

GENERAL SPECIFICATION

Field Operations

GS EP EXP 403

Production Availability Studies (PAS) of oil and gas facilities
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1. Scope and organization

1.1 Purpose of the specification

The purpose of this General Specification (GS) is to define the requirements for the performance of Production Availability Studies (PAS).

1.2 Field of application

This general specification applies to all development and project studies for new facilities or extensions to existing facilities, both operated by the Company and operated by others.

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of this document.

Reference	Title
IEC 60050-192	International electrotechnical vocabulary - Part 192: dependability
ISO 14224	Petroleum, petrochemical and natural gas industries. Collection and exchange of reliability and maintenance data for equipment
ISO 20815	Petroleum, petrochemical and natural gas industries. Production assurance and reliability management

Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published in the applicable yearly collection.

Reference	Title
Equipment type	Evaluation de l'Indisponibilité Théorique des Equipements Types et Exemple de Construction d'une Fonction. Rapport final établi par Marie BOITEAU. Révision 1 (31/03/08)
GS EP EXP 405	Standard reliability data report

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3. Acronyms

ADS	Assumption Data Sheet
bopd	barrels of oil per day
bwpd	barrels of water per day
CCF	Common Cause Failure
ESD	Emergency ShutDown
FMEA	Failure Mode and Effects Analysis
FSV	Field Support Vessel
HIPS	High Integrity Protection Systems
HIV	Heavy Intervention Vessel
k	10 ³
KoM	Kick-off Meeting
LIV	Light Intervention Vessel
M	10 ⁶
MAP	Production shortfalls (from the French “Manque à Produire”)
MTTF	Mean Time To Failure
PAS	Production Availability Study
PAD	Production Availability Diagram
PID or P&ID	Piping and Instrumentation Diagram
PFD	Process Flow Diagram
ROV	Remotely Operated Vehicle
Scfd	Standard cubic feet per day
SIMOPS	SIMultaneous OPerationS

Sm³/d or Scmd	Standard cubic meter per day
SoW	Scope Of Work
W	Watt
λ	Failure Rate
μ	Active Repair Rate

4. Terms and definitions

Availability	Ability to be in state to perform as required (IEC 60050-192).
Common Cause Failures (CCF)	Failures of multiple items, which would otherwise be considered independent of one another, resulting from a single cause (IEC 60050-192).
Company	Total E&P or any Total E&P subsidiary
Consolidated Scope of Work (SoW)	Improved SoW obtained from an intensive question/answer process between the Contractor and the Company. This should be performed at the very beginning of a production availability analysis in order to: - Identify the key indicators to estimate. - Verify that the actual problems are correctly identified
Contractor	Any Company has signed a Contract with for the realisation of a PAS.
Critical failure	Failure of an equipment unit that causes an immediate cessation of the ability to perform a required function (ISO 14224).
Degraded failure	Failure that does not cease the fundamental function(s), but compromises one or several functions (ISO 14224).
Emergency ShutDown (ESD)	Control actions undertaken to shutdown equipment or process in response to a hazardous situation.
Failure	Termination of the ability of an item to perform a required function (ISO 20815).
Failure mode	Effect by which a failure is observed on the failed item (ISO 14224).

Failure Mode and Effects Analysis (FMEA)	Qualitative method of analysis that involves the study of possible failure modes and faults in sub items, and their effects at various indenture levels (IEC 60050-192)
Failure Rate (λ)	limit, if it exists, of the quotient of the conditional probability that the failure of a non-repairable item occurs within time interval $(t, t + \Delta t)$ by Δt , when Δt tends to zero, given that failure has not occurred within time interval $(0, t)$ (IEC 60050-192)
Flaring Policy	Description of flaring consents and constraints.
Flow Diagram	A directed graphical network made of modules representing the various parts of the production system with their given production capacities linked together in order to represent the circulation of the production flow.
Logistic Delay	Accumulated time during which maintenance cannot be carried out due to necessity to acquire maintenance resources excluding any administrative delay (ISO 20815).
Operating Philosophy	Rules describing how the installation is operated. <u>Note</u> : Safety, maintenance, spare part and flaring policies depend on the given production installation. They are likely to have a strong impact on production availability performance.
Production Availability Diagram (PAD)	Graphical network made of blocks linked together to represent the criticality, the logic, the level of redundancy, the capacity of the different items of the facility under study.
Production Availability	Production availability is the ratio (expressed as a percentage) of actual production over the production forecast for a given period of time (ISO 20815). <u>Note 1</u>: It is important to check the parameters of this formula as early as possible since they may vary during the study (production profile, nominations, etc.). <u>Note 2</u>: Actual production figures and the production reference level used to calculate MAP must be clearly indicated to facilitate the interpretation of production availability. <u>Note 3</u>: The production availability of several systems does not simply consist of a sum or a product of their respective production availability figures. <u>Note 4</u>: Production availability is not necessarily associated with oil or gas production, but could, for example, concern water, steam, or energy injection, etc.

Repair Rate (μ)	Limit, if it exists, of the quotient of the conditional probability that the repair is completed within time interval $(t, t + \Delta t)$ and Δt , when Δt tends to zero, given that the repair started at $t = 0$ and had not been completed before time t (IEC 60050-192)
Reliability	Ability to perform as required, without failure, for a given time interval, under given conditions (IEC 60050-192).
Reliability Block Diagram (RBD)	Logical, graphical representation of a system showing how reliability of its sub items (represented by blocks) and combinations thereof, affect reliability of the system (IEC 60050-192)
SIMultaneous OperationS (SIMOPS)	SIMultaneous OperationS (SIMOPS) of production and construction or production and well activity may request that production is partially or completely shut down for safety reasons.

5. PAS methodology

The following section outlines the methodology and the main steps of the PAS process, as presented in the workflow in the figure 1:

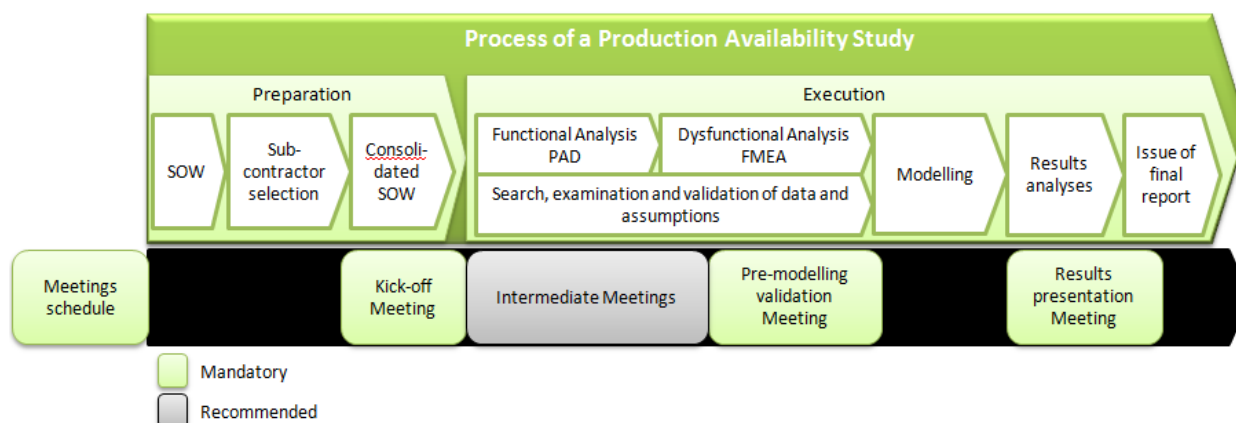


Figure 1: Process workflow

5.1 Preparation phase

5.1.1 Scope of Work

{Rule 1:

Whatever the level of details of the study, the Company shall prepare a detailed SoW that include:

- A project description and the context of the study;
- The objectives of the PAS (all the parameters to evaluate, the availability targets to meet, etc.);