_\_\_\_

##### **Company Operation Representative**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Title: \_\_\_\_\_

Signature: \_\_\_\_\_

##### **Third Party Representative (if applicable)**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Title: \_\_\_\_\_

Signature: \_\_\_\_\_

## 7. APPENDIX

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This section is filled during the preparation of the OTP document, it shall mainly contain any template sheet to be used during the OTP execution such as Motor Load Run Running Log form and those documents to be used as technical reference during execution of the OTP such as marked up P&ID.

#### 8. ATTACHMENTS

This section is filled during the OTP test execution, it shall contain the Log forms recording the operating parameters and all those documents used as technical reference such as:

- Mechanical & Electrical Isolation Check List;
- ICSS & UCPs Blocks, Forces and Overrides List;
- Vendor's SAT Procedure.

### **4 OTP PROGRESS MONITORING**

In order to monitor the progress about the completion of an OTP, relevant sections, listing and detailing pre-requisites checks, testing procedures, system reinstatement and preservation requirements shall be structured in separate "tasks", each one including specific "check steps". See also above the OTP STEPS SUMMARY TABLE.

The OTP progress, according to Project requirement, can be monitored daily or weekly and the progress figure can refer either to a defined percentage of the OTP accomplished (e.g. 5% pre-requisites, 20% preliminary checks, 90% operational test, 100% post-test condition) or to the calculated percentage of steps accomplished.

### **5 OTP ROLES AND RESPONSIBILITIES**

Rules about witnessing and acceptance of OTP's steps, tasks and overall completion should be defined on a contractual basis.

Any involvement, in the approval process of an OTP, of a Third party or Certification Authority should be defined as well accordingly to project specific contractual requirement.

In any case, the following general rules, about notification, witnessing and acceptance, should apply.

Any official notification, related to OTP activities, shall be provided 48 hours in advance.

Whenever responsibility for the execution of Commissioning activities belongs to a Contractor, this latter shall duly notify to Company the starting of the activities relevant to a specific OTP.

Company's appointed Integrated Commissioning Team (made of both Commissioning and Operation Personnel, under coordination of Company Commissioning Manager) shall witness the execution of the OTP steps and sign them for acceptance.

#### **ENGINEERING COMPANY STANDARD**

Interim (in case of OTP split between commissioning w/o & with hydrocarbon feedstock) and final acceptance of the OTP shall be signed both by Company Commissioning Manager (or his deputy) and Company Operation Manager (or his deputy).

Whenever Contractor is responsible also for operating the Facility, Contractor's Operation Team shall be involved into notification and acceptance process of any OTP.

Whenever, the responsibility for the execution of Commissioning activities belongs to Company, each Commissioning System Lead shall be responsible for notifying, in due time, and involve the appointed Operation Team representative for witnessing and validating the accomplishment of the several OTP steps and tasks.

Even in this case, anyway, interim and final acceptance of the OTP shall be signed both by Company Commissioning Manager (or his deputy) and Company Operation Manager (or his deputy).

The single step signature should comply with the following rules:

- Test Pre-requisites and Test preparation to be signed by the Contractor or Company commissioning responsible.
- Operational Test and Post Condition to be signed by both Commissioning and Operation responsible.