MANUAL

DESIGN OF OFFSHORE LIVING QUARTERS

DEP 37.17.10.10-Gen.

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DESIGN AND ENGINEERING PRACTICE

PREFACE

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Shell International Exploration and Production B.V. (SIEP)
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The Hague, The Netherlands,

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The objective is to set the recommended standard for good design and engineering practice applied by Group companies operating an oil refinery, gas handling installation, chemical plant, oil and gas production facility, or any other such facility, and thereby to achieve maximum technical and economic benefit from standardization.

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TABLE OF CONTENTS

APPENDICES

1. INTRODUCTION

1.1 SCOPE

This DEP specifies requirements and gives recommendations for the design of offshore living quarters.

This DEP covers the complete architectural and technical services design for new and refurbished living quarters for offshore fixed and mobile installations. This DEP may also be used as an addition to new project contracting specifications as a part of a design brief.

This DEP states the minimum standards for design. Additional requirements are also listed which may be incorporated within the living quarters and may also provide additional comfort for personnel within the accommodation spaces. Living quarters, control stations and ancillary spaces should conform to these requirements.

All aspects of living quarters design are considered including permanent, ancillary and temporary accommodation, emergency living quarters and the possible use of living quarters as a temporary refuge. The design of helidecks and of the structure and substructure of living quarters are excluded from the scope of this DEP.

This DEP is a revision of the DEP of the same number dated November 1993; a summary of the main changes is given in (1.5).

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by SIOP and SIEP, the distribution of this DEP is confined to companies forming part of the Royal Dutch/Shell Group or managed by a Group company, and to Contractors and Manufacturers/Suppliers nominated by them (i.e. the distribution DEP is “F”, as described in DEP 00.00.05.05-Gen.).

This DEP is intended for use on offshore installations.

If national and/or local regulations exist in which some of the requirements may be more stringent than in this DEP, the Contractor shall determine by careful scrutiny which of the requirements are more stringent and which combination of requirements will be acceptable as regards safety, environmental, economic, and legal aspects. In all cases, the Contractor shall inform the Principal of any deviation from the requirements of this DEP which is considered to be necessary in order to comply with national and/or local regulations. The Principal may then negotiate with the Authorities concerned with the object of obtaining agreement to follow this DEP as closely as possible.

1.3 DEFINITIONS

1.3.1 General definitions

The **Contractor** is the party which carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project, or operation or maintenance of a facility. The Principal may undertake all or part of the duties of the Contractor.

The **Manufacturer/Supplier** is the party which manufactures or supplies equipment and services to perform the duties specified by the Contractor.

The **Principal** is the party which initiates the project and ultimately pays for its design and construction. The Principal will generally specify the technical requirements. The Principal may also include an agent or consultant authorised to act for, and on behalf of, the Principal.

The word **shall** indicates a requirement.

The word **should** indicates a recommendation.

1.3.2 Specific definitions

Accommodation space Any room used for eating, sleeping, cooking or

	recreation, as an office, sick bay, laundry room or locker room, any corridor giving access to any of these rooms, and any store room in the vicinity of any of these rooms.
Ancillary rooms	Those spaces which include the HVAC plant rooms, electrical switch rooms, battery rooms and suchlike which may serve both the Living Quarters and the installation.
Clean area	A hygienic area, free from dirt or contaminating matter.
Control stations	Those spaces in which the radio, central fire detection or control, the installation's central internal communication equipment, the emergency source of power or the emergency switchboard are located.
Hazardous areas:	As defined in Institute of Petroleum part 15 (IP-15) "Area Classification Code for Petroleum installations":
Zone 0	Areas in which an explosive gas-air mixture is continuously present, or present for long periods.
Zone 1	Areas in which an explosive gas-air mixture is likely to occur in normal operation.
Zone 2	Areas in which an explosive gas-air mixture is not likely to occur in normal operation, and if it occurs it will exist only for a short time.
Non-hazardous	By implication, an area which is not classified as Zone 0, 1 or 2 is deemed non-hazardous.
Normally manned offshore installation	An offshore installation on which persons are normally present.
Mobile installation	An offshore installation, other than a floating production platform, which can be moved from place to place without major dismantling or modification, whether or not it has its own motive power.
Living quarters	Living quarters, whether permanent, temporary or emergency, are permanently enclosed spaces such as cabins, dining/galleys, recreation rooms, sick bay, offices, change rooms, wash room areas and similar spaces used for the accommodation and welfare of personnel.
Sick bay	A room for the medical treatment and care of sick and injured persons.
Welfare needs	Those essential needs of personnel on offshore installations which include private areas for sleeping and resting, personal hygiene areas for washing, showering and changing, and areas for catering, food storage, dining, laundry, recreation and medical requirements.

1.4 ABBREVIATIONS

HVAC	Heating, Ventilating and Air Conditioning
ICC	Installation Control Centre
LQ	Living Quarters
MDPE	Medium Density Polyethylene
OIM	Offshore Installation Manager
PCF	Permit Control Facility
POB	Personnel on Board
TR	Temporary Refuge

1.5 SUMMARY OF MAIN CHANGES

This DEP is a revision of the DEP of the same number dated November 1993. Other than editorial changes, the main change since the previous edition is that the requirements have been presented in a goal setting format.

1.6 CROSS-REFERENCES

Where cross-references to other parts of this DEP are made, the referenced section number is shown in brackets. Other documents referenced by this DEP are listed in (16).

2. GOALS FOR THE DESIGN OF LIVING QUARTERS

2.1 OVERALL GOALS

The overall goals for the design of the LQ are, as far as is reasonably practicable:

- To provide an area where the POB (Personnel On Board) may be protected from harm, weather, noise and vibration.
- To provide a standard of accommodation commensurate with the duration and regularity with which persons are required to reside on offshore installations.
- To provide ancillary spaces to facilitate the operational requirements of the installation.
- To achieve the optimum use of space and weight in terms of living conditions and cost-effective layout through appropriate functional suitability, aesthetic appearance and coordinated interior arrangements.

2.2 SPECIFIC GOALS

The specific goals which contribute to the overall satisfaction of the overall goals are, as far as is reasonably practicable:

- To provide a design brief which defines the Operator's requirements and documents the basis for design.
- To provide adequate spaces, where required, to fulfil welfare needs in terms of areas for:
  - sleeping and resting;
  - personal hygiene;
  - catering and dining;
  - laundry;
  - recreation and leisure;
  - medical facilities.
- To provide adequate areas, where required, for management and control functions.
- To provide good access arrangements between all areas that personnel may require to use in both normal and emergency conditions.
- To provide adequate space for those utility services and equipment that are required to be located within the LQ.
- To select materials, equipment, components and finishes which are fit for purpose and suitable for their intended use in offshore conditions.
- To make provision in the design for utility services that make cost-effective use of space and interface efficiently with planned or existing platform utility services.

3. PREPARATION OF A BASIS OF DESIGN

3.1 GOAL

To provide a design brief which defines the Principal's requirements and documents the basis for design.

3.2 STRATEGY

Before the design of the LQ may commence a design brief should be formulated which defines the Principal's requirements and sets out the criteria to which LQ should be designed. Sizes and spatial configurations can therefore be assessed at an early stage in the design process and thus allow for optional arrangements in the most cost-effective manner. The conclusion of this process could provide a functional specification for a new LQ.

3.3 GUIDANCE

Information should include, but not be limited to, the areas described in the following Sections.

3.3.1 Location

Location of LQ relative to the installation and the installation location relative to onshore facilities.

3.3.2 Environmental conditions

Information should include, but not be limited to, maximum and minimum temperatures, humidity and design wind speeds and direction.

3.3.3 Type of LQ

3.3.3.1 Permanent Living Quarters

The permanent LQ may form part of an integrated deck, a self-contained module, a series of modules or a combination of all three. The LQ may be located directly on the installation or be located on its own jacket with bridge connection to the installation(s).

3.3.3.2 Permanent ancillary accommodation

Permanent ancillary accommodation may be required to augment permanent LQ facilities. This may take the form of pre-fabricated modular units. Various proprietary modular systems exist which are fully certified by the appropriate authorities and provide a variety of options and configurations from a single module to a range of interconnecting units. Whichever form is required, they should meet the requirements of this DEP.

If it is foreseen in the initial design of the permanent LQ that there may be a requirement for ancillary accommodation, then utility connections should be installed for later hook-up. Also, consideration should be given to designing the LQ utilities to cope with the extra future demand of ancillary accommodation.

The initial layout of the LQ should also reflect the ability to change, with spaces and circulation routes so positioned to allow for interconnection with ancillary accommodation. In all cases, safe escape routes should be retained.

3.3.3.3 Temporary reusable modules

Temporary reusable modules may be required on manned or normally unattended installations for use as additional accommodation on a specific short-term basis for a maximum period of twelve months or within legislative constraints.

3.3.3.4 Emergency living quarters

On normally unattended installations, means shall be provided for emergency accommodation unless it can be ensured that the need will not arise. This accommodation should be designed to cater for short maintenance visits or unscheduled overnight stays only. It should be capable of adequately and safely accommodating all persons who may be on the Installation at any one time and provide protection from the weather, sufficient food and water together with suitable means of heating and lighting to last for a limited period.

Dedicated sleeping facilities that are suitable and adequate for the purpose should be provided.

Medical facilities and storage for life jackets and survival suits should be provided.

3.3.4 Facilities

This covers the extent of facilities required in terms of welfare needs, personal hygiene, catering, management, control and services for the LQ and its installation(s).

The requirement for flexibility and change should the installation(s) facilities be expanded or

contracted should be considered.

3.3.4.1 Cabins

There should be sufficient beds for the maximum number of people required to sleep on the installation, without sharing by persons on successive shifts.

The number of persons per cabin shall not exceed four people, but it is recommended that a maximum of two persons should be accommodated in each cabin, with the following exceptions:

- Short-stay construction or maintenance workers' accommodation when a maximum of eight persons per cabin may be accepted for a limited period (see 4.2).
- Women should be allocated separate accommodation.

3.3.4.2 Personal hygiene

Personal hygiene facilities should be provided comprising:

- basin, shower and water closet available to each cabin (these may be shared but should be additional to public facilities);
- washroom facilities for general use with separate facilities for male and female personnel;
- separate wash room facilities for personnel to change and store dry working clothes before entering accommodation spaces;
- dedicated facilities for the galley staff and also for the medical treatment area.

3.3.4.3 Catering, food storage, dining and laundry

There should be sufficient food and water for all occupants according to the frequency with which supplies can be replenished.

The dining room size should be based on the seating arrangement and equipment to cater for shift patterns of the personnel. Experience has shown that a sizing basis of 35% POB likely to be on board at any one time is required.

Laydown area should be provided external and adjacent to the galley food storage area for temporary food containers and waste storage.

Separate laundry and linen storage should be provided on larger installations.

Emergency bedding store for one helicopter complement should be provided.

A refreshment room (tea/coffee room), separated from accommodation spaces, should be provided with direct access to the installation.

3.3.4.4 Recreation facilities

There should be a recreation space large enough to provide seating at one time for at least 50% of the number of personnel likely to be on board.

Additional recreational facilities may be provided, the number and size of which should be based upon the complement, the duration period of offshore residence and shift patterns.

Recreation facilities may include:

- games room;
- quiet lounge;
- video room;
- cinema;
- gymnasium.

Recreational areas with combined functions may be acceptable where space limitations restrict LQ size and the total usage is likely to be low.

3.3.4.5 Medical facilities

A first aid or medical room shall be provided with equipment, facilities and medication for rendering first aid to and treating persons who are injured or fall ill.

3.3.4.6 Management and control facilities

Facilities for management and control functions should be provided on the installation as follows:

LQ management and administration such as:

- Administration offices and crews room.
- Briefing room.
- Bonded store and camp boss office.
- Technical library.

Installation management and administration such as:

- Embarkation/disembarkation points (transit lounge).
- Radio and telecommunications room (see also DEP 32.71.00.12-Gen.).
- ICC (Installation Control Centre) or Emergency Control Stations.
- PCF (Permit Control Facility).

3.3.4.7 Utility service areas

Facilities required for utility service areas which may be located within LQ may include:

- Plant and equipment rooms for HVAC plant, potable water systems including storage tanks, purification treatment, pumps, calorifiers, compressors and condensers.
- Switch rooms for electrical switchgear, distribution boards and transformers.
- Battery rooms for batteries, chargers and inverters.

The requirement for utility areas will depend upon the availability and capacity of utility services on the host installation and the extent of self-support of the LQ.

3.3.5 Hazard Identification and Assessment

Of paramount importance in the design of Living Quarters is the aspect of safety for both personnel and the installation. This should dictate the type of construction and determine its ability to provide protection along with suitable means of access and escape. The positioning of Living Quarters on an installation and their classification and zoning requirements relating to the Installation do not form part of the scope of this DEP. The required protection of the Living Quarters should be established as a result of an assessment which may be the Fire and Explosion Assessment required by the Safety Case Regulations or similar local legislation. Reference is also made to Fire and Explosion Strategy as described in EP 95-0230.

The assessment should establish:

- The boundary classification and blast protection requirements.
- The means of access and escape.
- Arrangements for helicopter operations and survival craft.
- Possible positions of fresh air intakes and extracts with respect to the ingress of potential hazards such as smoke and gas.

Reference is made to EP 95-0000.

3.3.6 Manning levels

A considered assessment shall be made of the occupancy and fluctuations in manning levels by male and female persons throughout the life of the installation.

3.3.7 TR requirements

The LQ may be designated wholly or in part as a TR and should then conform to DEP 37.17.10.11-Gen. The TR should contain muster area(s) for the personnel on the installation and should be equipped with a control point for emergency communications.

The location of the designated TR, whether within the LQ or externally, should dictate escape routes. In all cases, escape routes should lead to the designated muster area(s) and doors should open in that direction. If muster areas are within the LQ, the escape routes should lead from there to evacuation points.

If the LQ are not to be the TR, the design should include an assessment of the risk that may prevent personnel from safely reaching their designated muster point in the TR. The escape routes from the LQ to the TR should be suitably protected against the risks that have been identified.

3.3.8 Construction

The objective is the provision of a structure(s) that utilises optimum weight and space in the most cost-effective manner in terms of materials and construction. Consideration should be given to the selection of materials, ability to fabricate, and construction facilities for the specified design life.

The LQ and their associated structures and services should be designed as an integrated unit to the greatest degree practicable. The design should ensure the maximum degree of onshore assembly and minimum amount of offshore work. Similarly, the design should optimise the possibilities for pre-commissioning and testing installations and systems onshore and minimising all offshore work.

Life cycle costs, ease of maintenance and the replacement of component parts should be a prime consideration at all times in the design development.

Weight limitations and cost control are always of prime importance in the design of LQs. In this regard, consideration should be given to prefabrication with lightweight materials. The advantages of modularisation are in quality control, fabrication, fit-out and testing which can be carried out in specialist workshops rather than a fabrication yard environment. However, the handling of lightweight modular units in high-speed winds may present a significant problem, and handling procedures should ensure safe practice during transportation, load-out and positioning. Consideration should also be given to enhanced protection of modular units against damage during transport.

Steelwork in a LQ is generally not subjected to low ambient temperatures (below 0 °C) and should not therefore require Charpy impact testing.

The method of construction and installation may require additional steelwork for sea-fastening and installation aids. These may impose weight and dimensional constraints.

For further detailed structural guidance reference is made to DEP 37.19.10.30-Gen. and DEP 37.19.00.30-Gen.

3.3.9 Noise and vibration

LQ shall in normal circumstances comply with noise and vibration limits in accordance with DEP 31.10.00.31-Gen., sections (4.3). and (4.4).

Sources of possible noise and vibration are:

- Air-borne noise radiating directly from a source to its surroundings;
- Structure-borne noise resulting from vibration in the audio frequencies range transmitted via the structure from a remote source and radiated as airborne noise;
- Vibration.

Noise and vibration should not exceed acceptable levels and should be such that warning signals are audible, normal speech, telephone and radio communication is possible and an acceptable environment is provided in accommodation areas for sleep and recreation.

A noise and vibration analysis should be carried out in sufficient detail at an early design stage.

Due consideration should be given to the location of mechanical and electrical equipment both internal and external to the LQ, which may be the source of noise and vibration and require containment. This equipment may be located in plant room spaces, workshops and suchlike. Consideration should also be given to materials selected for construction of those spaces.

3.3.10 Utility services

The layout of utility services affects the overall LQ spatial arrangements and therefore should be considered in the conceptual stage of design. Services should be selected and

efficiently arranged to facilitate their operation, reliability and future maintenance. The following systems may be required:

3.3.10.1 Piped services

- hot and cold potable water distribution system;
- drainage systems (single stack);
- seawater cooling and fire services;
- chilled water;
- refrigerant;
- compressed air; instrumentation and plant.

3.3.10.2 Heating, Ventilating and Air Conditioning (HVAC)

Refer to DEP 31.76.10.10-Gen. for general HVAC considerations.

(1) Temperature

The HVAC system should be designed to maintain a minimum temperature of 20 °C and a maximum temperature of 26 °C in all normally manned areas (cabins, offices etc.). The noise generated by the HVAC system should not exceed 40 dB(A). During periods when the outside conditions exceed design values, it is accepted that the inside temperature may not be to specification.

(2) Ventilation rates

Ventilation rates (in terms of air changes per hour) should be established from heating or cooling fresh air requirements and the need for pressurisation.

(3) Pressurisation

The LQ, if located in a non-hazardous area, should be pressurised to within the range of 25 Pa to 65 Pa with respect to outside atmosphere at design wind speed.

LQ located either partially or completely in a hazardous area shall be pressurised to a minimum of 50 Pa with respect to outside atmosphere at design wind speed.

Air locks should not be ventilated or pressurised.

(4) Extract system

If the toilet extraction is not a separate system, adequate protection should be in place to prevent odours circulating through the LQ on partial or total failure.
Extraction ventilation systems in the LQ should be separated to serve the following areas:

General extraction ventilation from cabins, office, recreation areas, dining room, locker room, toilets and corridors should be achieved through a centralised low-velocity ducted system.

Dedicated extraction system from the galley-associated stores, laundry, sick bay, electronic equipment, radio operator rooms (if fitted with gaseous extinguishing) and battery rooms.

(5) Air supply systems

The main air supply system should either be a fixed 100% fresh-air system, or a fresh-air/recirculated-air plant with automatic temperature-controlled change-over for full fresh air to part recirculation. The plant should be provided with an appropriate filtration system, which may be a two-stage filter/coalescer to collect dirt, moisture and salt aerosols.

(6) Humidification

The relative air humidity in normally manned areas should be between 20 and 80%. This requirement may be tightened if dictated by equipment requirements.

(7) Transfer grilles

Transfer grilles should only be provided in toilets since the objective is not to transfer air from cabins into corridors. All corridors and staircases should be positively pressurised in

comparison with adjacent areas to assist in maintaining smoke-free escape routes.

(8) Galley systems

Air supply ductwork to the galley shall be connected to the main supply duct outside the galley boundaries. Supply ducting to other areas shall not be taken through the galley areas.

The galley should be provided with canopies and hoods over all cooking equipment. These should be fitted with cleanable grease filters and suitable drainage. Provision should be made for fire detection and protection in the hoods, exhaust ductwork and fat fryer systems according to local regulations, NFPA-96, or similar standards.

(9) Laundry systems

Warm air drying machines are a serious potential source of fire. This is primarily due to inadequate filtration system permitting the build-up of lint, and to unsuitable duct design and materials selection. Where these machines are provided the following design guidance should be adopted:

- Position filters as close as possible to the drying machine outlet.
- Avoid vertical duct runs.
- Avoid concealed ductwork.
- Include adequate access doors for complete system cleaning and inspection. Provide specific means for quick removal and replacement of system components.
- Filters should be of a high capacity type.
- Minimise extract duct length from laundry machine to atmosphere.
- Use 'A' rated ducts, particularly where circumstances preclude application of the design principles stated above.

(10) Emergency and temporary LQ/TRs and office modules

Air supply and extraction ventilation as described above should be provided to achieve the required air change rates. Humidity control and cooling may not be provided.

Internal pressurisation should be provided as described above.

3.3.10.3 Electrical

- power distribution;
- lighting.

Further details are given in DEP 33.64.10.10-Gen.

3.3.10.4 Communications

- mandatory communications in the form of a combined public address and general alarm system;
- operational telecommunications including radios and telephones;
- non-essential telecommunications including entertainment systems and ancillary equipment;
- if the LQ are used as the TR, then radio and phone communications are required at muster points. Refer to DEP 37.17.10.11-Gen.

3.3.10.5 Detection and protection systems

These systems should include heat, smoke, fire and gas detection and protection systems in accordance with:

DEP 32.30.20.11-Gen., DEP 80.47.10.32-Gen. and (if required) DEP 80.47.10.12-Gen.

Reference is also made to EP 95-0000 series.

3.3.10.6 Co-ordination of utility services

Utility services should be co-ordinated so that all services are identified and located to allow fabrication and offshore hook-up to be completed with minimum offshore work. It also ensures deck-to-deck heights are kept to a minimum through optimisation of available space.

Main services, with the exception of firewater mains, should enter the LQ through a main service shaft. Consideration should be given to segregating the shaft for pipes, ducts and cables. The shaft should allow for ease of distribution at each level. Access for maintenance should be provided wherever required. Firewater mains should run external to the LQ.

All services should be clearly identified and routed together wherever possible.

Where utility services are temporarily terminated, they should be suitably blanked off to prevent ingress of dirt and moisture.

3.3.10.7 Platform interface

Design of structural and service interface connections between the LQ and the installation should minimise offshore hook-up and possible later removal.

With a modular-construction LQ, the structural interface should include lifting and support points. Ease of placement and the removal of the LQ on installation abandonment should be considered.

Common services should be grouped with a minimum of penetrations into the LQ and segregated as required by operational and maintenance considerations. Services interfaces may include the following:

- seawater, for HVAC cooling and fire services;
- potable water (cold), for domestic hot and cold water service;
- water/glycol mixture, heating medium for HVAC and/or domestic hot water generation;
- service and instrument air;
- electrical;
- communications;
- instrumentation;
- fire and gas connections;
- drainage piping;
- roof drainage from the helideck and LQ.

3.3.11 Materials and equipment

Materials, equipment, components and finishes selected should be fit for purpose and suitable for application in an offshore environment.

Materials should be non-combustible except where it can be demonstrated that any other required property or use of the materials precludes this. They should comply with relevant codes or standards and material selection based upon the following criteria:

- suitability for use in terms of physical, operational and environmental conditions;
- compatibility of materials;
- safety;
- hygiene;
- durability;
- weight;
- thermal and acoustic properties;
- assembly;
- maintenance;
- flexibility;
- finishes and aesthetic appearance.

Equipment within or associated with the LQ should comply with a recognised standard or specification and be suitable for its intended purpose. It should be located to ensure safe operation, be provided with a safe means of access and incorporate efficient control apparatus, guards, shields and other means of protecting personnel.

Further detailed guidance is given in section (13).

3.3.12 Preliminary sizing

The structure should be designed to allow for maximum utilisation of space, flexibility of layout and ease of service routings in both horizontal and vertical locations. Preliminary

sizing of the LQ should be based upon:

- Welfare needs and essential utility areas such as vertical shafts and risers, and horizontal routes for ducts, cables and trunking.
- Management and control facilities and utility services areas. These may or may not be an integral part of the LQ.
- Structural considerations and lifting restrictions.
- Safety considerations. The ability to escape from a hazard will dictate flow patterns and the position and size of corridors and staircases. The size of rooms will dictate the number, size and position of exit points.
- Designated muster stations (TR), if within the LQ, are to accommodate all POB.

3.3.12.1 Module height

The function of a space will determine its ceiling height. The depth of the ceiling void should be based upon the arrangement and maintenance requirements of the services to be accommodated. These requirements together with the structural framework configuration will have a direct bearing on the overall height of the LQ.

3.3.12.2 Layout principles

To achieve optimal use of space and ensure related areas are positioned adjacent to one another, the following should be carefully considered:

- Efficient use of space with respect to welfare needs, utility services and minimal personnel circulation.
- Flexible (multifunctional) use of space.
- Social interaction, providing social activity facilities but ensuring privacy where required.
- Personnel circulation, which ensures ease of access of personnel into, through and out of LQ, to and from helideck, muster area(s) and survival craft.
- Efficient arrangements; similar facilities should be located on the same level for ease of communication.
- Optimisation of services, so arranged to facilitate operations, maintenance and repair.
- Segregation of services, with water and drainage services located away from electrical services, machinery or equipment rooms.
- First aid, with access for stretchers, ease of evacuation of injured persons and facilities for emergency treatment.
- Hygiene facilities provided on each level for ease of cleaning.
- Access for personnel entering or exiting the LQ via the locker room or management and control facilities; access for services with the provision of laydown areas which are to be accessible to installation cranage and supply boat moorings for:
  - food storage and compactors adjacent to permanent food storage areas;
  - removal of bulk equipment within easy reach of plant rooms.
- Segregation of dissimilar noisy and quiet areas, dirty and clean areas, refer to (Appendix 1.1).

3.3.12.3 Personnel circulation

Circulation within the LQ should be arranged for ease of both horizontal and vertical flow of personnel between spaces. In addition, it should allow for the separation of working areas from accommodation spaces. Consideration should be given to work and leisure pattern arrangements and safety aspects in terms of means of escape. Access to cabins should be arranged to ensure that sleeping areas are not used as through-routes.

The numbers of entrances and exits into and out of the LQ should be limited. The primary 'dirty' entrance/exit should be via the locker room. An additional 'dirty' entrance/exit should be provided between the ICC/PCF and the installation. A 'clean' entrance/exit should be provided between the transit lounge and the helideck, and for access between the galley/food stores and laydown area.

Airlocks should be provided to all LQ entrances and exits, except those used for emergency, in order to maintain pressurisation and to limit smoke ingress.

4. WELFARE NEEDS - CABINS

4.1 GOAL

To provide adequate spaces, where required, to fulfil welfare needs in terms of areas for sleeping and resting.

4.2 STRATEGY

In order to maintain a level of comfort for individuals' needs in terms of privacy and quietness, the number of persons sharing a cabin shall not exceed 4 persons for a permanent LQ. However, it is Shell's preference that each cabin should either be double or single berth occupancy and provided with personal hygiene facilities which may be shared between two cabins. All cabins should be to the same standard on an installation.

In cases where campaign maintenance is the primary strategy for scheduled maintenance it may be permissible to install cabins with a maximum occupancy capacity of 8 people for temporary use. These cabins should not be in use for more than two weeks at a time and should not be used more than four times a year. If such an arrangement is considered, the benefits shall be carefully assessed, giving due consideration to the fact that such an arrangement will have a detrimental effect on the comfort of the individuals. Refer to (Appendix 4) for percentage weight savings by increasing the number of berths per cabin.

4.3 GUIDANCE

4.3.1 Cabin sizing

Cabin sizing should be based on the facilities provided and the amount of free circulation space for the occupants. In order to cater for individual needs, the minimum floor area for single and double cabins, excluding shower and water closet compartments and lobby, should not be less than 7.6 m^2. The net internal cabin area excluding lockers, bunk, desk and basin should not be less than 4.0 m^2. The minimum floor area for four-person occupancy should not be less than 12 m^2. For a larger temporary cabin (dormitory) the minimum floor should not be less than 3 m^2 per berth.

The clear internal height of the cabins should not be less than 2.4 m. The clear internal height of the shower, toilet and lobby area may be reduced to allow greater space in ceiling voids for utility services.

An example of an indicative cabin layout which makes good use of available space for two berths is shown in (Appendix 2).

For an assessment of module weight variations due to varying cabin sizes refer to (Appendix 4).

4.3.2 Cabin conversion

Cabins may be provided with a top bunk. This should be hinged to allow it to fold back to the bulkhead when not in use.

4.3.3 Additional berths

Where additional berths are required for circumstances such as hook-up or maintenance, additional temporary accommodation modules may be provided.

4.3.4 Cabin contents

As a minimum each cabin should contain:

- bunk unit with drawers underneath, and personnel restraint (safety) rail to top bunk;
- entertainment unit, clock and reading lamp associated with each bunk;
- provision for TV viewing from each bunk;
- desk, lamp and desk chair;
- lockers;

- life jacket and grab bag storage (if not provided at muster points);
- easy chair;
- shelf unit;
- tackboard.

5. WELFARE NEEDS - PERSONAL HYGIENE

5.1 GOAL

To provide adequate spaces, where required, to fulfil welfare needs in terms of areas for personal hygiene.

5.2 STRATEGY

Toilet and washing facilities should be provided for:

- Individuals' personal hygiene associated with the cabins.
- Public use, associated with all other facilities within the LQ, with separate toilet and washing facilities provided for male and female personnel.
- Dedicated facilities for galley staff and for the medical treatment area.

5.3 GUIDANCE

5.3.1 Cabins

Each cabin should have access to a wash basin, a WC and a shower. However, experience has shown that the indicative cabin layout shown in (Appendix 2) is very efficient in terms of personnel use, in that separation of the toilet and washing facilities allows use of all of the facilities at the same time. The combined area of the lobby, WC and shower also provides a noise barrier between the corridor and the cabin (sleeping) spaces. Arrangements that combine these facilities preclude simultaneous use which, at peak periods, may cause inconvenience to personnel. The preferred inclusion within the cabin space of the basins is also seen as the most efficient use of available space. Alternative layout proposals should be developed to allow comparison with respect to efficiency of personnel use, use of available space, and effectiveness in ensuring quiet sleeping areas.

5.3.2 Public utilities

Sizing of washing and toilet areas for general public use should be based on the POB. Facilities provided in cabins should not be included in the calculation for those required for public use. The following table is a guide to requirements:

Male personnel

1 WC per 25 persons (see NOTE 1 below);
1 urinal per 1 to 15 persons;
2 urinals per 16 to 30 persons;
3 urinals per 31 to 60 persons;
4 urinals per 61 to 90 persons;
5 urinals per 91 to 100 persons (see note 2 below);
1 basin per 10 persons for dirty processes; or
1 basin for 20 persons for clean processes.

Female personnel

1 WC per 10 persons (see NOTE 3 below);
1 basin per 10 persons for dirty processes or;
1 basin per 20 persons for clean processes.

NOTES: 1. For over 100 persons, 1 in 4 of additional WCs may be a urinal.

2. For over 100 persons additional provision of urinals should be determined by the number of WCs (see NOTE 1).

3. A minimum of 1 female WC and basin should be provided on every normally manned installation.

On installations with more than 25 POB, 2 showers may be installed in the toilet area and 1 shower in the female toilet area in the locker room.

5.3.3 Galley facilities

Toilet facilities containing a WC and wash hand basin should be provided for the sole use of the galley staff. This should be integral to the galley, but separated by a ventilated lobby.

5.3.4 Locker room

The locker room is required for personnel to change and store their working clothes, boots, and helmets before entering the clean area of the LQ. The locker room should be located so as to act as a natural transit between the working and accommodation areas. Public toilet and washing facilities should be located adjacent to the locker room and available to personnel before changing.

The locker room should accommodate lockers for 200% of the POB with an additional 15% for visitors. Lockers should be not less than 1 000 mm high x 300 mm wide x 500 mm deep. Consideration should be given to sealing the space between the tops of the lockers and ceiling to prevent accumulation of rubbish.

Lockers should be two-tier compartimental units and arranged in banks with adequate space between banks for personnel to change. Island bench seats and/or seats adjacent to the lockers should be provided.

6. WELFARE NEEDS - CATERING AND DINING

6.1 GOAL

To provide adequate spaces, where required, to fulfil welfare needs in terms of areas for catering and dining.

6.2 STRATEGY

6.2.1 General

The complex comprising laydown, food storage and preparation areas, the galley and dining room forms the largest integrated area in the LQ. It should be large enough to receive, store, process and serve perishable and non-perishable food for consumption by personnel on the installation. The facilities should be located together on the same level. Any refreshment room for use outside of the main catering complex also forms a part of the catering facilities.

Food should be received in containers via the laydown area, stored in designated temperature-controlled storage areas, prepared in a designated area, cooked in the galley and served to personnel in the dining room. The location of these areas should take into account logical work flows and patterns, from storage to issue, preparation, service and wash-up.

Where religious rulings so require, for instance with respect to kosher food and halal food, such food should be prepared and/or served in separate areas.

Dry waste should be deposited in compactors and waste bins situated in the laydown area. Perishable waste should be disposed of into waste disposal units located in the galley and discharged into the drainage system.

Lockers for the storage of galley staff's outdoor clothing should be provided in a convenient place adjacent to the galley.

A separate office may be provided within the galley complex for catering management purposes, which may also be combined with the camp boss office and bonded store.

As it is recognised that provision and operation of the catering complex would benefit from specialist Contractor input, it is recomended that this input be incorporated into design and construction.

6.2.2 Laydown areas

A dedicated laydown area should be located adjacent to the galley access, within the working radius of an installation crane and within the crane operator's view to enable containers, compactors or waste bins to be offloaded from the supply boat. Laydown areas should be arranged to allow day-to-day access to the food containers and constant visits to the waste compactors. They should be large enough to receive and accommodate the food containers and waste compactors and to accommodate emergency deep-freeze containers during breakdowns.

6.2.3 Food storage

Correct food storage is fundamental to any food operation to ensure good standards of hygiene. Storage conditions should reduce the rate of decomposition as much as possible to ensure that the food is maintained at the highest standard. Conditions in stores shall not expose the goods to a risk of taint or other contamination.

6.2.4 Food preparation

Areas should be dedicated to:

- baking and pastry preparation;
- vegetable preparation;
- meat, fish and poultry preparation.

Food preparation areas should be arranged to provide direct access to the preparation areas so as to minimise the risk of contamination in the food preparation chain between raw products such as meat, fish, vegetables and bakery products such as bread, cakes and sweets etc.

6.2.5 Galley

The galley should include areas for:

- prime and ancillary cooking requirements;
- hot services;
- dish wash facilities;
- pan wash facilities;
- equipment storage.

The area allocated within the galley complex for these activities should relate to the capacity of the service requirements. For higher POB sectionalised areas may be required and for lower POB multi-purpose space may be utilised.

6.2.6 Dining

The dining room should be designed as an integral part of, and adjacent to, the galley and should include for the serving of food and beverages on a self-help basis.

The dining furniture should be arranged to provide adequate personnel circulation with ease of access to servery and beverage counters. Consideration shall be given to the flow patterns, with sufficient space being allocated for queuing adjacent to the servery. This should be located near the entry of the dining room. See (Appendix A1.5).

The siting of the waste, dirty return and wash-up area should be located near the exit routes of the dining room.

6.3 GUIDANCE

6.3.1 Laydown areas

The sizing of laydown areas may be based on the following:

- POB greater than 50
  - at least 3 food containers, each 2.5 m^3;
  - 2 waste compactors, each of an area approximately 7.5 m^2;
  - space to be allocated for at least 1 refrigerated deep-freeze container;
  - 1 baler for waste paper in a weather proof enclosure.
- POB less than 50
  - at least 2 food containers;
  - 2 waste bins;
  - 1 baler (25 POB and over).

As loading of waste compactors and bins can be hazardous in windy conditions, safety side netting should be installed.

6.3.2 Food storage

The following 'walk-in' or purpose-designed temperature-controlled cabinets should be provided:

- deep freezer;
- refrigerated store;
- dry goods store;
- vegetable store;
- consumables store;
- defrost and blast chiller cabinets.

The minimum sizes of the above areas should be based on the location of the installation

relative to onshore facilities and the frequency with which supplies can be replenished.

Operating temperatures for the food storage areas should be as follows:

- deep freezer -18 °C;
- cold rooms 1 to 4 °C;
- vegetable store +6 °C;
- dry goods internal ambient;
- consumables internal ambient.

Proprietary deep freeze and refrigerated walk-in stores should be complete with floor, walls and ceiling panels, doors with trace heating to frames and thresholds, pressure relief valves and controls.

Refrigeration evaporators should be mounted in or adjacent to areas served, with associated compressor/condensing units mounted externally to the LQ, or within areas from where surplus heat can be easily and conveniently discharged.

Refrigeration machines should use zero-ozone-depletion refrigerants whenever possible. In the absence of these, refrigerants that exhibit the lowest practical depletion potential should be used.

Refrigerated stores should have external controls which include warning lights, thermostats and operating temperature display.

Entrances to deep freezers should be fitted with a flexible thermal curtain to prevent heat gain during prolonged periods of opening and with emergency alarm buttons within.

Doors should be openable from both directions for safety reasons.

6.3.3 Galley equipment

It is preferred that all galley equipment for an installation be supplied by a single specialist Manufacturer/Supplier for uniformity, spares and standardised quality. Their co-operation should be considered at an early stage of the design process so that a unified layout can be achieved. Technical support should be provided for all equipment selected. A Galley Equipment Guide is shown in (Appendix 1.2).

All base equipment in the galley, servery, dishwash area and storage shelving should, wherever feasible, be mounted on castors (front braked) for ease of cleaning and flexibility in the layout. Only sink units and items of equipment where stability is required should be set in fixed positions.

The equipment should be so arranged that the aisle space between equipment is a minimum of 1350 mm to allow for working and circulation. Refer to (Appendix 1.4) for details of central island units.

Sufficient clearance between floor finishes and equipment should be allowed for cleaning access.

6.3.4 Hot servery counter

The hot servery counter should be located in the bulkhead between the galley and dining room and positioned with ease of access to the prime cooking equipment arrangement. It should be designed to operate on a part assisted, part self-help principle with adequate capacity. As an initial guide it should be able to serve a minimum of 8 persons per minute over approximately 8 to 10 metre run. The integral hot cupboard should be capable of reaching and maintaining temperatures of 90 °C maximum and 65 °C minimum.

Refer to (Appendix 1.3.1) for details of the hot servery counter.

6.3.5 Cold servery counter

The cold servery counter should be located in the dining room. Refer to (Appendix 1.3.2).

Flow patterns of the servery should be so arranged that the services and dispensers are located near the entry point. A multi-purpose customised servery unit may be required for complements of 35 POB or more to meet the food and beverage service requirements.

Installations with a complement of less than 35 POB should include stand-alone chill units for all food and beverage items.

6.3.6 Wash-up area

Dishwash equipment should be located adjacent to the "dirties reception" from the dining room. It should incorporate a fully automatic plate and utensil washing machine with racks for cups, plates and utensils and a choice of wash rinse programmes of maximum three minutes, boxed edge tabling waste disposal unit, flexible rinse arm, basket storage and customised complimentary handling equipment. The washing machine should be fitted with an automatic feed soap dispenser.

Pan wash areas should be located within the galley and incorporate a single sink with integral splashback and pot boy scrubber. This area should include pot receipt and storage racking.

6.3.7 Dining areas

Lockable storage cupboards with shelving should be provided, where space permits, around the perimeter of the dining room to augment the servery storage. A lockable cupboard for storage of emergency medical supplies should also be provided in this area.

Refer to (Appendix 1.5) for guidance on seating and table arrangements.

6.3.8 Refreshment room

The refreshment room may be located outside the LQ in a non-hazardous area, or incorporated within the LQ and provide facilities for workers to smoke and have refreshments without first having to cleanse themselves. It should also be located so that it is accessible to both production and maintenance personnel. Consideration should also be given to the provision within the LQ of an area specifically for smoking, should the refreshment room be separate from the LQ.

The refreshment room should be equally divided into smoking and non-smoking areas for installations with a POB greater than 35. The areas should be segregated with partitioning in order to prevent migration of smoke. Single areas should be provided in the smaller installations.

Contents may include:

- stackable chairs for a minimum of 10 persons;
- tables;
- counter common to both areas, containing facilities for the preparation of hot and cold;
- beverages, to include storage cupboards under a sink unit with hot and cold potable;
- water supply. It may also contain:
  - hot water boiler;
  - chilled cold drink/water dispensers;
  - disposable cup dispensers;
  - tea/coffee dispensers.

7. WELFARE NEEDS - LAUNDRY

7.1 GOAL

To provide adequate spaces, where required, to fulfil welfare needs in terms of areas for laundry.

7.2 STRATEGY

Clothes and linen may be laundered offshore. If there is a requirement for offshore laundering then the following should apply.

The laundry and main linen store should be located together with direct interconnecting access. The laundry should be arranged with a clear distinction between a dirty linen reception area and a clean linen collection point. The clean linen collection point should be provided with shelving, consisting of a pigeon hole numbered and allocated to each bunk, where personal laundry can be stored whilst awaiting collection.

The laundry is a major source of noise and usually operates for 24 hours per day. It should therefore be located remote from cabins and any other quiet areas.

As it is recognised that provision and operation of the laundry and associated areas would benefit from specialist Contractor input, it is recommended that this input be incorporated into design and construction. The laundry facilities will normally be operated by the catering Contractor.

7.3 GUIDANCE

The laundry and linen facilities may include the following areas:

- laundry;
- main linen store;
- sub-linen stores (in cabin areas);
- emergency bedding store (if required).

The laundry facilities should be adequate to service the requirements of the POB based on sufficient installed equipment. As a guide this should include for 5 kg per person twice a week.

Washing machines and dryers should be mounted on plinths and positioned to allow a minimum clearance of 600 mm to the rear and 400 mm on either side of the equipment for maintenance access. The plinths and structural floor supporting the machines should be suitably designed to cater for their loadings and to isolate vibration from the structure. The use of antivibration mountings should be considered. The Manufacturer/Supplier of the equipment should be consulted to ascertain their requirements.

For ease of use and to minimise manual lifting and carrying, a sub-linen store may be located on every level in a multilevel LQ containing cabins. It may be located adjacent to the main access and internal staircase(s). The sub-linen stores may be used by the janitor to store and distribute linen and where applicable should be sized to accommodate the trolley used by the janitor.

Should an emergency bedding store be required, it should accommodate sleeping bags for nominally 20 persons. This store may be located outside the laundry area.

7.3.1 Laundry contents

The contents of the laundry may include:

a) Washing machines
Washing machines should be combined washer/extractors (spinners). They should incorporate fully automatic washing controls with manual override, and be equipped with standard selection programmes for the washing cycles, ranging from cold to boil. The door should be fitted with a door contact switch which cuts off heating and motor (washing and spinning) as soon as the door is opened, and with an interlock to prevent opening during a wash cycle. Machines should also be supplied complete with safety

interlocks and automatic contacts to safeguard against overloads and excessive wear during spinning cycles. Machines should be fitted with automatic feed soap dispensers. Machines with the capacity to wash 23 kg loads are recommended.

b) Tumble dryers
Tumble dryers should be electrically heated and supplied with manual control, thermostat, time and signal lights. Doors should be fitted with contacts which cut off heating and motor as soon as the door is opened.
Inspection panels should be placed in the extract duct work for safety purposes.

c) Other equipment
- double sink unit with shelf underneath;
- work tables with shelf underneath and upstand at the back edge;
- vacuum operated ironing table, caster mounted with thermostatically controlled electrically heated ironing surface and integrated water reservoir bottle;
- laundry baskets; and
- laundry trolleys.

7.3.2 Janitor and sub-linen stores

Each cabin level should contain storage room(s) for cleaning equipment, clearly marked as such, and may contain bed linen.

Each janitor’s store may contain:

- low level cleaner's sink with hot and cold pillar taps;
- one cleaner's trolley;
- one store cupboard for cleaning materials;
- shelving (adjustable) for linen storage.

8. WELFARE NEEDS - RECREATIONAL AREAS

8.1 GOAL

To provide adequate spaces, where required, to fulfil welfare needs in terms of areas for recreation and leisure.

8.2 STRATEGY

Rooms provided for the various activities within the recreation area should be located and arranged with movable partitions so that areas can be enlarged or reduced to accommodate particular requirements.

The recreation facilities should be grouped in one area. Where space permits, the facilities should be located adjacent to the dining room, and positioned so that a logical flow sequence is established between the recreation facilities and the dining room. The route between the recreation facilities, the stairway and the dining room should be designed to afford easy circulation and avoid congestion. The bonded store, if required, and public toilets should be located on or near this route. The recreation/dining room may also form part of the muster area for evacuation purposes.

A combination of recreation facilities may be acceptable in order to restrict the LQ size.

8.3 GUIDANCE

The following facilities may be provided:

- games room;
- quiet lounge;
- video room which may be combined with transit lounge;
- cinema;
- gymnasium;
- computer room.

As a guide these facilities may comprise:

8.3.1 Games room

Sizing criteria should be based upon providing seating for 10% of the POB, although a minimum of 6 chairs should be provided. 60% of this seating should be of the easy chair type and the remainder stackable chairs. The facilities provided will be dictated by the area available and local customs, but may include items like:

- half-sized snooker table complete with all accessories;
- two bulkhead-mounted dartboards in cabinets;
- folding table tennis table with accessories;
- range of storage cabinets for table top games;
- coffee tables;
- tack board;
- stand for video game(s);
- counter for refreshments.

8.3.2 Quiet lounge

The quiet lounge should be designed to provide seating for 10% of the POB with easy chair and stackable chair seating to the same ratio as for the games room (minimum 6 chairs) including the following facilities:

- coffee tables;
- two folding card tables with associated stackable chairs;
- range of storage cabinets and shelving for books, magazines, etc. with one lockable section;
- tack board.

8.3.3 Video room

The sizing criteria for the video room should be based upon providing seating for 10% of the POB but with a minimum of 12 chairs. This seating may be a mixture of built-in upholstered seating and free-standing easy chairs and may be supplemented with stackable chairs. The seating should be arranged so that the occupants can view a video screen mounted at high level.

In addition, the following facilities may be provided:

- television on swivel bracket mounted at high level;
- coffee tables.

8.3.4 Cinema

Cinemas should be designed to seat 20% of the POB. Comfortable purpose-made permanently fixed tip-up cinema seats should be provided. It should also be possible to use the cinema as a general assembly room for meetings or training and instruction activities. The cinema should be sound-proofed.

A wide-screen video system may be supplied together with brackets for high-level support of the projector. Video equipment and volume control should be located in the cinema. A range of lockable cupboards may be provided below the screen.

8.3.5 Gymnasium

The gymnasium should be located adjacent to recreation rooms but remote from quiet areas to avoid nuisance noise. The gymnasium may contain the following equipment:

- multi-station exercise machine;
- heavy-duty cycle exercise machine;
- heavy-duty rowing exercise machine;
- set of weighing scales;
- international weight lifting set;
- weight training floor mat.

Where space is restricted the amount of equipment will need to be reduced. Typically, one two-station exercise machine would require 16 m^2, with a single station machine requiring 12 m^2.

8.3.6 Computer room

A computer room for hobby purposes may be supplied, and should include space, facilities and services to allow adequate operation of personal computers by at least 5% of POB at one time.

8.3.7 Telephone hoods

Telephones should be provided and located in positions convenient for public use. One telephone should be provided for up to 35 POB and two for 35 POB and greater.

9. WELFARE NEEDS - MEDICAL FACILITIES

9.1 GOAL

To provide adequate spaces, where required, to fulfill welfare needs in terms of areas for medical facilities.

9.2 STRATEGY

All normally manned offshore installations shall contain a dedicated medical facility. The size of the facility and the equipment shall also comply with local regulations and be determined in consultation with the Principal's medical advisor.

The medical facility should be used for the treatment of sick or injured persons and shall be sized accordingly whilst also catering for the other duties of the offshore medic.

The anticipated maximum length of time it may be necessary to accommodate an ill or injured person will dictate the amount of furniture, equipment and medical supplies. This will again dictate the layout and dimensions of the medical facility. The medical facility will normally also be required to provide facilities for emergency treatment.

The medical facility should be located in a quiet area away from any through-routes. It should be positioned to provide easy passage for a stretcher and attendants to and from any part of the installation and from there to the boat or helicopter deck and support vessel. It should also be located next to the medic's cabin and, where possible, close to an open area such as the dining room to allow the creation of an emergency casualty clearing area with logistics and communications via the medical facility.

The provisions for normally unattended installations should meet local requirements and be determined in consultation with Principal's medical advisor.

9.3 GUIDANCE

On each permanent LQ, the medical treatment area should be provided with a WC, wash hand basin and shower, either as a dedicated facility serving the treatment area or shared with the medic's cabin only. The WC enclosure should be separated from the treatment area by a ventilated lobby.

On installations with more than 100 POB, it is also preferable for the medic's cabin to have an observation window of the whole sick bay treatment area. Normal access to the medic's cabin should not be via the medical facility.

The full requirement of furniture and equipment should be determined in conjunction with the Principal's medical advisor, but may include the following:

- full-length examination couch;
- examination chair;
- examination lamp(s) for couch and chair;
- single pedestal desk with lockable drawers;
- chair;
- standard-size lockable drawer filing cabinet;
- high-level and low-level cupboards, with lockable doors and drawers;
- cupboard unit with sink and double drainer, and hot and cold potable water;
- privacy curtain system, running on silent track ceiling-mounted and arranged to enclose both the examination couch and the examination chair;
- instrument sterilizer;
- pharmacy refrigerator, approximately 0.5 m^3 capacity;
- foot-bath;
- bath;
- stretcher suitable for winching into a vessel or helicopter;
- collapsible stretcher suitable for recovery of injured persons from any part of an installation.

The bath should be a low-level, full-length type approachable from three sides. Alternatively,

an inflatable bath with the facility to accept air bottles for inflation may be provided.

For complements in excess of 25 POB, additional facilities should be provided and located in a screened-off area:

- hospital bed (two hospital beds may be considered for over 100 POB), accessible from three sides with sufficient space on one side to allow shifting of patient from stretcher to bed;
- hospital-type call system, installed over bed with indicator and audible signal in medic's cabin and adjacent to the desk in reception;
- hospital-type patient's bedside locker;
- wheel chair.

Medical supplies are not covered by this DEP.

10. MANAGEMENT AND CONTROL AREAS

10.1 GOAL

To provide adequate areas, where required, for management and control functions.

10.2 STRATEGY

10.2.1 General

Facilities for LQ management and administration and, if required, the installation management and administration, and internal and external communications should be provided. Installation management may include the ICC if located in the LQ, process plant and utility systems control and monitoring.

The layout of these areas should provide the best possible conditions for administration of the installation during both normal operations and under emergency conditions.

Management and control areas may include the following facilities:

10.2.2 Offices for installation management

The allocation of offices and their location will depend upon operational requirements. Offices should be located close to each other and designed to provide for flexibility in use which may involve an open plan arrangement for some areas.

10.2.3 Administration office

This office serves as the reception and administrative area for personnel arriving or departing, and as the administrative centre for the boat/helideck and LQ. The office should be sited to provide easy access to arriving and departing personnel and located adjacent to the transit lounge, with a dividing counter and hatch. The office size should be kept to a minimum to reflect its occasional use.

10.2.4 Transit lounge

The transit lounge serves as the arrival and departure area for personnel and should be located with easy access for personnel and baggage to and from the boat/helideck. It should, where possible, be provided with a separate entrance and exit to assist the flow of incoming and outgoing personnel and with an area allocated for the donning and removal of survival suits.

10.2.5 Crew room

If helicopter storage, maintenance and base facilities are provided, a rest room should be allocated for helicopter crews which should be located adjacent to the transit lounge and have an area of approximately 15 m^2.

10.2.6 Briefing room

Facilities should be available for meetings, instruction and training purposes. This can either be a dedicated briefing room supplied with necessary aids such as videos, projectors, display boards, etc., or combined as a multi-function room with the cinema or transit lounge.

10.2.7 Bonded store and camp boss office

The bonded store, which may also form the office of the Camp Boss (LQ Administrator) and the catering manager's office, should be sized as a single person office, constructed to be totally secure with stable-type door, counter and stays for holding the door open.

10.2.8 Technical library

The technical library should be used for the filing and storage of operating and maintenance manuals, instruction books, etc. for the installation. For large installations a dedicated area may be allocated near the office complex, but smaller installations may use a section of an

office.

10.2.9 Radio and telecommunications rooms

The radio room should be located on the same level and near to the ICC, or it may be located within the ICC itself. It should be located near the OIM's office to facilitate emergency response. It should be provided with a window to allow the operator to clearly observe weather and sea conditions. An observation window may be provided in the bulkhead dividing the radio room and the ICC where they are adjacent.

In addition to radio and telecommunications requirements, space may also be required for rechargeable radios and their chargers.

Access to the radio room should be from the office corridor, with preferably a twin leaf stable-type door. Access to the telecommunications room will normally be from the radio room.

The telecommunications equipment room(s) should be located adjacent to the radio room and the ICC with direct access between them.

10.2.10 Muster areas

Muster area requirements should be determined early in the design stage so that due consideration is given in terms of size, location and the relationship with routes to embarkation areas. Where possible, muster areas should be sized to include grab bag and survival suit etc. storage allowing direct personnel evacuation without further need to visit cabins or other areas in order to minimise congestion and delay during evacuation. Areas should also be grouped so that mustered personnel are spread out as little as possible.

10.2.11 Emergency response base

Consideration should be given to the provision of an Emergency Response Base within the protection provided by the LQ. The area should allow convenient communication with the ICC/radio room and be equipped with Respiratory Protective Equipment, air compressor, protective clothing and hand-held equipment for incident response.

10.2.12 ICC

The Installation Control Centre (ICC) should be located for easy access to and from the installation and close to the offices of supervisory personnel and the technical library.

The ICC should have the necessary monitoring or control equipment required to monitor, control and manage daily operations on the installation and the safety functions in emergency situations.

It is considered advantageous for specialist input to be included at the design stage, to ensure that selection and siting of equipment, particularly control and monitoring screens, are coordinated to allow most efficient use. Reference should be made the ergonomic guidance given in EP 95-0340.

10.2.13 PCF

The Permit Control Facility (PCF) should preferably be located adjacent, and preferably with access, to the ICC and close to the offices of supervisory personnel. Consideration should be given to the provision of an external dirty lobby/airlock to an adjacent PCF to allow permit issue without the need for entry into the LQ. The size of the process diagram and the permit board should be such that all necessary information is clearly visible. This will then determine the space requirement for the PCF.

10.3 GUIDANCE

10.3.1 Offices

The size of each office should be dictated by the expected occupancy, the function of each space and its furniture and equipment requirements. (Appendices 1.6 and 1.7) give

suggested guidelines for minimum office requirements, their location and allocation.

The following schedule of typical furniture and equipment is included as a guide only:

- double pedestal desk;
- tables located adjacent to and same height as desk, for mounting of computers;
- personal computers;
- photocopier;
- office-type upholstered swivel chair for use with desk;
- stackable chairs;
- filing cabinet, standard size with four lockable drawers;
- cabinets with lockable double doors, four full-width adjustable shelves;
- storage cabinet with shelves;
- tack board, bulkhead mounted;
- 'Colourboard', bulkhead mounted;
- clock;
- planning boards.

10.3.2 Administration office

The contents of this office may include:

- racking for POB forms;
- table and photocopier;
- two double pedestal desks;
- two office-type upholstered swivel chairs;
- storage cabinet with shelves;
- two planning boards;
- key cupboard with sufficient hooks and labels for all personnel on board, safety glass fronted and fitted with a lock;
- open adjustable shelving fixed to bulkheads where convenient.

The office may be combined with the Radio Room.

10.3.3 Transit lounge

The lounge should be adequately sized for the expected maximum personnel transfer rate. A local density of 1 m^2 per seat should be allocated, plus an allowance for circulation areas, and where appropriate the survival suit racking and the changing area.

The transit lounge may contain:

- lounge seating;
- coffee tables;
- survival suit rack with captive hangers;
- counter as supplied to the refreshment room;
- weighing machine positioned with dial visible from both the lounge and the administration office;
- tack board;
- planning board;
- television and video player mounted on swivel-type bracket, in a convenient position at high level on a bulkhead. The video player may be operated locally or from the radio room.

The transit lounge may also be combined as the video room due to its infrequent use and ability to seat a sizeable group of personnel in one area.

If appropriate an area should be allocated to helideck crew clothing and communications equipment.

If applicable, an area within the lounge may be allocated for storage of protective equipment for the Helicopter Landing Officer(s), such as fire suits etc. Alternatively storage may be in the vicinity of the helideck. The area selected is for donning of safety equipment in a

protected environment.

10.3.4 Crew room

The crew room may contain:

- three easy chairs;
- three stackable chairs;
- coffee table;
- range of shelving and storage cabinets for books, magazines etc.; one section to be lockable;
- tack board.

10.3.5 Briefing room

The briefing room should be designed to seat 50% of the POB. The total number of chairs should not be less than 15. 60% of this seating should be of easy-chair type and the remainder stackable chairs. Wide screen, supports and electrical supply should be supplied as for cinema, with system control from the radio room.

10.3.6 Bonded store and camp boss office

Contents of this office/store may include:

- cabinet;
- double pedestal desk;
- office-type upholstered swivel chair;
- full-height adjustable shelving to be fixed to bulkhead where convenient.

10.3.7 Technical library

The contents of a dedicated library may include the following:

- reference table;
- table for a copying machine, and microfilm/microfiche readers;
- two upholstered chairs;
- four-drawer filing cabinet;
- range of open and adjustable shelving for storage of drawings, specifications, instruction manuals, performance and maintenance records and suchlike.

10.3.8 Radio and telecommunications rooms

The following items may be required in these areas:

- built-in and free-standing desks and benches;
- adjustable desk lights;
- office-type upholstered swivel chair(s);
- plinths to support heavy equipment.

The radio room may also be combined with the administration office.

11. ACCESS ARRANGEMENTS

11.1 GOAL

To provide good communication between all areas that personnel may require to use in both normal and emergency conditions.

11.2 STRATEGY

Circulation spaces shall provide the means of access to and escape from all areas of the LQ. Reference should be made to EP 95-0000 for additional details.

Rooms located on the same level should be interconnected by corridors connected vertically by staircases. Corridors and staircases shall be designed so that the LQ can be evacuated in an emergency as quickly as possible.

Corridors should be free from projections and obstructions. Portable fire extinguishers, hose reels, drinking fountains and suchlike should not obstruct free passage in any corridor and should not reduce the corridor width.

For ease of orientation, it is preferable to locate corridors, stairways, connection doors, emergency exits, etc. for each level in the same position and direction.

11.3 GUIDANCE

11.3.1 Exits

All working areas should in principle have two means of escape. Specific requirements should be determined by assessment.

Hinged doors used for means of escape should open in the direction of escape.

Main entrances and exits shall be provided with airlocks. The exits shall give access to external walkways or staircases which in turn shall be protected and preferably located in non-hazardous areas.

11.3.2 Corridors

The clear width of escape routes, corridors and stairways should be based on the traffic expectancy and should be at least 1.2 m wide to enable stretchers, carried by four attendants, to negotiate any directional changes. The clear internal height of corridors serving cabins should be similar to cabin lobbies, but not be less than 2.2 m.

Corridors shall be subdivided by fire-resisting doors which prevent the free travel of smoke along the corridor so that no undivided length exceeds 30 m.

Staircases

Internal staircases should have a minimum width consistent with corridors. Half landings should be provided for staircases where a flight of stairs would require in excess of 16 risers. Such landings should be provided at the midway height of the staircase wherever possible, landings should be provided at the top and bottom of every flight, and should be at least as great as the smallest width and depth of the staircase. In any case it should be large enough for the stretcher to be manoeuvred down and up the stairs.

To afford safe passage, landings should be clear of any permanent obstruction. A door may swing across a landing at the bottom of a flight but only if it will leave a clear space of at least 1 m.

Flights and landings should be guarded at the sides where there is a drop of more than 600 mm. Handrails or the like should be positioned at a minimum height of 900 mm above staircase risers and treads and 1 m above landings.

All staircases should have a clear headroom over the length and width of the staircase of at least 2.2 m.

The steepness of the staircase should normally be 37.5° to the horizontal but in no case

exceed 40°. The normal relationship between the dimensions of the riser and the tread is that the product of twice the riser plus the tread should lie between 550 mm and 700 mm. The riser should not exceed 190 mm and tread 240 mm.

Signs

A system of signage should allow personnel to easily establish their position within the LQ for evacuation and location purposes. International symbols should be used and, where descriptive, should be formatted so as to be easily recognisable and understandable by all personnel on the installation.

Three different types of sign should be provided:

a) signs indicating mandatory requirements, prohibitions, and actions in an emergency;
b) signs identifying and describing the use of fire and safety equipment;
c) signs giving information of a non-urgent nature, identifying compartments or areas and including any non-urgent miscellaneous items.

Different colours and shapes should be used for each of the three types of signs, but all signs should be easily recognisable and readable. Included in the sign philosophy should be the cabin bunk and locker numbering system.

All doors should display signs indicating the function of the room.

The door(s) to the Sick Bay should be marked with a clearly identified sign of 'SICK BAY'.

Emergency signs should be provided at escape routes and throughout the LQ to inform personnel of escape routes. Emergency signs are to be self-powered for permanent operation with no maintenance required.

12. UTILITY ROOMS

12.1 GOAL

To provide adequate space for those utility services and equipment that are required to be located within the LQ.

12.2 STRATEGY

The size of rooms housing mechanical or electrical equipment should be sufficient to facilitate operation, maintenance and repair. Space should also be allocated for telephone hoods, information boards etc.

There may be a requirement to consider some of the following services:

- HVAC Plant Room
- Electrical
  - switch rooms (normal and emergency switch gear);
  - battery room;
  - transformer room.
- Telecommunications
  - public address system panel;
  - telephone panel;
  - panels for entertainment, radio and television.
- Fire and gas panels
- Fire and gas damper control panels
- Potable water
  - cold water storage tanks, calorifiers, pumps, etc.
- Sewage
  - sewage treatment plant shall be located below and outside the LQ.

Sufficient space should be available for installation, maintenance, inspection, examination and testing of any equipment in plant rooms. Withdrawal spaces for pieces of equipment should be combined wherever possible. Adequately sized laydown areas may be required outside plant rooms and may require crane access.

12.3 GUIDANCE

12.3.1 HVAC plant room

A plant room is required for major HVAC and utility systems plant and equipment. A secondary plant room may be required to supplement the main plant room.

The following criteria should be applied when locating plant rooms:

- the main plant room should be located on a lower level of the LQ, but secondary plant rooms may be located adjacent to the area served to avoid lengthy runs of ducting and piping;
- plant rooms should be located remote from quiet areas and adjacent to the main fresh air inlet;
- the vertical service shaft should terminate in the main plant room.

Plant room size will be affected by:

- refrigeration being included in the HVAC design;
- availability of space for secondary plant rooms;
- the extent of utility systems supplied from other parts of the installation.

It should be noted that:

- fresh air inlets should be located remote from hazardous areas, any engine exhaust or other source of air-borne pollution;
- plant access doors should only be provided to satisfy a defined need;

- A watertap should be considered for cleaning purposes;
- Floor drain to be provided for wash-down purposes.

Replacement of large items of plant such as coils is rarely necessary when in-situ repairs can be effected. Personnel access doors should be utilised for equipment removal where possible.

12.3.2 Switch rooms

Two switch rooms may be required comprising:

- main switch room containing equipment for non-essential supplies;
- emergency switch room containing equipment for essential supplies.

Switch rooms, if provided, should be located together, adjacent to the HVAC plant room and close to the vertical service shaft for cables. Access to switch rooms may be via the plant room. If more than one switch room is provided, direct access should be provided between them.

12.3.3 Battery rooms

Battery rooms should be located adjacent to switch rooms, and should be of sufficient size to accommodate the batteries providing back-up power.

Ventilation may be required to ensure safe operation of the room(s) dependent upon the type of batteries to be installed. Reference should be made to DEP 31.76.10.10-Gen.

12.3.4 Fire and gas panels

Fire and gas panels should be installed in a safe area within or near the ICC or Emergency Response Base to aid the emergency response in a fire and/or gas alarm situation.

13. MATERIALS AND EQUIPMENT

13.1 GOAL

To select materials, equipment, components and finishes which are fit for purpose and suitable for their intended use in offshore conditions.

13.2 STRATEGY

All materials used in construction and fit-out including furniture, fixtures and fittings should, as far as reasonably practicable, be non-combustible. Fabricated items should be made to a recognised international or national standard that recognises the conditions to which they will be subjected offshore.

Materials and furnishings should meet all safety and fire regulations and additional consideration should be given to the toxicity of products of combustion emitted in flaming or smouldering.

Materials which have been tested in accordance with the requirements of Regulation 3 of Chapter II-2 of SOLAS, IMO-844E Fire Test Procedures or other equivalent international or national standard are acceptable.

A non-combustible material is one which is non-combustible in accordance with Regulation 3(a) of Chapter II-2 of SOLAS.

A standard fire test may be the test in Regulation 3(b) of Chapter II-2 of SOLAS or IMO-844E Fire Test Procedures.

Where there are variations to the design of components for an assembled system that are not covered by a specific certificate or if any detail of a certified design is changed, evidence should be provided to prove that these changes do not degrade the fire resistance properties for which type approval exists.

Documentary evidence of specified performance characteristics of materials should be provided during the tendering process.

13.3 GUIDANCE

13.3.1 Doors - general

Doors to stairwells, and in corridors, radio room (top half of stable door) and galley may be held open by magnetic catches. These should be activated by the fire and gas system to ensure maintenance of boundary fire rating in event of emergency.

Doors that are required to be locked for security should also allow immediate emergency opening from both sides.

Personnel doors should afford a clear opening of at least 850 mm wide by 2 000 mm high. The clear opening of escape route doors should equal the width of the associated escape route. Other door sizes should depend on access for equipment, stretchers, and wheelchairs.

Doors openings onto stair landings should not reduce the width of the landing below 800 mm, or the stair width, whichever is the greater.

External door openings should have thresholds and weather seals. Weather seals around door perimeters should be screw-fitted, adjustable, and easily removable for maintenance. Internal doors should be provided with seals, where necessary.

Seals on doors in TR boundaries should be of a design proven to offer adequate resistance to wear and, in addition to weather sealing, to gas leakage. If leakage rate assessment determines that additional sealing be added, then tape or otherwise proven means of additional sealing shall be used, provided that this can be adequately removed or broken in case of an emergency.

Weather hoods should be provided to all external sliding door gear. Manually operated sliding doors should have brakes to prevent door slamming.

13.3.2 Access and emergency doors

Access and emergency doors in external boundaries or internal bulkheads may be either hinged or sliding and should be supplied together with all associated ironmongery. Where doors are in continuous general use, or manual operation is difficult due to weight and/or restricted access, then automatic pneumatically operated doors should be used.

The type of door selected should be based on their safety aspect in terms of:

- fire rating;
- use, (type and frequency);
- size;
- environmental conditions.

13.3.3 Powered sliding doors

Pneumatic operation normally is through the latch lever mechanism, but may be replaced for special access, e.g. fork-lifts, by a pull wire etc.

a) Personnel doors
On striking the open limit switch the door will hold to allow access (typically 1-5 seconds) then close (under gravity).

NOTE: Personnel doors shall not be powered to the closed position.

A further operation of the latch lever should cycle the door from wherever it is to the fully open position.

(b) Large doors
These should be power-operated by continuously holding the latch lever, from either side of the door, in either the open or closed position, and walking with the door. Releasing the latch should stop the door wherever it is.

In special cases these doors may require a pull wire etc., to allow operation from a fork-lift etc. The normal operating mechanism should for safety reasons not be

accessible from the deck. There should be no latch lever system (for normal operation) and the door operation should be completely automatic, cycling to 'open' from one signal and to 'closed' from another signal.

NOTES: 1. Suitable warning signs and/or flashing signals should be fitted to alert personnel not to enter through these doors.

2. If these doors are used for personnel access they shall be fitted with all the necessary safety devices.

Use of powered doors may require installation of personnel warning signs and/or exclusion zones. Personnel doors fitted into larger doors should be interlocked to prevent operation of the powering system until the personnel door is fully shut.

On loss of air supply personnel doors should shut under gravity. Large doors should fail where they are, but have sufficient reserve of air to ensure complete closure on manual initiation, and have the opening cycle disabled. Large doors may also have bottled nitrogen/air override facility.

13.3.4 Internal doors

Internal doors on escape routes or where two-way traffic can be expected should have vision panels which should not compromise door ratings.

Internal doors may be provided with:

(a) Transfer grilles
Grilles may be provided in the lower part of doors to toilet and shower compartments only. Sizes and types should be determined during HVAC system design.

(b) Kick-out panels
Provision of panels depends on the degree of blast/fire risk to the LQ. An event could cause door distortion and prevent it from being opened. Panels may then be required as an alternative means of escape. Panels are not required for toilet or shower compartments.

13.3.5 Door fittings

All hinged doors should be adjustable to allow accurate fitment into frames. Lubrication nipples should be fitted to hinges.

All doors should be self-closing with selectors on double doors. Sliding doors should be gravity or pneumatically operated.

Lever and pull handles should be of sufficient size and strength to take a large gloved hand.

Door stops should be fitted to all hinged doors for personnel safety, positioned so as not to cause a hazard to escaping personnel. Neoprene strips or pads should be fitted so that metal-to-metal contact is avoided on door closing.

Latch-operated pressure relief ports may be necessary where opening/closure is difficult across spaces due to air pressure differential.

A master key system should be established for all lockable doors except the bonded store.

13.3.6 Enclosures

External boundaries, doors and internal firewalls, whether of single element or composite construction, should provide the necessary performance in respect of fire ratings, thermal and acoustic properties and, if required, blast loading determined by the fire and explosion assessment.

Internal firewalls should be located to limit the spread of fire, facilitate fire fighting operations and enhance escape and refuge from fires.

The determination of the degree of protection shall be based on evaluation of the fire and blast risk analysis. The following may be use as an initial guideline:

- 'H120' class divisions, as defined in Offshore installations: Guidance on Design Construction and Certification, UK Department of Energy:

- all external bulkheads and decks and roof (i.e. all external boundaries) of living quarters that could be exposed to the effects of hydrocarbon fire;
- all boundaries of 'Control Stations' that could be exposed to the effects of a hydrocarbon fire.

- 'A 60' class divisions, as defined in SOLAS:
  External boundaries or enclosures for following items provided they are not located in or adjacent to a hazardous area and are not exposed to hydrocarbons:
  - Control stations
  - Radio room
  - Internal partitions within living quarters comprising:
    - main structural members internal to living quarters
    - bulkheads around radio room, plant room and electrical switchrooms
    - stairwell.

- 'A 0' class divisions, as defined in SOLAS:
  - divisions separating utilities areas
  - internal partitions within living quarters compromising:
  - boundaries of the galley
  - divisions between plant rooms
  - internal decks.
- 'B-15 'class divisions, as defined in SOLAS:
  - internal partitions and internal ceilings in living quarters.

Every deck and its supporting structure within the accommodation area which is not required to be an H120 class or A-60 class division should be constructed of material which by itself or due to insulation provided will not lose its structural stability and not affect the fire integrity of the deck when subjected to a standard fire test for 60 minutes.

All corridor bulkheads, where not required to be A-60 class divisions, should be B-15 class divisions extending from deck to deck. B-15 class doors should be fitted in B-15 class bulkheads.

Air spaces enclosed above ceilings and behind panellings and lining should be divided by close fitting draught stops spaced not more than 14 metres apart, in order to limit the movement of smoke within the living quarters in a fire situation.

13.3.7 Internal partitioning/wall lining systems

Partitioning systems should be used to form internal area boundaries within the LQ. They should include doors and frames and the whole should be fire-rated to required standards and provide the necessary decibel reduction ratings once the boundaries are assembled.

Long-term durability and appearance of decorative surfaces should be of prime consideration, and the surfaces should be resistant to a certain amount of mechanical damage and to cleaning by solvents.

The system should be able to support face-fixed equipment where the weight does not exceed specified Manufacturer/Suppliers limits. Additional support, bracing or reinforcement may be required to support hose reel cabinets, items of fixed furniture or other heavy fittings. Fixings and reinforcements should be concealed within the panels and should enable equipment to be replaced without disturbance or damage to the system.

Services should be routed within the panel thickness. A panel identification system which indicates all service routings, cut-outs and access panels should be established.

Skirtings are required to assist cleaning and to improve the appearance of the floor/wall joint. If sheet vinyl, ceramic tiles or epoxy formulations are used as a finished floor material, an integral coved skirting material to the finished floor should be used.

Partitions to wet areas should be positioned on plinths at least 150 mm high and be sealed to prevent ingress of water to the base channel of the partitioning system.

Cubicle partitions which form toilet enclosures should be securely fixed to wall panelling and with legs to the floor. The cubicle partitions should be raised approximately 150 mm above floor level to allow ventilation. The overall height of the cubicle partitions should be approximately 2 m. Due consideration should be given to hygiene and ease of cleaning.

Bumper rails should be provided in corridors, staircases, routes between food storage laydown area and galley, refreshment room and any other area where damage to the partitioning system may occur.

13.3.8 Suspended ceilings

Suspended ceilings should be compatible with the partitioning systems and be installed in accommodation spaces for the following purposes:

- fire protection;
- sound absorption;
- hygiene, to assist cleaning;
- aesthetic appearance, to enhance the internal appearance of the accommodation spaces and form a continuous and integrated system with the internal partitions;
- concealment to allow cables, pipes and ducts to be run unobtrusively above the ceiling with provision of maintenance access through the ceiling;
- for ease of maintenace, panel type ceilings would be preferred.

Air spaces enclosed behind ceilings may require division by close fitting draught stops. The need for these should be determined by assessment. Consideration should also be given to the provision of additional stops to prevent the transmission of noise.

The ceiling system should accommodate all service fittings, such as specialist access panels, sprinkler heads, diffusers, recessed luminaires, smoke detectors, public address system loudspeakers and cable racking etc.

Access to services and systems within suspended ceiling spaces is frequently required, and it may be necessary to provide access panels. An identification system adjacent to access panels should indicate the nature of service, position of valves, fire dampers, fire protection equipment, etc., which can be accessed from that panel.

13.3.9 Floors

Floors may be painted exposed decks, solid screeded or raised. Selection should be based on the durability , appearance and suitability for area function. Floor screeds should be laid in order to provide surfaces suitable for self-finish applications or for subsequent laying of floor finishes.

Screeds in wet areas require particular properties if they are to be suitable for the specific conditions in those areas. Resin composite finishes are preferred for their hard wearing, impervious and non-slip properties. Alternative finishes in combination with resin screeds may be used to meet aesthetic or similar needs.

Resin composite finishes comprise a system of primer, screed and finish. With certain systems the screed and finish may be of the same material.

Primers should be used for all materials as the first application onto a prepared substrate. Manufacturer/Supplier's instructions regarding the materials used for priming should be closely adhered to. All materials, including pre-surface treatments such as primers and degreasers should be confirmed as being compatible by the flooring system Manufacturer/Supplier.

With resin composite finishes, as a general rule the smoother and less porous a floor surface the easier it is to clean. Whilst resin-based flooring can be formulated to produce smooth, non-porous surfaces with excellent slip resistance under dry conditions, the surface must be textured if it has to be non-slip under 'wet' conditions. Such texturing can be achieved by selective grading of aggregates, or by sandwiching special high-abrasion resistant aggregate between the surface coatings of clear or pigmented resins. The degree of contaminant build-up will be dictated by the coarseness. Coarse textured surfaces are, however, more difficult to clean. Where both slip resistance and ease of cleaning are, important, a compromise must be made. Flooring finishes should therefore be selected with just enough texture to suit specific working conditions and hygienic standards. Manufacturer/Suppliers should advise on cleaning methods necessary to retain these properties.

Particular attention should be paid in design to bulkhead/floor junctions, door thresholds, fixed galley equipment, drainage and any floor penetrations if serious failures in wet area floors are to be avoided.

Raised access floors may be required in ICC, radio, telecommunications and associated equipment rooms to accommodate power and communications cabling and may form a pressurised ventilation air plenum. This type of floor should be a proprietary system consisting of removable panels and stringers, supported by adjustable pedestal assemblies and/or fixed framed support system. Pedestals should be secured to the deck which should be suitably stiffened to provide a rigid subfloor. Panels should be finished in anti-static material.

13.3.10 Floor finishes

Floor finishes may be painted sheet vinyl, self-finished resin flooring, safety flooring, carpet tiles or rubber matting as detailed in the following paragraphs:

Sheet vinyl should be laid in the following areas:

- service corridors;
- telecommunications and radio rooms;
- transit lounge;
- cabin lobbies; toilets and shower areas (unless fully prefabricated);
- sick bay;
- dining room;
- gymnasium.

Vinyl flooring should be hard wearing, slip resistant and heavy duty. The vinyl should have an integral coved skirting, and should be laid in accordance with the Manufacturer/Supplier's instructions. All seams, including the joint between the skirting and floor, should be welded. Joints between the skirting and the bulkhead/partitioning should be finished with a suitable sealant compatible with materials to be sealed and applied in accordance with the Manufacturer/Supplier's instructions.

Self-finished resin flooring should be laid in the following areas:

- laundry and linen store;
- dirty area and public toilets;
- refreshment room;
- galley and galley airlock;
- food stores;
- locker room.

Resin flooring should include 150 mm upstands for coved skirtings, finished in the same material.

Safety flooring should be laid in the following areas:

- plant rooms;
- battery and charger rooms;
- switch rooms;
- potable water tank areas;
- calorifier rooms;
- workshops;
- around beverage counters.

Safety flooring should be either an epoxy resin system as above (or similar) complying with the following requirements.

- low surface spread of flames;
- chemical resistant including detergents;
- resistant to staining/marking, scuffing and cigarette burns;
- resistant to deformation of surface under constant load;
- resistant to deformation under dynamic and puncturing load;

- demonstrate heavy duty wear and hardness characteristics;
- demonstrate heavy duty friction characteristic for various materials, wet and dry.

Carpet tiles may be considered in:

- cabins and offices;
- corridors (other than service corridors);
- quiet lounge, admin. and games room;
- cinema;
- video and television rooms.

Carpet tiles should be heavy duty with low flame spread characteristics, non-combustible, resistant to the emission of toxic fumes, and loose laid in accordance with Manufacturer/Supplier's instructions.

To prevent premature wear and soiling of carpet tiles in corridors and other areas of high use during the hook-up period, consideration should be given to temporarily laying vinyl in those areas. Carpet tiles may then be laid over the vinyl when hook-up is completed.

Rubber matting should be interlocked reinforced open rubber fitted in switch rooms, in front of electrical panels and in air locks.

13.3.11 Windows

The use of windows should be minimised. They should be fitted for operational reasons only or in areas where window and bulkhead blast ratings exceed predicted events. They should be of the shutterless type, certified to the fire and blast ratings of the bulkheads in which they are placed and be capable of maintaining the fire, acoustic, dynamic overpressure and thermal insulation integrity of the bulkhead. The external face should form a weather, smoke and gas tight barrier.

The internal face should form a sealed barrier to maintain internal air pressure, but be removable for cleaning and maintenance.

The carcassing of window units should be insulated to prevent condensation and should incorporate thermal breaks. All glass should be replaceable from inboard.

Windows may be fitted with integral venetian blinds capable of being operated and maintained from within the room.

13.3.12 Furniture and soft furnishings

The specification of furniture and soft furnishings should be based upon:

- quality and comfort;
- durability and maintenance;
- appearance;
- ease of replacement;
- fire retardant;
- no emission of toxic fumes.

14. UTILITY SERVICES

14.1 GOAL

To design utility services so as to make cost-effective use of space and interface efficiently with planned or existing platform services.

14.2 STRATEGY

Utility services should be selected and efficiently arranged to facilitate their operation, reliability and maintenance. Sufficient space should be allowed for installation and maintenance, and for systematic examination and testing.

Recommendations for the use of certain materials are made in this DEP. Use of alternative materials such as GRP (Glass Reinforced Plastic) and GRE (Glass Reinforced Epoxy) will require an assessment of the life cycle costs and benefits.

The following services may be required and are described in the subsequent sections:

14.2.1 Piped services

- hot and cold potable water;

Potable water supplied to a LQ should be palatable, odourless, free from contaminants and colourless. Potable water distributed through copper pipes or MDPE (Medium Density Polyethylene), rather than seawater through cupro-nickel or MDPE pipes, is preferred for toilet flushing. Benefits are reduced erosion and corrosion potential, comparative ease of repair and reduced capital and maintenance costs.

- drainage systems - single stack;

The preferred system is the gravity vented single stack type, as it combines previously separated black sewage (sea water) and grey waste (potable water) systems, and consequently reduces installation and maintenance costs. It should also be noted that with the use of sea water the erosion potential dictates the use of materials other than carbon steel whereas with potable water and uPVC (Unplasticised Polyvinyl Chloride) materials significant savings may be realised in installation time and in material and maintenance costs.

Care shall be taken to ensure that the LQ system(s) is/are securely separated so that gas ingress or overpressurisation does not occur as a result of direct or indirect connections with other drainage systems.

The system(s) should be designed to receive waste water from washbasins, baths, showers, floor gullies and appliances in the galley, laundry and plant room and suchlike, and waste from toilets and urinals.

- heating medium;
- HVAC services including seawater cooling, chilled water and refrigerant;
- sea water fire service (protection systems).

14.2.2 HVAC

The LQ requires climatic conditioning in the form of heating, ventilating and/or air conditioning in order to maintain the temperature, relative humidity and air quality within defined limits for human living and working conditions and reliable operation of equipment. Refer also to DEP 31.76.10.10-Gen. and DEP 31.76.10.11-Gen.

14.2.3 Electrical

The electrical installation for the LQ should comprise normal, emergency and UPS (Uninterruptable Power Supply) supplies, and should be designed in accordance with DEP 33.64.10.10-Gen. Services should be concealed wherever possible to provide additional mechanical protection and obviate the need for cable armouring except for vital services.

14.2.4 Communications

Communication systems should incorporate:

- mandatory communications in the form of a public address and general alarm system;
- operational telecommunications including radios and telephones;

- non-essential telecommunications including entertainment systems and ancillary equipment which provide desirable but not essential facilities.

Reference is made to DEP 32.71.00.12-Gen.

14.2.5 Detection systems

These should include heat, smoke, fire, and gas detection systems in accordance with DEP 32.30.20.11-Gen.

14.2.6 Protection systems

The requirements for these systems should be established from the fire and explosion assessment. It may be acceptable for sprinkler systems to be omitted if an adequate case for safety can be established when considering the following:

- flammable inventories;
- ignition sources;
- detection systems;
- passive fire protection;
- opportunities for manual intervention;
- speed of response.

Reference is made to EP 95-0000, DEP 80.47.10.32-Gen and DEP 80.47.10.12-Gen.

14.3 GUIDANCE

14.3.1 Potable water distribution systems

14.3.1.1 Daily demand

Average daily demand per person of potable water may be calculated from the guidance data shown below:

	Litres
Drinking	2
Cooking	50
Laundry	30
Personal hygiene (inc. WC flushing)	190
Contingency 10%	28
Total	300

A minimum of 300 litres per person per 24 hour day based on the POB should be provided. It should be noted that use of seawater for WC flushing would allow a reduction in the potable water demand.

In addition, an allowance may be required for humidification dependent on the local environment and project requirements.

14.3.1.2 Storage

If an installation is provided with a desalination plant, deliveries of water by supply boat are only necessary when the plant is not available.

Installations that have no desalination plant will require all water to be delivered by supply boats. Installation storage capacity should be designed according to local circumstances and security of supply. Where space limitations dictate that only one potable water tank may be installed, consideration should be given to dividing the tank into two parts, with a valved balancing pipe to allow internal cleaning without interruption to LQ supplies.

It is structurally advantageous to position main tanks at low level on the installation and pump a supply to a smaller day tank. This day tank should be installed as high as possible under the helideck and sized to provide a minimum of 4 hours' supply (approximately 50 litres per person).

Consideration should be given to the installation of either two day tanks or a single two-compartment day tank, to give two independent main/day tank systems and reduce the possibility of complete system shutdown in event of contamination or maintenance.

Sterilisation equipment should be provided.

14.3.1.3 Cold water service

From the day tank a gravity distribution system should supply the LQ, with separate feeds to each of the following:

- general cold water service;
- WC cisterns (flushing valves should not be used);
- hot water calorifiers;
- HVAC system requirements except the chilled water systems which should be served from a dedicated make-up tank.

NOTE: A WC cistern/gravity potable water system is preferred to a flushing valve/pressurised sea water system, as the former offers quieter operation and lower maintenance costs and spares for cisterns are widely available.

14.3.1.4 Hot water service

Calorifiers should be provided for domestic hot water generation and storage, with vented

and pump-assisted circulation for hot water distribution. Two 100% calorifiers should be provided to ensure continuous supply during repair and servicing.

Electric immersion heaters are generally preferred to heating medium as the primary heat source because of lower life cycle costs.

Each calorifier should be capable of supplying sufficient hot water. The following criteria from the North Sea may serve as an initial guideline:

- a demand of minimum 115 litres per person per 24 hours;
- storage of 35 litres per person;
- 3 hour heat-up period.

These criteria will vary according to climatic conditions.

The calorifier temperature should be a minimum of 55 °C to prevent colonisation of legionella and a maximum of 65 °C to avoid scalding.

14.3.1.5 Wash-down facilities

Wash-down facilities should be provided as follows:

- hot and cold water supply with retractable hose to galley;
- cold water supplies to locker room and laydown areas associated with food stores.

14.3.1.6 Isolation and drain down of water distribution systems

Stopcocks should be provided at each fitting or range of fittings and at each thermostatic mixing valve. Provision for drain valves should be made in the distribution pipework which should be routed to allow complete system drain down. All valves should be in readily accessible positions.

14.3.1.7 Valves and cocks

Valves should be provided at all locations necessary for the correct operation, regulation, control and maintenance of the installation. Gate valves should not be used.

On calorifiers, lever-operated bronze gland-packed drain cocks with hose unions should be provided. Elsewhere, bronze gland-packed drain cocks with a serrated outlet for a hose connection should be provided.

14.3.1.8 Air venting

Devices for air venting should be provided at all high points in pipework and equipment. Vent cocks should be easily accessible, with air release pipes run to discharge at the nearest suitable visible point.

14.3.2 Drainage

Drainage systems should be designed to satisfy the following requirements:

- rapid, efficient and quiet removal of solids and liquids without blockage or leakage;
- prevention of entry of foul air into the LQ and provision for its safe escape to atmosphere;
- adequate and easy access for cleaning and clearing of obstructions;
- protection from extremes of temperature, either by siting or by insulation;
- prevention of undue external and internal corrosion, and erosion, by selection of suitable materials and waste matter velocities;
- avoidance of air locks, siphonage and obstructions;
- avoidance of mechanical damage, either by siting or protection;
- facilities for testing.

14.3.2.1 Discharge from fitments

Branch discharge pipes, especially those serving wash basins and urinals, should be as short as possible to reduce possibility of self-siphoning and to ensure that accumulation of

deposits is avoided.

The sizing of outlets, traps and pipework, etc., should be such that the discharge from any appliance is not restricted. Pipes serving more than one appliance should be sized to take into account simultaneous discharge. Typical discharge rates are as follows:

Appliance	**Capacity** (Litres)	**Max Flow Rate** (Litres/sec)	**Duration** (secs)
Flushing WC	9	2.3	5
Urinal (per person unit)	4.5	0.15	30
Wash basin (32 mm trap)	6	0.6	10
Sink (40 mm trap)	23	0.9	25
Bath (40 mm trap)	80	1.1	75
*Washing machine	180	0.7	300
*Dishwashing machine	70	-	-
Shower	-	0.1	-
Spray tap basin	-	0.06	-

*NOTE: Data to be confirmed with specific suppliers of galley and laundry equipment.

14.3.2.2 Traps and gullies

Water-filled traps should be provided at each fitment and the water seal should be deep enough, after possible loss due to evaporation and pressure fluctuation, to prevent foul air from the discharge system entering the LQ. WC traps shall be sufficiently large to contain soiled water and be at least 75 mm deep.

Traps should be designed so that deposits do not accumulate. They shall be accessible with adequate cleaning facilities. Floor gullies and channels should be provided with water-filled traps and, where space permits, connected to branch pipes of 75 mm or larger. Consideration should be given to the use of removable bucket traps in the galley, to prevent ingress of coarse food debris into the drainage system. Infrequent trap use can cause seal loss due to evaporation, and floor outlets should be located where usage will ensure seal maintenance. Minimum trap nominal pipe size should be as listed in the following table:

Appliance	**Size of Trap (mm)**
Wash basin	32
Sink	40
Bath	40
Shower tray	40
Drinking fountain	32
Galley sink	40
Urinal bowl	40
Urinal stall *	65
Food waste disposal unit	50

*NOTE: Where more than 6 stalls are provided in one range more than one outlet should be provided.

14.3.2.3 Bends and junctions

Bends in branch discharge pipes should be avoided to prevent blockage and to reduce the possibility of self-siphoning. Where bends are unavoidable, they should be large radius.

14.3.2.4 Ventilating pipes

Ventilating pipes should terminate above the LQ roof with a protective cowl and bird guard.

14.3.2.5 Access covers and rodding eyes

Access covers and rodding eyes should be provided at the base of all discharge stacks, where pipes change direction, and at the end of every run.

14.3.2.6 Floor drains

Floor drains should be provided for wash-down purposes and to areas where an accumulation of water may occur such as;

- personal hygiene areas;
- medical facility in location of bath;
- galley and laydown areas associated with food containers;
- refreshment and locker rooms;
- plant rooms.

Floor drainage gullies and channels should be recessed to accept floor finishes. Floor drainage channels (scuppers) are preferred in the galley and should be provided with loose flush-fitting gratings. Drains from gullies and channels should be complete with screwed outlet and screw covers, and integral trap and strainer. In plant rooms where equipment drains are hard-piped, floor drains should be fitted with funnel inlets.

14.3.2.7 External connections

The LQ drainage system should be arranged so that only one main flanged connection terminates externally, below the lowest deck but above the underside of support steel, for connection to the caisson disposal pipework. Cross-contamination between LQ and process drainage systems should be prevented.

14.3.2.8 Roof drains

Approx. 100 mm high upstands (bunding) should be provided around the perimeter of the LQ roof. Drainage should cater for rainwater, equipment drainage and deluge systems. Outlets with hopper heads should be provided for collection and connected to downpipes. Downpipes should run down the LQ exterior and terminate below the lowest deck.

14.3.2.9 Helideck drains

Helideck periphery drains may discharge into, or combine with, the LQ roof drains and should be adequately sized to cater for discharge from fire fighting facilities.

Consideration should be given to the impact on the environment of any contaminant contained within water discharged from the helideck.

14.3.3 Thermal insulation of pipework

Insulation may be required to protect pipework against damage by freezing and against heat loss, to provide protection to personnel and to prevent condensation, depending on the local weather conditions. Pipes above suspended ceilings and in service ducts should be insulated, but final lengths of hot and cold domestic water service piping serving fitments in cabins or toilets should not be insulated.

To avoid condensation a continuous vapour barrier should be applied to insulated pipework, equipment, and plant used to convey, store or generate fluids or gases at temperatures below design ambient dewpoint. Items requiring vapour barriers should be thermally insulated from their supports.

The following may require to be insulated:

- cold water service;
- hot water service;
- heating medium system;
- sea water cooling and fire services;
- chilled water systems;
- hot water service calorifiers;
- water tanks;
- refrigerant piping.

All insulated pipework within manned areas of the LQ should be protected from mechanical damage by stainless steel or similar sleeves.

14.3.4 Pipe gradients and routing

14.3.4.1 Gradients

All water and drainage services pipework on fixed installations should be installed with a continuous gradient in the direction of flow as listed below.

Service	Gradient	NOTES
Potable water (cold and chilled)	1 in 250	Direction of gradient to allow draining.
Potable water (hot), mains and branches	1 in 250	
Drainage	1 in 60	This gradient is preferred for main drainage lines in order to maintain self cleaning velocities.

Floating installations may require greater gradients or a different type of system.

14.3.4.2 Layout and routing

Piping should be arranged so that full access is provided for maintenance of equipment, and so that equipment can be removed with the minimum of pipe dismantling.

Horizontal piping should be grouped and run at a uniformly established elevation throughout the LQ. Elevations should be selected so that high and low points are minimised. Grouping of lines in layers should be limited to no more than two layers in any one group. The length of hot water pipe 'dead legs' should be kept to a minimum.

Exposed pipes should be avoided within accommodation areas of the LQ, but where unavoidable should be either stainless steel or chromium plated.

Piping joints should not be formed in the thickness of partitions, ceilings or floors.

Pipes should be installed with due regard to expansion, contraction, water-hammer and vibration. Hot water pipes should be installed with a minimum clearance of 300 mm from electrical cables and conduits to avoid galvanic interaction. Installation of water services above electrical cables, conduits or electrical equipment should be avoided.

14.3.5 Material and equipment

14.3.5.1 Potable water pipework

Pipe should be solid drawn seamless copper. Permanent connections should be copper capillary with silver brazing alloys. Break connections should be compression type with swaged joints. Alternative materials such as GRE and GRP may also be considered providing material performance is not reduced.

14.3.5.2 Drainage pipework

Pipes and fittings should be uPVC with solvent welded joints.

14.3.5.3 Roof and helideck drainage

Pipes should be carbon steel in accordance with DEP 31.38.01.15-Gen.

14.3.5.4 Potable water storage tanks

Main tanks should be multi-compartment type with insulation between compartments. Day tanks may have a single compartment. Each should be of carbon steel or equivalent proven materials, lined with epoxy resin suitable for potable water, insulated to prevent condensation. Stainless steel and GRP should also be considered as alternative materials. The following equipment and connections should be considered:

- ball valve and float;
- sight glass;
- overflow pipe with fine-mesh filter, to prevent the ingress of foreign matter;

- overflow warning pipe with fine-mesh filter;
- inlet pipe connection;
- outlet pipe connection(s);
- manhole cover(s);
- internal ladder (for tanks exceeding 1 m depth);
- vent pipe with fine-mesh filter;
- low water level alarm;
- drain valve(s) suitable for hose connection.

14.3.5.5 Chilled water make-up tank

The tank should be constructed from carbon steel plate with an open top and be galvanised after manufacture, or manufactured of equal proven materials. Stainless steel or GRP should also be considered as alternative materials. The following equipment and connections should be considered:

- ball valve and float;
- overflow pipe with wire bird guard;
- outlet pipe connection;
- drain valve suitable for hose connection;
- fixed lid (readily removable) with cut-out for system vent pipe;
- electric immersion heater and thermostat (where risk of freezing exists).

14.3.5.6 Calorifiers

Calorifiers should be constructed of welded sheet copper, and be complete with supporting feet or cradles and lifting rings. Support steelwork should be of welded construction and painted, with sheet lead pads fitted between supports and the calorifier shell. The following equipment and connections should be considered:

- pressure relief valve;
- dial thermometer;
- dial pressure gauge;
- bronze draw-off gland cocks for drainage;
- cold feed;
- primary flow;
- primary return;
- secondary flow (if platform heating medium is primary heat source);
- secondary return (if platform heating medium is primary heat source);
- open vent;
- manhole;
- immersion heater with control and high limit thermostat (hand reset).

In addition, should heating be by primary hot water coils, bursting discs may be required dependent on the primary system pressure.

Where heating medium is used as the primary heat source, temperature control for each calorifier should be effected through the use of a diverting valve situated within the primary mains. The valve should be operated by a calorifier-mounted immersion control and high temperature limit thermostat(s).

14.3.5.7 Circulating pumps

Pumps should be of the inline flange mounting type installed for parallel service, and complete with line size strainers, non-return check valves, isolating valves, upstream and downstream pressure gauges, and flexible connections.

15. INTERIOR DESIGN

15.1 GENERAL

Whilst it is difficult to quantify people's attitudes to interior design, it is considered to be of benefit to the well-being of personnel using the LQ to be surrounded by a pleasant environment that has well co-ordinated colour schemes and selective lighting which enhance the quality of space.

A comfortable and aesthetically pleasing environment which is both practical and functional will have a positive psychological effect on personnel who spend extended periods offshore, and will as a consequence enhance the safety aspect of the personnel and the installation.

It is therefore strongly recommended that a specialist interior designer be included in the Contractor's team at an early stage of the design work so that the interior decoration can be fully integrated into the design of the LQ.

15.2 COLOUR BOARDS AND PERSPECTIVES

Colour schemes should be selected to achieve an aesthetically pleasing appearance throughout the LQ. They should embrace all aspects of the LQ interior finishes for all areas, and be fully co-ordinated with lighting. Finishes should include curtains, bed linen, ceilings, partitions, floors, doors, furniture and all other visible fixtures and fittings. Details should be prepared in the form of accurately coloured perspective boards, which should include material/fabric samples and illustrations of furniture, fixtures and fittings.

Perspective representations of interior spaces such as recreation rooms, dining room, transit lounge and cabins should also be considered as part of the scope of work of the interior designer.

15.3 MOCK-UP CABIN

Experience has proven that production at an early stage in LQ construction of a full-size mock-up cabin and adjacent corridor, in order to determine the quality of materials specified, construction details and co-ordination of services, is of significant benefit.

As cabins are the most repetitive LQ space, this exercise enables bulk items of materials, fittings and furniture to be manufactured once all the construction, assembly, connections, supports, joints and fixing details have been checked. It also allows service routings to be assessed and clashes avoided.

The mock-up should be identical in all aspects to that proposed for the permanent cabin and complete in every detail of layout and construction, including wall and ceiling panels, doors, furniture, fittings, finishes, all services in the cabin and void space above it and moveable items.

16. REFERENCES

In this DEP reference is made to the following publications:

NOTE: Unless specifically designated by date, the latest edition of each publication shall be used, together with any amendments/supplements/revisions thereto.

SHELL STANDARDS

Index to DEP publications and standard specifications	DEP 00.00.05.05-Gen.
Noise control	DEP 31.10.00.31-Gen.
SIEP Piping classes	DEP 31.38.01.15-Gen
Heating, ventilating and air conditioning for plant buildings	DEP 31.76.10.10-Gen.
Installation, testing and balancing, and commissioning of HVAC systems	DEP 31.76.10.11-Gen.
Fire, gas and smoke detection systems	DEP 32.30.20.11-Gen.
Telecommunications for offshore platforms	DEP 32.71.00.12-Gen.
Electrical engineering guidelines	DEP 33.64.10.10 -Gen.
Design of offshore temporary refuges	DEP 37.17.10.11-Gen.
Design of steel substructures for fixed offshore platform (amendments/supplements to API RP 2A-LRFD)	DEP 37.19.00.30-Gen.
Weldable structural steels for fixed offshore structures (amendments/supplements to BS 7191)	DEP 37.19.10.30-Gen.
Area classification (amendments/supplements to IP 15)	DEP 80.00.10.10-Gen.
Water-based fire protection systems for offshore facilities	DEP 80.47.10.12-Gen.
Movable fire fighting equipment for onshore applications	DEP 80.47.10.32-Gen.
HSE Manual	EP 95-0000
Fire and Explosion Strategy	EP 95-0230

BRITISH STANDARDS

Offshore Installations: Guidance on Design. Construction and Certificaton	DoE

Issued by:
UK Department of Energy
Her Majesty's Stationary Office
London, United Kingdom

Institute of Petroleum Area Classification Code for Petroleum installations, Model Code of Safe Practice - Part 15 (ISBN No. 0471921602)	IP 15

Issued by:
Institute of Petroleum
61 New Cavendish Street
London W1M 8AR
United Kingdom

INTERNATIONAL STANDARDS

Fire Test Procedures — IMO-844 E

International Marine Organisation. International Conference (Safety of Life at Sea) Convention of 1974, 1978. Protocol and 1981, 1983 and 1988 amendments — IMO-SOLAS

Issued by:
International Maritime Organisation
4, Albert Embankment
London SE1 7SR
United Kingdom

17. BIBLIOGRAPHY

NOTE: The following documents are for information only and do not form an integral part of this DEP:

1.	Fire tests on building materials and structures	BS 476
2.	Specifications for hot dip galvanised coatings on iron and steel articles	BS 729
3.	Specification for calorifiers and storage vessels for central heating and hot water	BS 853
4.	Capillary and compression tube fittings for copper and copper alloy	BS 864
5.	Specifications for manufacture of sectional cold rooms (walk-in type)	BS 2502
6.	Specification for copper and copper alloy tubes	BS 2871
7.	Specification for unplasticised PVC soil and ventilating pipes, fittings and accessories	BS 4514
8.	Code of Practice for selection, installation and maintenance of electrical apparatus for use in potentially explosive atmospheres	BS 5345
9.	Safety signs and colours	BS 5378
10	Stairs, ladders and walkways	BS 5395
11.	Specification for performance requirements and tests for office furniture	BS 5459
12.	Fire safety signs, notices and graphic symbols	BS 5499
13.	Code of Practice for sanitary pipework	BS 5572
14.	Specification for fabrics for curtains and drapes	BS 5867
15.	Office furniture	BS 5940
16.	Loading for buildings	BS 6399
17.	Sanitary installations	BS 6465
18.	Assessment of the ignitability of mattresses with primary and secondary sources of ignition	BS 6807
19.	Code of practice for safety of powered doors for pedestrian use	BS 7036
20.	Specification for resistance to ignition of upholstered furniture for non-domestic seating by testing composites	BS 7176
21.	Chartered Institution of Building Services Engineers Volumes A,B,C Guides	CIBSE
22.	LQ weight estimating study; SIEP EPT-DF, December 1997	EP 98-5442
23.	Heating and Ventilation Contractors Association Specifications for Sheet Metal Ductwork DW142 , 1982; DW143, 1994; and amendment 142 (A) 1988	HVCA
24.	Institute of Plumbing - Plumbing Engineer's Services Design Guide	IoP
25.	Institute of Electrical Engineers Recommendation for electrical and electronic equipment of Offshore Installation. Wiring regulations	IEEE
26.	Rules and Regulation for the Classification of Fixed Offshore of Shipping Installation	Lloyds Register
27.	Code for the Construction and Equipment of	IMO-811

Mobile Offshore Drilling Units. (MODU Code)

APPENDIX 1 AREA SEGREGATION, GALLEY EQUIPMENT AND SERVERIES

A1.1 SEGREGATION OF AREAS IN LIVING QUARTERS

It is desirable to segregate clean areas from dirty areas and quiet areas from noisy areas. The following schedule indicates the categories of various areas. Segregation has a significant effect on the location of areas within the Living Quarters.

Rooms/Area	Dirty	Clean	Noisy	Quiet
Cabins		X		X
Galley		X	X	
Dining room		X	X	
Locker/change room/toilets	X		X	
Laundry		X	X	
Recreation room		X	X	
Quiet room		X		X
Smoke/tea room	X		X	
Sick bay		X		X
Radio room		X	X	
Plant room	X		X	

A1.2 GALLEY EQUIPMENT GUIDE

Number of personnel on board	0-35	35-50	50-100	100-150
PRIME COOKING EQUIPMENT				
Solid top, heavy duty range incorporating under oven 2/3/4 plate top	1	1	1	2
Brat pan with frying pan	-	1	1	1
Combination steam/convection oven	1 x 6 gast	1 x 6 gast	1 x 10 gast	1 x 10 gast
Convection oven 6 x 1/1 gastronorm*	-	1	1	2
Salamander multi purpose with brander 785 mm wide x 330 mm deep x 325 mm high	1	1	1	1
Deep fat fryer, 55 kg per hour, self filter	1	1	2	2
ANCILLARY EQUIPMENT				
Sink for hand wash with elbow tap	1	1	1	2
Vegetable preparation sink	-	-	1 x single	1 x double
Meat/fish double bowl sink	1	1	1	1
Potwash sink with steriliser sink	1	1	1	1
Mobile work bench to suit min. 1 200 mm length	-	1	3	3
Gravity-fed slicer x 300 mm	-	1	1	2
Pot racking 1 500 mm	1	1	1	2
Refrigerated work bench with under cabinet	1	1	1	1
Multi-purpose bench-mounted vegetable preparation machine	1	1	1	1
Floor-standing food mixer x 23 litres	1	1	1	2
Microwave (wall mounted), 3.2 kw input, 1.65 output	1	1	1	1
Potato peeler x 4.5 kg	1	1	-	-
Potato peeler x 6.3 kg	-	-	1	1
Potato chipper	-	-	-	1

NOTE: "GASTRONORM" is an internationally used generic term that refers to a size of a food container of 530 mm x 320 mm of varying depth. The container may be used for either hot or cold food. The required size is denoted by symbols such as 6 x 1/1 which means 6 full size containers.

A1.3 GUIDE TO HOT SERVERY COUNTER AND COLD SERVERY

A1.3.1 Hot servery counter

The servery counter should be designed to incorporate standard 1/1 gastronorm container inserts on tiled pads to the heated well and should be capable of maintaining prepared food at 65°C. The well and under-cupboards should be heated by means of removable convector units.

Features may include:

- convection-heated under hot cupboard with removable shelves and top hung sliding doors with bearing rollers and guide pins to lower edge;
- heated plate lowerator for 250 mm diameter plates with base access for ease of cleaning;
- integral cranked polished stainless steel heated over-shelf incorporating long life mesh guards.

The height should allow carved joint service;

- 150 mm polished edge toughened glass sneeze screen;
- control panel with digital temperature display with sensors to all zones on control panel;
- front-fitted control panels held open or slide out for ease of access.

A1.3.2 Cold servery

Features may include:

- chilled display to provide salads and desserts and other food items and maintained at a core temperature of 5 °C. The minimum deck display, depending on POB, should be:

35 to 50	4 x 1/1 gastronorm
50 to 100	6 x 1/1 gastronorm
100 +	8 x 1/1 gastronorm

  To achieve the display size with minimum length, sealed doors or shelving with chilled blown air should be incorporated into the design;

- chilled milk dispenser, free standing to dispense a minimum of 5 litres of fresh milk;
- chilled fruit juice and water dispenser, free standing to dispense minimum of 5 litres;
- ice cream dispenser. Where delivery of pre-made ice cream is considered safe, the unit should incorporate a chilled self-help sealed tank unit. A free-standing soft serve counter model may be supplied where an ice cream conservator cannot be used;
- chilled under cupboard storage sized to gastronorm 1/1 containers;
- beverage-making facility, consisting of expansion or hydro boiler capable of continuous boiling water, self levelling 7 ounce disposable cup sleeves. Space allowance should be made for self-help beverage ingredients and waste bin and could be in the form of a customised unit;
- automatic bread toaster, conveyor type with quartz heating capable of minimum 200 slices per hour;
- ambient top, minimum of 3 metre run for display of bread, cheese, fresh fruit, cereals, condiments, and soup kettle;
- cutlery, crockery and tray dispenser points.

The servery unit may also contain digital temperature read-outs for the chilled decks and an automatic defrost cycle with electrical evaporation tray or drainage.

A1.3.3 Alternative counter layouts

Alternative counter layouts may offer arrangements that are more suitable than the foregoing preferences, and should be investigated on a project-by-project basis. It is also likely that specialist Contractors have specific expertise to offer, which should be used when the need arises.

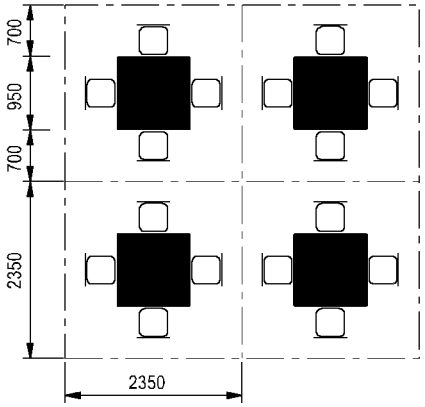
A1.4 CENTRAL ISLAND UNIT FOR GALLEYS

If a central island unit is installed, it should be so arranged that a floor-mounted multi-purpose service spine is fitted to receive all electrical and water supplies for the prime cooking equipment. This spine should include appliance isolators and be compartmentalised to separate water from the electrical supplies. Flexible connections should be fitted between the appliances and service spine.

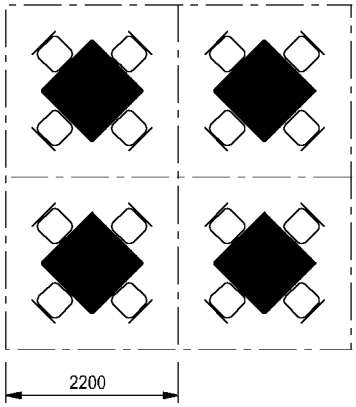
If water and electricity are to be supplied from the ceiling they shall run through vertical columns servicing the spine and be integral with the cooker hood. The columns should be compartmentalised, separating water from electrical services. The spine height should be approximately 50 mm higher than the workbench upstand height and of sufficient width to contain all electrical connections and isolation equipment.

A1.5 TABLE AND SEATING ARRANGEMENTS IN DINING ROOM

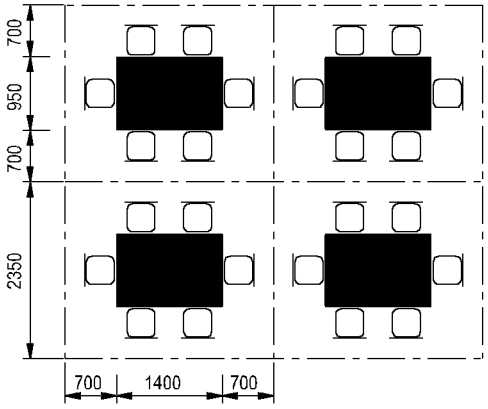
SQUARE TABLES
SQUARE LAYOUT
Local Density 1.4 m^2/Person



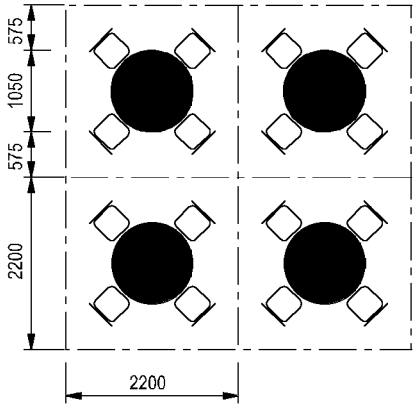
SQUARE TABLES
DIAGONAL LAYOUT
Local Density 1.2 m^2/Person



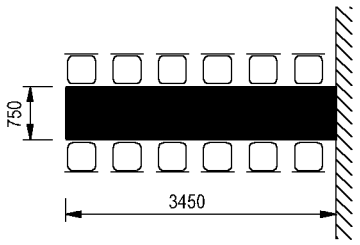
RECTANGULAR TABLES
SQUARE LAYOUT
Local Density 1.1 m^2/Person



CIRCULAR TABLES
DIAGONAL LAYOUT
Local Density 1.2 m^2/Person



RECTANGULAR TABLE(S)
APPLICABLE TO A SMALLER DINNING ROOM
Local Density 0.9 m^2/Person



NOTES

- Local densities are minimum requirement and shall not be reduced. (Dimensions shown are for guidance only).
- Use of rectangular (long) table arrangements are to be confined to installations with less then 25 berths.

A1.6 TYPICAL ALLOCATION OF OFFICES, LARGER INSTALLATION

This table provides indicative guidance only. Installation-specific requirements may change depending on construction and maintenance work, drilling and well services programmes etc.

Office function	Area m^2	Preferred location	Allocation
Administration	12 (max.)	adjacent to transit lounge with hatch and observation windows	2-person office
Bonded store	10	near to the galley/dining complex	bonded store
Camp boss	8	incorporated into galley complex	1 person
(Contract) tool pusher	12	adjacent to Ops. Sup.	2-person office, plus seating for 4
Drilling supervisor and wellsite Operations engineer	10	adjacent to external door	2-person office, plus seating for 4
Drilling, well services specialist	24	incorporated into main office complex	4-person office, plus seating for 2
Materials controller/safety officer	12	adjacent to OIM office	2 person office, plus seating for 2 Allow for minimac VDU
Office (standard)	13	adjacent to LQ main entrance	2 person seating for 2
OIM	12.5	adjacent to radio room/control room/transit	1 person, but facilities for a 6 person conference
Planner	10	incorporated into main office complex	1-person office, plus seating for 1
Operations supervisor	10	adjacent to OIM	1-person office, plus seating for 4
Operations technicians	30	adjacent to control room with observation window in dividing bulkhead. Only required if control room is in LQ	5-person office
ISC Rep.	10	adjacent to production supervisor	1 person office, plus seating for 4
Radio room	15	adjacent to OIM	1 person
Services supervisor	10	close to radio room	2-person office, plus seating for 4
Stationery store	7.5	adjacent to main office complex or admin.	Full height adjustable shelving required
System supervisors (operations)	7.5	adjacent to control room with direct access, and with observation windows in dividing bulkhead. Only required if control room is in LQ	1-person office, plus seating for 2.
Technical library	15	incorporated into main office complex	Facilities for 1 person - not permanently occupied
Well services supervisor	10	adjacent to external door	1-person office, plus seating for 2.

A1.7 TYPICAL ALLOCATION OF OFFICES; SMALLER INSTALLATION

Office Function	Area m^2	Preferred location	Allocation
OIM	10	adjacent to radio room and transit lounge	1 person, plus seating for 2
Office	15	adjacent to L.Q. main entrance - also used as technical library	3 persons, seating for 2
* Office	13	adjacent to L.Q. main entrance.	2 persons seating for 2
Radio room	15	adjacent to OIM - will also be used for administration	2 persons
* Chief Stewards Office	8	incorporated into galley complex	1 person

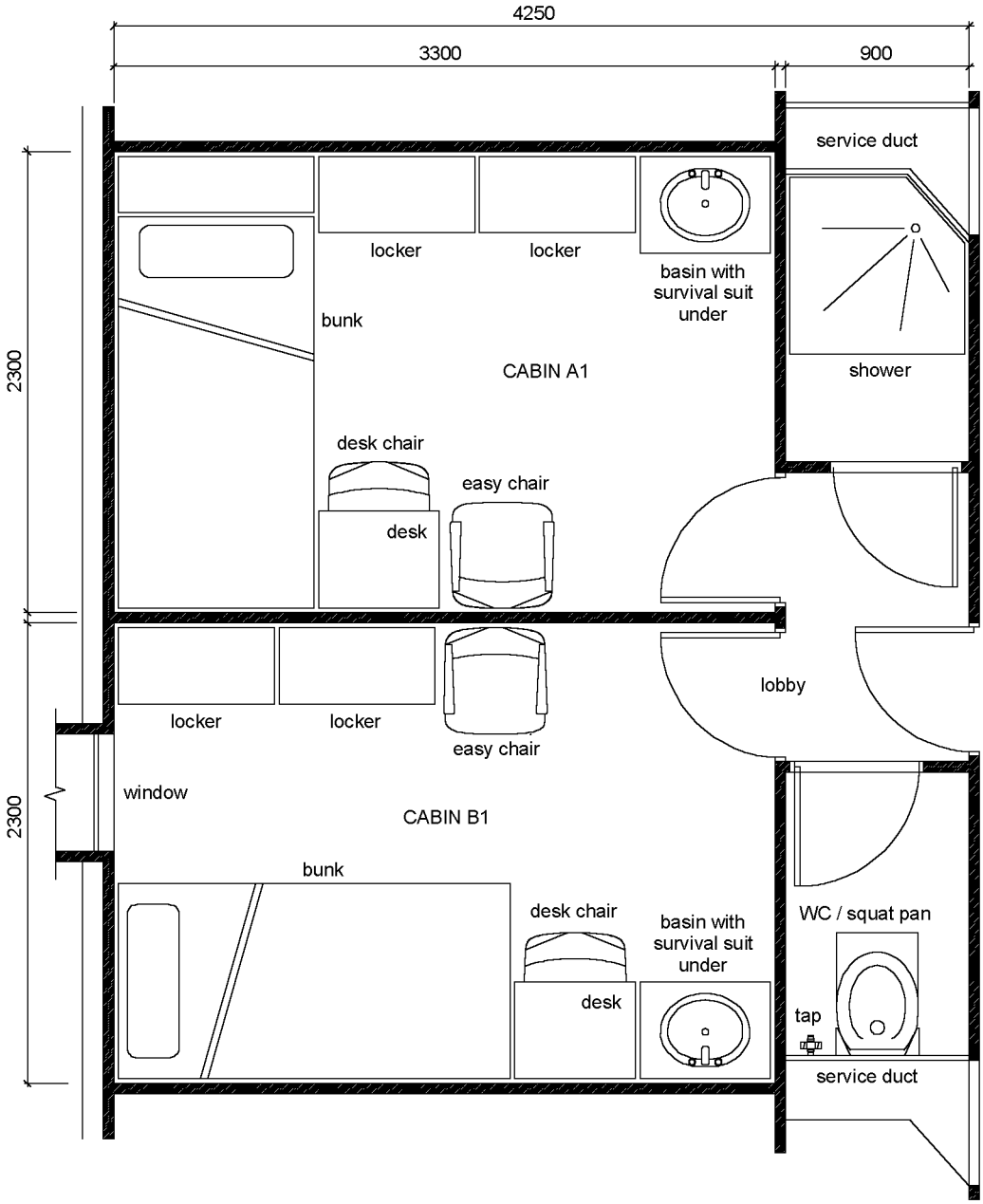
NOTE: *Areas marked thus may be required according to operational need.

A1.8 RECOMMENDED LIGHTING LEVELS

Area	Position of measurement	Colour appearance of lamps	Lux
Cabins	general area 1.2 m from floor desk top bunk lights	warm cool warm	125 200 125
Cinema	Horizontal at seat level (dimming facilities required)	warm	150
Corridors	1.2 m from floor	warm	150
Dining room	table tops servery cold desserts counter	warm warm warm	300 400 400
Food stores	floor level	cool	200
Galley	working surfaces, sinks and hotplates	cool	500
Games room	on playing surfaces (separate illumination required for dart boards)	cool	400
ICC	worktops and instrument panels	cool	750
Laundry	working surfaces and sinks	cool	400
Medical facility	desk and working surfaces examination couch bed examination lighting reading lamp (restrict luminaires seen by recumbent patient)	cool cool * cool warm *may be supplemented by local examination lighting.	500 500 500 100
Offices	desk tops	cool	500
Offices	computer screens	cool	500
Plant room, switch room	1.2 m from floor	cool	300
Quiet lounge	desk or table surface (dimming facilities required)	warm	300
Smoke room and change area	surface of drinks dispenser counter 1.2 m from floor	cool intermediate	300 200
Transit lounge	1.2 m from floor	warm	400

APPENDIX 2 INDICATIVE CABIN LAYOUT

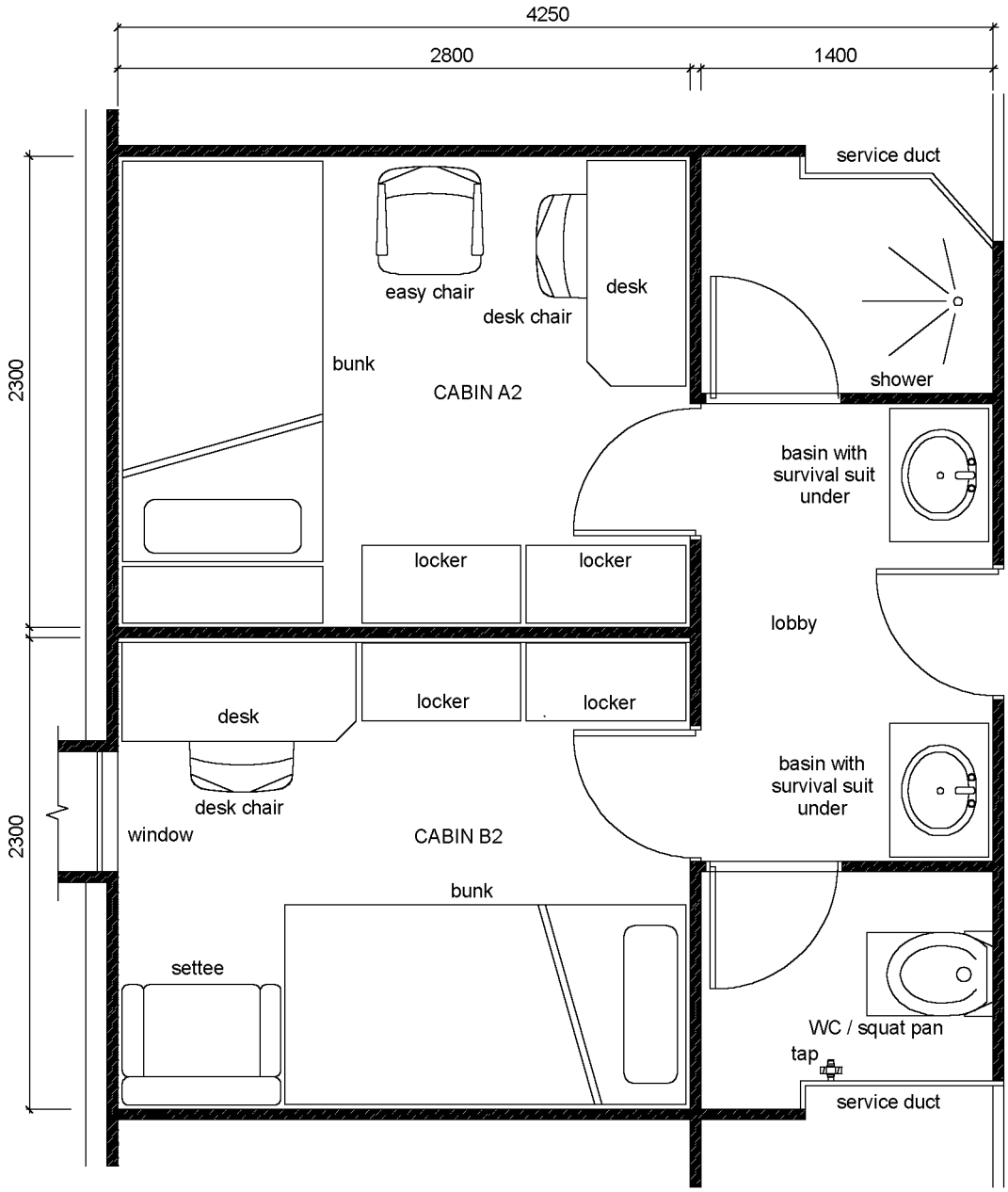
FIGURE A.2.1 SUGGESTED 2 PERSON CABIN LAYOUT ALTERNATIVE 1



ADVANTAGES	DISADVANTAGES
- good utilisation of space between the furniture layout and amount of free space - lobby separates sleeping area from corridor - personal hygiene facilities can be used by all 4 occupants simultaneously - good services and service duct arrangement	- congested lobby area - basins in sleeping area could cause problems of splashing and disturbance to other occupant if asleep - difficult configuration should window be required (Cabin B1)

AREAS	A1	B1
Gross internal cabin area excluding personal hygiene area	7.6 m^2	7.6 m^2
Net internal cabin area excluding lockers, bunk desk & basin	4.0 m^2	4.3 m^2
Gross internal personal hygiene area	2.6 m^2	
Lobby area	1.3 m^2	

FIGURE A.2.2 SUGGESTED 2 PERSON CABIN LAYOUT ALTERNATIVE 2



ADVANTAGES	DISADVANTAGES	AREAS	A2	B2
- all personal hygiene facilities are separated from sleeping areas - all these facilities can be used by 4 occupants simultaneously - good services and service duct arrangement	- circulation space in lobby does not form part of cabin relaxation area, therefore free area with sleeping / relaxation space is restricted	Gross internal cabin area excluding personal hygiene area	6.4 m^2	6.4 m^2
		Net internal cabin area excluding lockers, bunk & desk	2.6 m^2	3.2 m^2
		Gross internal personal hygiene area	3.0 m^2	
		Lobby area	2.4 m^2	

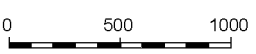
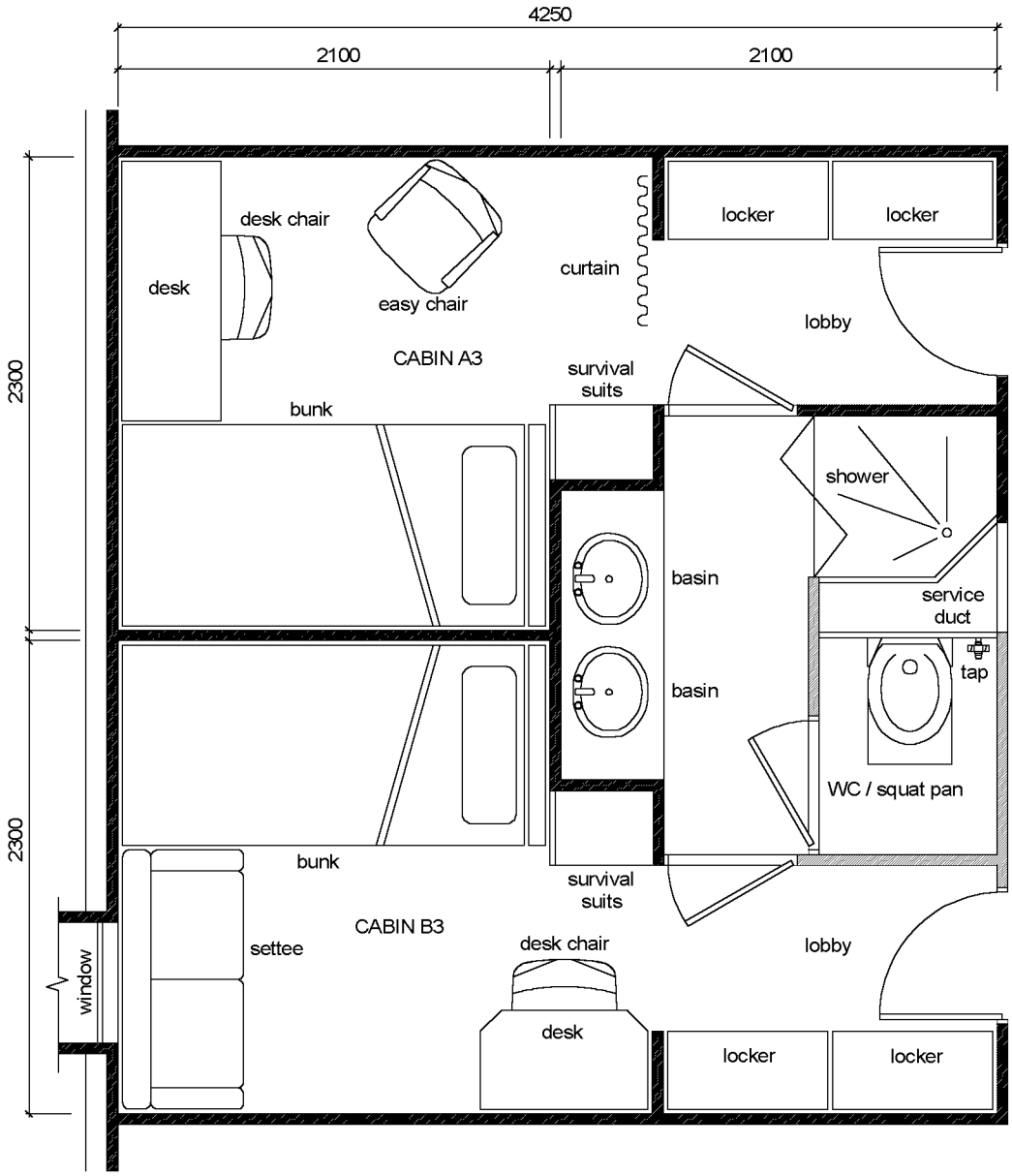


FIGURE A.2.3 SUGGESTED 2 PERSON CABIN LAYOUT ALTERNATIVE 3



ADVANTAGES	DISADVANTAGES	AREAS	A3	B3
- all personal hygiene facilities are located in one area - personal hygiene unit is easy to prefabricate	- elongated spatial arrangement in cabin area - restricted access to service duct, may require maintenance worker to enter cabin to obtain access to toilet enclosure - no separation between sleeping area and lobby	Gross internal cabin area excluding personal hygiene area	7.6 m^2	7.6 m^2
		Net internal cabin area excluding lockers, bunk desk & survival suit locker	4.0 m^2	5.3 m^2
		Gross internal personal hygiene area	4.1 m^2	

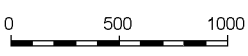
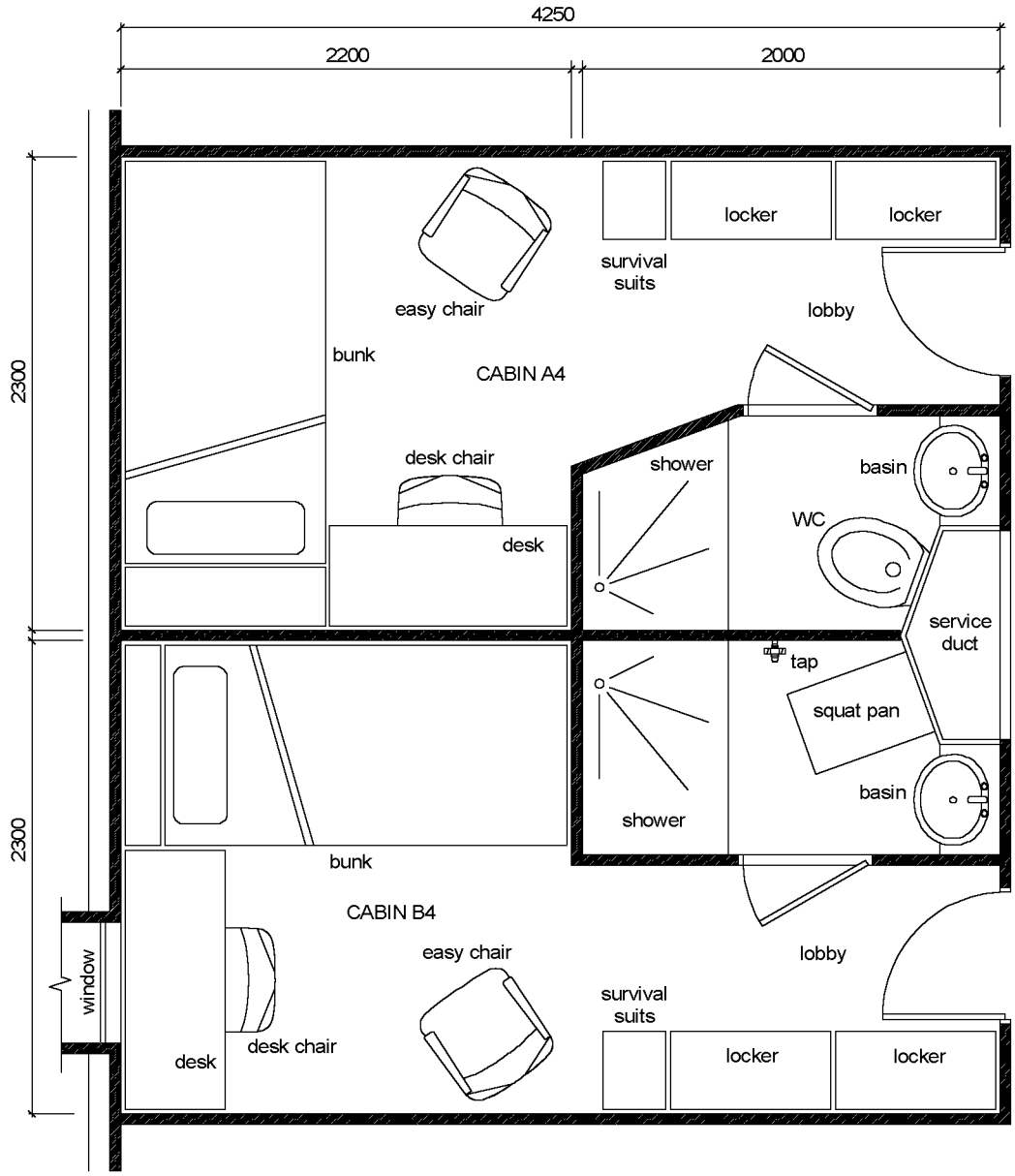


FIGURE A.2.4 SUGGESTED 2 PERSON CABIN LAYOUT ALTERNATIVE 4



ADVANTAGES	DISADVANTAGES	AREAS	A4	B4
- "hotel like" arrangement most suitable for single occupancy or two on shift work - personal hygiene unit is easy to prefabricate - good service duct arrangement	- elongated free area arrangement with no lobby separating the sleeping area from the corridor - increased number of personal hygiene facilities for two cabins - these facilities can only be used by one occupant in each cabin at any one time	Gross internal cabin area excluding personal hygiene area	7.6 m^2	7.5 m^2
		Net internal cabin area excluding lockers, bunk desk & survival suit locker	4.0 m^2	4.0 m^2
		Gross internal personal hygiene area	1.8 m^2	1.9 m^2

0 500 1000

APPENDIX 3 PROJECT/OPERATIONS SUPPLY ITEMS

The following list is a suggested division of responsibilities regarding the supply of various items:

Project Supply	Operations Supply
Fixed and loose furniture and fittings	PCF permit board tiles
All soft furnishings other than bedding	Mattresses, pillows and bedding
Carpets and floor coverings	Cutlery, cups, saucers and plates etc.
Television, cinema and video equipment	Video games (recreation areas)
Gymnasium equipment	Recreation room games
Weighing machine (transit lounge)	Photocopiers
Rubber matting (floors)	Computers for office and personal use
	Life jackets, fire suits and survival suits
	Vending machines
	Medical supplies

APPENDIX 4 EFFECT OF CABIN SIZE ON MODULE WEIGHT

A study (see reference below) was initiated to investigate, for offshore living quarters, the correlation between weight or cost and accommodation sizes and numbers of berths. The areas that were investigated were:

- Weight against cabin size (large, medium or small cabins).
- Weight against number of berths per cabin (2, 4, 8 or 16 berths).
- Weight against quantity of public space (recreation, cinema and dining as separate rooms, two rooms or combined as one).

The aim was to establish the cost of extra space. A typical, modern North Sea living quarters module was used as a datum.

The results are intended to be comparative rather than accurate weight estimates; a relative accuracy of +/-25% was permitted. The study excluded the effect of deck size variations due to variations of the LQ surface area.

Summary and conclusions

The results of the study (see Figure A4.1-3) show that the effects of cabin and public space on module weight are small.

A change of cabin size of 1 m^2 has a large effect on luxury because inhabitants perceive space as very important, but makes a difference of only 2% to module weight.

The multiple-berth cabin arrangements examined save between 6% and 11% in module weight when compared with 2-berth cabins with private showers. The trade-off in standard of living is very pronounced, especially when one considers the common showers and toilets which are necessary. Cabins over 2 berths have not been built for North Sea platforms for about 15 years.

Combining public rooms into multi-purpose spaces in the arrangements examined produces module weight savings of only 2% and clearly erodes the standard of living. Recreation facilities are a sensitive welfare issue.

The foregoing illustrations show the effects on module weight in the form of simple graphs. The conclusion can be drawn that reducing the size of cabins and public spaces has only small effects on the total LQ module weight, although they may be perceived as the main variable. More fundamental factors such as wall ratings control have a much greater effect on weight.

Reference: LQ weight estimating study; Kiltie Offshore Design, December 1997. SIEP document number: EP 98 5442.

FIGURE A4.1 WEIGHT EFFECT OF CABIN SIZE

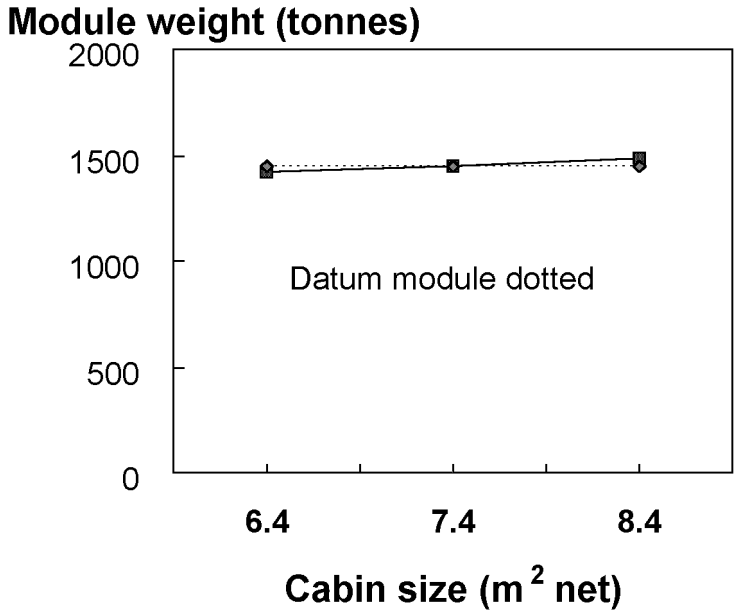


FIGURE A4.2 WEIGHT EFFECT OF NUMBER OF BERTHS PER CABIN

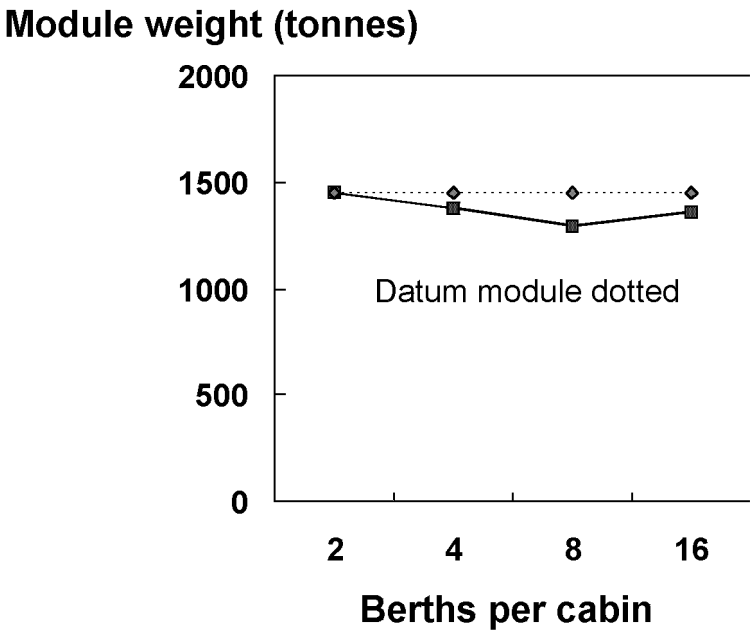
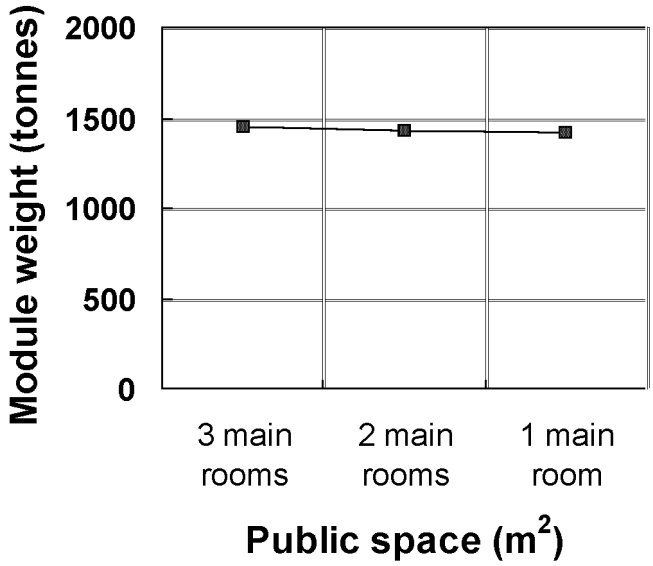


FIGURE A4.3 WEIGHT EFFECT OF COMBINING PUBLIC SPACES



NOTE: Three main rooms: Recreational area for 50% of POB; Cinema for 50% and dining for 35% of POB. Two main rooms: recreation and cinema combined for 75% and dining for 35%. One main room: recreation, cinema and dining combined for 100% POB