



Exploration & Production

GENERAL SPECIFICATION

Design of Field Facilities

GS EP SAF 021

Layout

Main Instructor for Derogation: ECI (Design of Field Facilities)

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Contents

1. Scope	4
1.1 Purpose	4
1.2 Applicability	4
2. Reference documents	4
3. Terminology and definitions	6
4. Location of the installation	8
4.1 Choice of a location	8
4.2 Impacted area	9
4.3 Site Contingency Plan	9
5. General arrangement	9
5.1 Methodology	9
5.2 Unit sorting	10
5.3 Unit configuration	13
5.4 Interconnection units	20
5.5 Location of rooms in the installation	20
5.6 Layout of integrated platforms	22
5.7 Temporary facilities	24
5.8 Future extensions	25
6. Equipment layout	25
Annex 1 (Informative) - Methodology to select layout	26
Appendix A - Spacing - Default distances tables	27
Appendix B - Arrangement of interconnections between units	46
B1. Pipe-racks	46
B2. Cable routes	46
B3. Bridges (offshore only)	46
Appendix C - Equipment layout	48
C1. General	48



C2.	Wells	49
C3.	Unfired process equipment.....	50
C4.	Fired equipment.....	55
C5.	Piping.....	57
C6.	Flares and vents	58
C7.	Storage	58
C8.	Safety equipment.....	59
C9.	Buildings	59
C10.	Miscellaneous	60
Appendix D – Bibliographic references.....		62



1. Scope

1.1 Purpose

This general specification lays down the minimum safety requirements for the layout of **installations**, both onshore and offshore.

The dispositions of this specification are in accordance with **API RP 14J** recommendations unless appropriate justification corresponding to COMPANY practices and tolerances is brought.

The main recommendations for the **layout** of installations and the main steps of the methodology are included in Annex 1 of this document.

1.2 Applicability

This specification is **not** retroactive.

It shall apply to new installations and to major modifications or extensions of existing installations, both onshore and offshore.

This specification does **not** cover:

- Exploration drilling temporary facilities
- FPSO's and boats
- LNG plants
- Jetty and shoreline terminals
- Refining and marketing facilities.

2. 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
Not applicable	

Professional Documents

Reference	Title
API RP 14J	Recommended Practice for Design and Hazards Analysis for Offshore Production Facilities

Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
Not applicable	

Other documents

Reference	Title
	Statement Of Requirements (SOR) Safety Concept Operating Philosophy

Total General Specifications

Reference	Title
GS EP ECI 001	Reference levels for offshore platforms
GS EP ELE 001	Electrical design criteria
GS EP ELE 079	Electrical apparatus for potentially explosive gas atmosphere
GS EP ELE 364	Electrical installations
GS EP LSO 110	Environmental effects considerations for helidecks
GS EP SAF 041	Technological Risk Assessment Methodology
GS EP SAF 216	Area classification
GS EP SAF 221	Safety rules for building
GS EP SAF 222	Safety rules for turbines, Diesel engines, gas engines and process units in sheltered or enclosed areas
GS EP SAF 227	Safety rules for fired heaters
GS EP SAF 253	Impacted area, restricted area and fire zones
GS EP SAF 261	Emergency Shut-Down and Emergency De-Pressurisation (ESD and EDP)
GS EP SAF 262	Pressure protection relief and hydrocarbon disposal systems
GS EP SAF 321	Fire pump stations and fire water mains
GS EP SAF 337	Passive fire protection: Basis of design

Reference	Title
GS EP SAF 341	Location and protection on onshore hydrocarbon storage
GS EP SAF 351	Escape, evacuation and rescue from fixed installations
GS EP STR 002	Permanent lifting or handling devices for offshore installations

3. Terminology and definitions

There are three types of statements in this specification, the “shall”, “should” and “may” statements. They are to be understood as follows:

Shall	Is to be understood as mandatory. Deviating from a “shall” statement requires derogation approved by the COMPANY
Should	Is to be understood as strongly recommended to comply with the requirements of the specification. Alternatives shall provide a similar level of protection and this shall be documented
May	Is used where alternatives are equally acceptable

For the purpose of this specification, the following definitions shall apply (the terms defined in this section are often in bold characters in the text of the specification):

Area (impacted)	Area that extends beyond the boundaries of the installation but which is nevertheless affected either permanently by normal operation of the facility (e.g. noise, radiation) or exceptionally by the consequences of an emergency situation caused by a major failure (COMPANY)
Area (restricted)	Area within the boundaries of the installation and hence under the control of COMPANY, which is affected permanently by normal operation of the facility (e.g. noise, radiation) or exceptionally by the consequence of an emergency situation caused by a major failure (COMPANY)
Credible event	Incident likely to occur within a concerned area. Used for the definition of fire zones. Consequences corresponding to a credible event of a given fire zone shall not impact other fire zones (COMPANY)
Emergency Control Centre	Place where emergency response personnel go to undertake their emergency duties (COMPANY). Equivalent to ISO-definition of Emergency Station
Emergency Response (ER)	Action taken by personnel on or off the installation to control and/or mitigate a hazardous event (ISO)
Equipment	Any component or group of components specifically identified and itemised on the P&IDs (COMPANY)
Escape Route	Route from an area of an installation leading to a muster area, a Temporary Refuge (TR), an embarkation area and/or means to escape (ISO)

Escape, Evacuation and Rescue (EER)	General term used to describe the range of possible actions including escape, muster, refuge, evacuation, escape to the sea and rescue/recovery (ISO)
Failure (major)	A conceivable incident that can possibly occur on the facility. Used for the definition of the facility restricted area and impacted area (COMPANY)
Fire zone	Area within the installation where equipments are grouped by nature and/or homogeneous level of risk attached to them. The partition into fire zones is such that consequences of a fire, flammable gas leak or an explosion corresponding to the credible event likely to occur in the concerned fire zone, shall not impact other fire zones to an extent where their integrity could be put at risk
FPSO	Floating, Production, Storage and Offloading system includes, in addition to storage and offloading capability, facilities for receiving crude oil from producing wells and processing it for export by separating water and gas (OGP)
Fuel source	Same as ISO definition of "source of release" (API)
General Arrangement (GA)	Also called Overall Plot Plan. Action of sorting and grouping equipment into units , defining their location considering environment, neighbourhood, unit inter-dependence and spacing to match safety and operability requirements (COMPANY)
Hazardous area and zone	A hazardous area is defined as a three dimensional space in which a flammable atmosphere may be expected to be present at such frequencies as to require special precautions for the control of potential ignition sources (IP 15). All other areas are referred to as non-hazardous areas (or safe areas) in this context. In a hazardous area three types of zones (0, 1 and 2) are recognised (IP 15)
Ignition source	Source of temperature and energy sufficient to initiate combustion (API)
Installation	Technical unit in which dangerous substances are produced, used, handled or stored, including all the equipment, structures, pipework, machinery, tools, private railway sidings, docks, unloading quays serving the installation, jetties, warehouses or similar structures, floating or otherwise, necessary for the operation of the installation (COMPANY from European Directive 96/82/EC, dated December 9 th , 1996)
Layout	Action of selecting the location of the installation , defining unit general arrangements and placing equipment within units (COMPANY)
Local Authority	Organisation, body, office or individual responsible for approving the installation with regards to local applicable regulation and for defining jointly with COMPANY, approving and enforcing the Site Contingency Plan (COMPANY)

Lower Flammable Limit (LFL)	Lower concentration of gas (by volume and expressed in percentage) in a gas-air mixture that will form an ignitable mixture (API, NFPA)
Site Contingency Plan	Plan describing all the measures planned for dealing with the scenarios deduced from the major risks calculated for the installations
Source of release	Point from which flammable gas, liquid or a combination of both can be released into the atmosphere (ISO)
TEMPSC	Totally Enclosed Motor Propelled Survival Craft: Craft capable of sustaining the lives of persons in distress from the time of abandoning the installation (ISO)
Units	Areas within the installation resulting from its partition into a reasonable number of geographical and functional groups of equipment having the same type (hydrocarbon, pressure, inventory, ignition, etc.) and levels (high, medium, low) of risks (COMPANY).

4. Location of the installation

The location of any new **installation** or any major extension of an existing **installation** shall be approved by COMPANY.

The choice of the location shall always be justified by a supporting dossier as described below, particularly when several locations can be initially envisaged.

4.1 Choice of a location

The following surrounding facilities and their foreseeable extension shall be identified:

- Other petroleum or industrial installations
- Access roads, ground, sea (waterways) and air transportation networks
- Electrical power, water, telecommunication, distribution networks
- Presence and density of population, public buildings.

The following environmental conditions shall be identified:

- Soil conditions, relief
- Local specific risks such as seismicity, landslides (either onshore or submarine), floods, sand storms, permanent frost, typhoons
- Meteorological conditions (temperature, hygrometry, sun, rain, wind, snow, ice, fog, lightning)
- Sea conditions (water depth, swell, currents, salinity)
- Cold source vicinity (sea, river, air)
- Protection of nature (site, fauna, flora) and visual impact
- Security risks.

The Local Regulation in force shall be complied with (e.g. the requirements imposed by the **Local Authority**).

The different criteria, factors and rankings in the decision-making process shall be recorded. The selection shall be justified in all cases. Special attention shall be given to the selected location when several options can be initially envisaged.

4.2 Impacted area

Once a location has been selected:

- The impacted area around the installation is defined taking the major failures scenarios using the consequence analysis methods and criteria as specified in **GS EP SAF 253**
- Permanent settlements, public places and transport corridors encroaching the impacted area shall be particularly identified and the need to relocate them shall be specifically addressed.

4.3 Site Contingency Plan

From the very beginning of this process and before a location is eventually selected, a preliminary **Site Contingency Plan** is prepared in close relationship with **Local Authorities**.

It shall be ensured that dispositions it includes regarding communication (alerting neighbourhood and **Local Authorities**), evacuation, rescue means to public and implementation of mitigation measures are fulfilling **Local Authorities'** requirements.

The Site Contingency Plan may also cover areas extending beyond the impacted area but it is not the purpose of the present document to elaborate upon it.

5. General arrangement

5.1 Methodology

Different approaches are possible to determine minimum distances between different fire zones and between units within the same fire zone.

COMPANY's practice is to proceed as follows:

- At Preliminary and Conceptual stages, issue a preliminary **General Arrangement** based on the recommendations provided in various General Specifications, including this one (in particular refer to Appendix A tables and figures), and/or COMPANY engineering expert judgment
- At Pre-Project stage, issue the **plot plans** and improved partitions between fire zones and units, using consequence analysis software(s) available in-house (refer to **GS EP SAF 253**)

- At Basic Engineering stage, issue **layouts** within units and, if proven necessary, carry-out further consequence analysis and/or a QRA¹ to confirm/optimize distances and partition
- At Detailed Engineering stage, incorporate VENDOR data to finalise equipment **layouts** (refer to Appendix C for equipment location requirement and recommended distances between equipments).

Detailed work on **General Arrangement** (GA) shall **not** commence before :

- The location of the installation has been selected (refer to Section 4)
- The **restricted area** has been defined (as per **GS EP SAF 253**)
- The installation has been split into **fire zones** (as per **GS EP SAF 253**).

GA of any new installation or any major extension of an existing installation shall be subject to approval by COMPANY and shall incorporate all provisions for temporary facilities and/or future extensions.

5.2 Unit sorting

5.2.1 Main Principles

- **Fire zones, unit partitions** and number of units shall be coherent
- **Unit partition:** The split into units shall be compatible with the split into fire zones. Each unit is included into one, and only one, fire zone. A unit cannot sit over two fire zones. One fire zone can incorporate one or several units. Units are further divided into pieces of equipment, and bulk. Each fixed equipment belongs to one, and only one, unit. A piece of fixed equipment cannot belong to two units
- **Fire-fighting and emergency capabilities:** The capability for the active fire-fighting and emergency systems to operate efficiently on the biggest units within their fire zones and with maximum acceptable risk for the assets shall be ensured
- **Risk level:** Partition should be such that each unit is composed of elements (equipment and/or components) having comparable process risk levels
- **Process flexibility and availability:** The break-down into units should be such as to allow optimum operational flexibility and required availability. For instance in the case of an installation composed of two separators and two compressors, it shall be assessed whether it is preferable to group them into two identical processing trains comprising one separator and one compressor each, or into a separation unit (comprising both separators) and a compression unit (comprising both compressors). Input for such arrangement shall be provided by the OPERATING PHILOSOPHY
- **Asset protection:** The split into units shall be such that the risk acceptability criteria set forth in **GS EP SAF 041** for assets is complied with
- **Interconnection between units:** An interconnecting unit is defined only if it links different process units and if it is mainly composed of all-welded piping with few flanges, or single run cables with few junction boxes. A pipe-way within a single process unit or with

¹ QRA shall be used only on large projects or when imposed by applicable regulation and in order to keep individual risk within acceptable limits. In practice QRA shall be carried out by the end of the basic engineering i.e. soon enough so as to allow feed back of its main findings into the layout, if necessary.

numerous flanges, valves, vents, drains, etc., shall be considered as being part of the unit it pertains to. Offshore, bridges between platforms are interconnecting units

- **Sub deluge zones:** The possible partition into sub-deluge zones shall also be considered and made compatible with the unit sorting (Refer to **GS EP SAF 253**).

5.2.2 Group of equipment

With reference to **API RP 14J**, units shall be sorted out into nine different categories called "groups of equipment" (refer to table below) presenting homogeneous risks, both in terms of nature and level.

The objective is two-fold:

- (i) Achieve segregation of fuel source from ignition source by separation of equipment
- (ii) Define compatibility of units between each-other (refer to Section 5.2.3).

Group	Type	Main equipment	Hazard
T1	Wellhead	Wellheads, chokes, wellhead manifolds and headers	Fuel source
T2	Unfired process	Manifold and headers, separators, heat exchangers, water treatment, pumps, compressors, unit enclosures, finger type slug catcher, metering	Fuel source
T3	HC storage	Storage tanks, sump tanks, produced water treating tanks	Fuel source
T4	Fired process	Fired equipment, fired heaters, TEG reboilers	Ignition source
T5	Machinery and power generation	Generators, electric equipment, air compressors, engines, turbines	Ignition source
T6	Buildings	Living quarters, technical buildings, maintenance areas and buildings, offices, control room, sewage disposal, water makers	Ignition source
T7	Pipelines and risers	Risers, pig launchers, pig traps	Fuel source
T8	Vents		Fuel source
T9	Flares	Including burn pits	Ignition source

5.2.3 Compatibility

Units are compatible together when they can be located beside each other:

- Either without particular precautions dictated by safety that would come in addition to other considerations such as constraints of construction, operability or maintenance
- Or providing supplementary precautions (e.g. enlarged distance or separation wall) are duly implemented.

Two **units** indicated as non compatible shall be located in two different fire zones.

Unit Compatibility		T1	T2	T3	T4	T5	T6	T7	T8	T9
T1	Wellhead	Y								
T2	Unfired process	N ⁽¹⁾	Y							
T3	HC storage ⁽¹⁰⁾	N ⁽⁸⁾	N ⁽²⁾	Y ⁽³⁾						
T4	Fired process	N	Y ⁽⁴⁾	N	Y					
T5	Machinery	N ⁽⁸⁾	Y	N	Y	Y				
T6	Buildings	N	N ⁽⁵⁾	N ⁽⁵⁾	N ⁽⁵⁾	N ⁽⁵⁾	Y			
T7	Pipelines and risers	Y	Y	N ⁽⁶⁾	N	N	N	Y		
T8	Vents ⁽⁹⁾	N	N ⁽⁷⁾	N	N	N	N	N ⁽⁶⁾	Y	
T9	Flares	N	N ⁽⁷⁾	N	N	N	N	N ⁽⁶⁾	N	Y

- (1) Not compatible as a general rule however exception for unfired process units attached to wellhead unit e.g. test separator.
- (2) Not compatible as a general rule except (i) unfired process units attached to storage unit e.g. pumping station for hydrocarbon transfer and (ii) small (less than 50 m³) propane storage used in cooling units and providing they are suitably protected (additional distance + embankment).
- (3) Liquid hydrocarbon storage is not compatible with liquefied hydrocarbon storage.
- (4) Units indicated as non compatible by **API RP 14J** but considered compatible by COMPANY if sufficient distance is provided (as per Appendix A or consequence analysis as per **GS EP SAF 253**).
- (5) Buildings are not compatible with any other units. This restriction does not apply to technical buildings housing process (hazardous or non-hazardous) or utility.
- (6) Not compatible as a general rule but it is tolerated that pipelines (excluding risers, manifolds, pig traps) can cross storage units or flare/vent areas if they are without flange and suitably protected against explosion (from storage units) and radiation (from storage units and flare/vent).
- (7) Units indicated as non compatible by **API RP 14J** but COMPANY tolerates that flare/vent drum and auxiliaries (e.g. condensate pumps, purge/pilot gas skid) are in the flare/vent fire zone providing radiation criteria given in GS EP SAF 262 are fulfilled..
- (8) Except for wells with pumping units.
- (9) Cold vents (as per **GS EP SAF 262**) only. Degassing vents (as per **GS EP SAF 262**) compatible with all other units.
- (10) This category includes both liquid hydrocarbon and liquefied HC storage.

On highly congested **installations**, and in particular offshore, units cannot always be segregated by position. In order to provide sufficient independence, they shall be separated by passive fire and blast protection that can resist the effects of a fire or an explosion (based on the scenarios retained in the SAFETY CONCEPT and corresponding to the **credible events**) and conserve the following default fire and blast ratings **after** the fire or explosion has occurred:

- H-120 (or J-120 if and where relevant) within the impact distance of a process or hydrocarbon storage fire zones and for units necessary for Emergency Response and/or **EER**
- H-60 (or J-60 if and where relevant) within the impact distance of a process or hydrocarbon storage fire zones for non-**EER** or non-**ER** equipment
- A-0 in a non-hazardous area, but in the **restricted area**
- Blast protection ratings are evaluated according to the congestion within the platform
- No particular requirement outside the **restricted area**.

5.3 Unit configuration

5.3.1 Objectives

Unit configuration shall be such that the main safety objectives listed below are fulfilled:

- Generic for any industrial installation
 - o To prevent logistics accidents, and in particular to pay attention to security and control of access (refer to Section 5.3.2), traffic (refer to Sections 5.3.3 & 5.3.5) and lifting (refer to Section 5.3.6)
 - o To ease operability of the installation with a special emphasis on accesses to working areas (refer to Section 5.3.7) and space reservations around equipment (refer to Section 5.3.8).
- Specific to hydrocarbon production, processing and storage installations
 - o To locate ignition sources and fuel sources with due consideration of wind, in order to prevent ignition after a gas release (refer to Section 5.3.9)
 - o To locate fuel sources with due consideration of wind, sea swell and current, to minimise the consequences of fires (refer to Section 5.3.9)
 - o To ease mitigation measures, and in particular facilitate access for Active Fire-Fighting (refer to Section 5.3.10)
 - o To provide adequate arrangements for safety to life, and in particular **EER** (refer to Section 5.3.11).

5.3.2 Security and control of access (onshore only)

The installation under the control of COMPANY shall be closed to general public access.

The installation under the control of COMPANY shall be fenced. Refer to Figure 1 - Security and access control (typical onshore).

The installation shall be divided into a **general service area** and a **plant area** as defined below:

- The **general service area** comprises activities in relation with the outside world (T6 classification) and that cannot cause hydrocarbon hazards, such as parking lots, workshops, warehouses, offices, living quarters, control rooms, muster areas, embarkation area, bus stations or helidecks
- The **plant area** incorporates activities that can cause hydrocarbon or other chemical and ignition hazards, such as well heads (T1); process units, unfired or fired (T2 and T4); hydrocarbon storage units (T3); machinery and power generation (T5); pipelines and risers (T7); vents (T8); flares and burn pits (T9).

Entry point(s) from outside the installation to the **general service area** shall be located to meet **security** requirements. Entry points from the **general service area** to the **plant area** shall be located to meet **safety** requirements.

Direct access of public to the **plant area** shall be made impossible.

Access of public to the **general service area** shall be made normally possible via one single main entrance with a security check-point.

Other means of access shall be normally closed and limited to exceptional or emergency purposes e.g. exceptional heavy loads, Emergency Response or emergency exits.

The access from the **general services area** to the **plant area** shall be limited to authorised personnel only. The access of authorised personnel from the general service area to the plant area shall be made normally possible via a limited number of main entrances, preferably one with a safety check-point.

The other means of access between the **general services area** and the **plant area** shall be limited to exceptional or emergency purposes, with the same principles as above.

5.3.3 Access roads (onshore only)

Access roads shall be segregated into three categories:

- Outside up to the security check point
- In the **general services area**
- In the **plant area**.

5.3.3.1 General for all access roads

Access roads shall be practicable all year round and of adequate type for the vehicles that are likely to be used, in particular for the following: overall maximum weight, maximum axle weight, head and width clearance, roadway width and bending radius.

Special consideration shall be paid for snow, ice, defrosting and heavy rains conditions.

At least **one access road** shall remain passable in any combination **of fire scenario and environment conditions**.

Provision for the specific risks to the installation and its environment such as cattle guards, illuminating at night or under fog conditions, risk of water flood or heavy rains (e.g. monsoon) shall be considered.

5.3.3.2 Additional requirements in the installation

Inside the installation, the restrictions for traffic use and directions to reach the loading/unloading posts or the parking lots shall be clearly identified and marked.

Access roads shall conveniently stop at the muster areas in the general service area.

5.3.3.3 Additional requirements in the plant area

The restrictions for entry into the **plant area** applicable to all vehicles shall be assessed taking into account type of engine, fuel and exhaust system.

Access ways in the **plant area** shall provide safe and easy access for any service vehicles (e.g. mobile fire-fighting means, crane or heavy truck), with (refer to Section 5.3.10 & Appendix C1.1):

- Adequate headway and width at overhead pipeline crossing points
- Capacity to bear the biggest load
- Adequate turning bend radius
- Where necessary, protection of access road nearby piping equipment against vehicle collision.

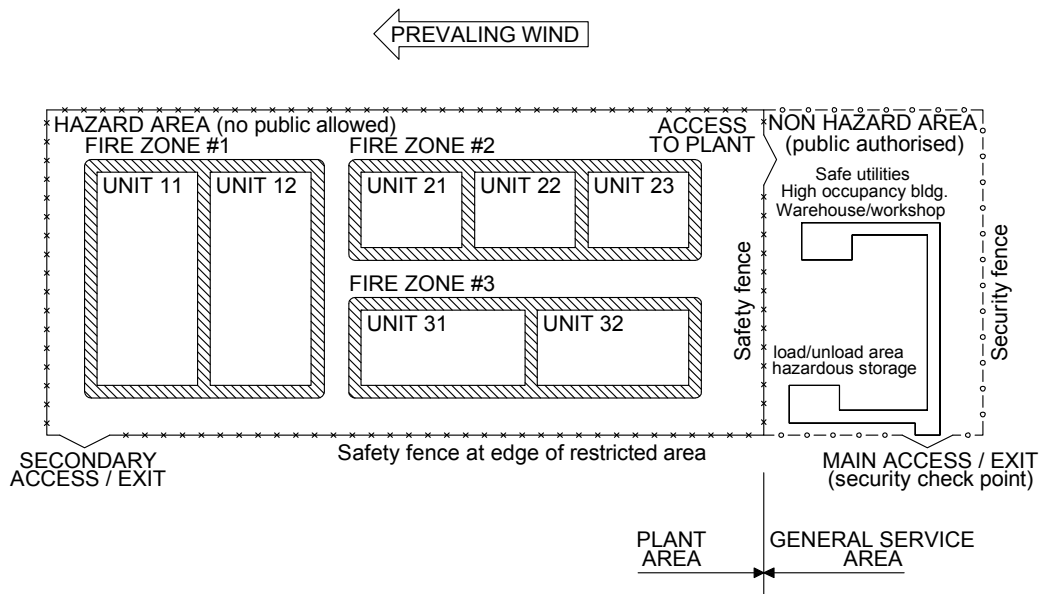


Figure 1 - Security and access control (typical onshore)

5.3.4 Boat approach (offshore only)

Boat landings shall not be on the same platform side as risers.

Boat landings should not be located above sea lines that are not suitably protected against maximum load impact by boats using the landing.

Furthermore the boat-landing position shall take into account risks due to:

- Flare, vent and exhaust locations
- Wind, sea swell and current direction (refer to Section 5.3.9).
- Hazardous areas, including when wire-line operations are performed on any well.

The location of the landing should take into consideration the direction of the prevailing wind, swell and/or tidal currents in order to minimise the likelihood of collision by a drifting boat.

Boats should normally approach the boat-landings against swell and current.

Ideally boat landings should be downstream of the most stringent prevailing wind, swell or tidal current (see Figure 2 - Typical layout of offshore fixed platforms) downwind of the platform.

A perpendicular position (see Figure 3 - Typical layout of offshore integrated platform) to the prevailing weather and sea might be acceptable, but there could then be limitations on the operational envelop of the boat.

The position and operation of the boat landing shall take into consideration the possible presence of a jack-up or tender support rig alongside the platform including flaring from the platform, jack-up or tender support rig. Appropriate operational constraints shall be put in place whenever flaring takes place.

Where a boat landing platform location, orientation or approach procedure does not comply with the above, a risk assessment shall be carried out, and a justification dossier produced supporting the reasons why the boat landing does not comply with these requirements.

5.3.5 Helicopter approach

Helideck position shall take into account risks due to:

- Flare, vent and exhaust locations
- Wind direction (refer to Section 5.3.9)
- Hazardous areas.

Helicopter should normally approach helidecks into the wind. The 210° approach sector shall be free, up to 1 km away, of any obstacle to air navigation and in particular of any flare, drilling mast/pole, crane and exhaust chimney.

For further details, refer to specification **GS EP LSO 110**.

5.3.6 Location of cranes and lifting devices

Cranes and lifting devices shall be located aside loading/unloading posts.

Loading/unloading posts shall be close to the main ways of access but shall not encroach upon them.

- **Offshore and shoreline crane.**
 - o Operational swing zones are prohibited above sea lines and risers unless they are suitably protected against maximum load impact
 - o The loads shall not pass over supply boats, except for routine loading/unloading operations.

- o The routine operational swing zones of permanently installed cranes shall not pass over equipment containing hydrocarbon unless said equipment has been designed for resistance to impact from loads dropped by the crane or properly protected
- o Crane movement above such equipment shall be limited to heavy maintenance activities. In these cases, the equipment shall be depressurised and drained and a specific procedure implemented or a lifting study and a dropped object risk assessment study shall be carried out.
- **Onshore**, the same recommendations shall be applied regarding swing zones over equipment containing hydrocarbon. Where a mobile crane is given preference over a set of fixed cranes, its possible and foreseeable operational locations shall be reserved and reinforced with concrete slabs. The safe access of mobile crane to its operational spots shall be demonstrated.

In all cases the crane operator shall have view over the whole swing zone and traffic around.

5.3.7 Access to working areas

Access arrangement for all routine operations should be straightforward and simple.

Operation and inspection points should be accessible and visible from main floors or aisles, preferably without the help of ladders.

All equipment requiring human intervention (for operation, maintenance, inspection, etc.) with a periodicity of at least once a month should be provided with permanent and fixed access devices.

Equipment, instruments, valves hand-wheels and piping shall not protrude into access ways so as to cause a hazard or to obstruct the escape ways. For further details dealing with the minimum clearances of the access ways, refer to Appendix C1.1.

5.3.8 Space reservations around equipment

Provisions shall be made to ensure that all routine operation involving handling of materials and equipment can be conducted in a safe manner.

Where simultaneous operations (SIMOPS) may take place between drilling or work-over and production, sufficient space shall be made available for pipe handling, mud handling, chemical delivery or sludge removal without interfering with the safety of personnel or with the safe operation of the installation.

Space shall also be provided for the lay-down of equipment during maintenance or replacement, particularly for large items, such as heat exchanger bundles, flame tubes, turbine and/or compressor shafts (overhauls).

5.3.9 Wind, sea swell and current

Several main criteria shall be considered. Refer to Figure 2 - Typical layout of offshore fixed platforms.

5.3.9.1 Ignition of a gas cloud

Flammable gas sources (release sources) shall not be located up the prevailing wind of any ignition source. This general rule may be deviated from in the specific case of integrated platforms (refer to Section 5.6).



5.3.9.2 Ignition of liquid hydrocarbon spills

The potential sources of liquid hydrocarbon spillage from production/processing units (release sources) should not be located up the prevailing wind of any ignition source.

5.3.9.3 Fire escalation

Any hazardous area shall be located down the prevailing wind of any hazardous area of lesser danger.

In particular, the accommodations and non-hazardous areas shall be located up (preferred option) or perpendicular (alternative option) to the prevailing wind of hydrocarbon production/processing units.

5.3.9.4 Flares and cold vents

Ignited flares are sources of ignition and should not be located down-wind of sources of flammable gas (or should be located far enough from them), except where flare are high enough to avoid any risk.

Conversely, the risk of flame-out where the flares become sources of fuel (i.e. release source) shall be considered.

Cold vents (refer to **GS EP SAF 262**) are source of release (i.e. fuel source) and could become ignition sources in case of accidental ignition.

As a consequence of the flares and cold vents being both sources of release and ignition, their preferred location is perpendicular to the prevailing wind.

5.3.9.5 Escape, Evacuation and Rescue (EER)

EER routes and systems shall be located up the prevailing wind of hazardous areas. **TEMPSC** which can head for a safe place by their own, should be located up and on the sides parallel to the prevailing wind. Life-rafts best location is on the sides parallel to the prevailing wind (refer to Section 5.3.11 & **GS EP SAF 351** for further details).

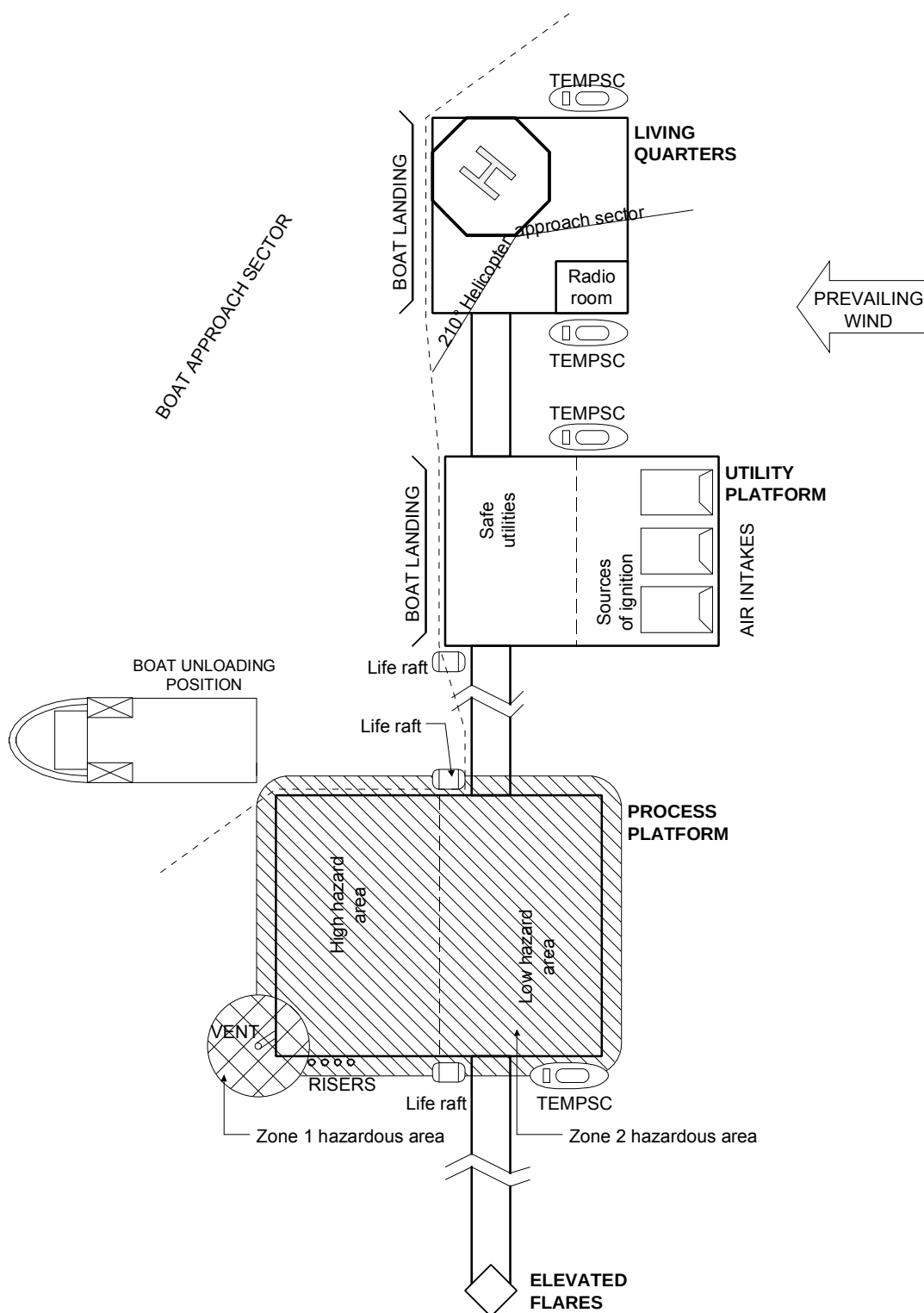


Figure 2 - Typical layout of offshore fixed platforms

5.3.10 Fire-fighting-related requirements

The maximum unit size shall be compatible with the maximum fire zone size (refer to [GS EP SAF 253](#) for further details).

Monitors shall either be accessible in case of fire, or alternatively they shall be remote controlled. Monitor control panels shall be shielded from thermal radiation coming from any potential fire.

The access ways shall be designed in such a manner that each unit handling hydrocarbon is accessible over the whole length of its sides, the loop surrounding them shall be connected to the general access system at a minimum of two points distant from one another and preferably from opposite side of the unit.

Access for active fire-fighting shall be possible under any combination of fire scenario and weather conditions. In particular, units shall be convex and should preferably be rectangular.

The layout shall be such that the fire water can be contained, or drained, to preclude any risk of liquid running fire.

5.3.11 Escape, Evacuation and Rescue systems

In addition to provisions for normal operation, the layout shall incorporate specific requirements to face an emergency situation.

Escape, Evacuation and Rescue (EER)-related requirements in the SAFETY CONCEPT shall be considered as mandatory for safety to life, and shall prevail over any assets protection, operability or technical constraints for unit layout.

The **EER** facilities, including temporary refuges, shall be located with due consideration for wind, sea swell and current (refer to Section 5.3.9) in addition to requirement mentioned in [GS EP SAF 351](#).

5.4 Interconnection units

Appendix B provides guidelines for the arrangement of interconnections between units such as pipe-racks, cable routes and bridges. It does not deal with other location and protection cases, for which another general safety specification is available:

- ESDV's (refer to [GS EP SAF 253](#) & [GS EP SAF 261](#))
- Flare network (refer to [GS EP SAF 262](#))
- Fire main ring (refer to [GS EP SAF 321](#)).

5.5 Location of rooms in the installation

The location of rooms in the installation shall be selected with a particular attention, and shall be supported by a specific justification dossier for approval by COMPANY.

The different rooms in the installation shall be classified either as:

- Technical rooms or
- Control rooms or
- Laboratories (and other rooms containing fuel sources as analyser shelters) or
- Workshops and warehouses or