



Exploration & Production

GENERAL SPECIFICATION

FIELD OPERATION

GS EP EXP 201

**Operations preparation during project -
Maintainability & Inspectability criteria**

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1. Scope

The availability of industrial facilities is directly affected by the downtime associated with their maintenance and inspection activities. This may vary significantly depending upon the complexity of the plants, its maintainability, its inspectability, and the statutory requirements.

In order to achieve the required performance it is necessary to anticipate the maintenance and inspection requirements at project phase, and to ensure suitable maintainability and inspectability of the concerned plant.

This specification aims at defining maintainability and inspectability criteria, both technical and organisational, necessary to ensure the installations' integrity throughout their life, that shall be assessed throughout the pre-project and project phases. These requirements complement as necessary those provided in other Company General Specifications.

2. Application

This General Specification is applicable to all construction projects including the erection of new facilities, or the modifications of existing ones, whether implemented by integrated project groups or by the modification/construction or maintenance teams of the affiliates; it concerns all facilities operated by the Company.

3. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Standards

Reference	Title
EN 13306	Maintenance Terminology
ISO 14224	Petroleum and natural gas industries – Collection and exchange of reliability and maintenance data for equipment

Professional Documents

Reference	Title
Not applicable	

Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
Not applicable	

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS EP EXP 203	Maintenance and Inspection documentation preparation during project phase
GS EP EXP 205	Requirements to MIEC Contractor for spare parts
GS EP EXP 311	Plant Integrity. Minimum Inspection requirements
GS EP ECP 103	Process sizing criteria
GS EP SAF 261	Emergency shut-down and emergency De-Pressurisation (ESD & EDP)
GS EP STR 002	Cranes for fixed offshore installations
GS EP MEC 290	Rotating machines packages
GS EP ELE 001	Electrical design criteria
GS EP ELE 364	Electrical installations
GS EP PVV 107	Piping stress analysis

4. Terminology

Maintainability	Ability of an item under given conditions of use, to be retained in, or restored to, a state in which it can perform a required function, when maintenance is performed under given conditions and using stated procedures and resources. (EN 13306) Note: In the above definition, and in the context of the present General Specification, the term maintainability is understood to also include the ability to permit inspection of equipment, named by extension inspectability.
Vital	Equipment whose failure immediately decreases the level of safety, affects the environment, or impairs export or production.
Critical	Equipment necessary for health and general welfare of the personnel, or whose failure may affect the environment, or impair export or production.
Secondary	Equipment whose failure neither affects safety, nor the environment, nor production.

Shutdown strategy The strategy applicable for the planned shutdowns states the intent to either proceed to regular total shutdowns like in the refinery sector and applied generally in the LNG plants, or alternatively to perform the maintenance and inspection works independently unit by unit, or to adopt an intermediate policy (partial shutdowns).

5. Generalities

During the course of a project Maintenance and Inspection Engineering is performed, consisting of several simultaneous activities:

- Maintainability and Inspectability studies **GS EP EXP 201**
- Documentation management **GS EP EXP 203**
- Spare-parts selection **GS EP EXP 205**

5.1 Specification purpose

The purpose of the present specification is to define the maintainability and inspectability criteria that shall be considered throughout the project process by all parties involved in or in charge of:

- The project design, coordination or supervision,
- The engineering, the specification, selection or purchase of materials and equipment, the construction, the installation, or the commissioning,
- The supply of equipment or services (vendors),
- The operations preparation including the maintenance engineering, the inspection engineering, the baseline surveys and the start-up of the facilities.
- The maintenance and Inspection engineering QA/QC.

It ultimately aims to ensure that the maintainability and inspectability criteria are met thus ensuring the required availability and integrity of the facilities throughout their operational life.

5.2 Nature of maintainability and inspectability criteria

The maintainability and inspectability criteria cover various aspects, of both an organisational and technical nature which may be intrinsic (only related to item) or extrinsic (context dependant). They cover preventive and corrective maintenance requirements, major overhaul, revamping and inspection works. They are established in light of various obligations and of economic considerations.

They include but are not restricted to:

- Consistency between the design, the maintenance and inspection strategies resulting from the operating philosophy, and the applicable standards and rules: legal requirements, Company HSE standards,
- Consistency of equipment and associated maintenance/inspection philosophy with the maintenance and inspection resources that can be mobilised, and with the industrial environment, context of after sales services, available logistic support,

- Consistency with the shutdown strategy: process by-pass, amount of spare parts and capital spares, tools sets, working space around packages, accommodation facilities, lifting and storage facilities, maintenance and inspection staff, etc.
- Spare capacity, redundancy of items (hot or cold stand-by),
- Standardisation of equipment (other similar equipment already installed, or subject to installation),
- Modularity (possibility of partial exchange by module, possibility of alternative running modes involving equipments from different units or trains,
- Equipment and item environment: access, physical constraints (temperature, smoke, gases, etc.), others,
- Handling facilities (possibilities for installation or removal),
- Dismantling/tooling (convenient dismantling possibilities, availability of standard or special tools),
- Internal access (convenient access to internals),
- Potential hazard constraints (e.g. corrosive or contaminated products, stress level, etc.),
- Standardisation of components (components suitability to various equipment),
- Equipment condition monitoring (possibility of on-line or off-line monitoring, of sampling, availability of measurement points), facilities for defect analysis and for efficient diagnosis,
- Availability and usefulness of required documentation,
- Availability of the necessary supporting means: workshops, warehouse, stock, support contracts, etc.

6. General design studies

Specific maintainability and inspectability related studies shall be carried out during the course of the project. They shall first be taken into account to validate the equipment lay-out, and the main project options, and shall be followed up along the project to ensure consistency of the final delivered installations.

These studies include but are not restricted to:

- Validation studies on certification or inspection matters, as defined in chapter 5.1,
- Reliability and risk assessment studies, as defined in chapter 5.2,
- Accessibility study, as defined in chapter 5.5,
- Handling – lifting studies, as defined in chapter 5.6,
- Complementary maintainability and inspectability reviews, as necessary.
Such studies shall typically be carried out for the packages and other equipment of high value, subject to heavy maintenance, and with critical impact on operations. This includes but is not limited to: the power generation systems (main and emergency units), the gas lift, or gas injection or gas export compression packages, the water injection packages, the water treatment units, the oil export systems, and the export metering systems.