



LIVING QUARTERS MODULE BUILDING PRINCIPLES

General Features

Emtunga builds both customer specified Living Quarters and LQ's according to our own preferred design. The design and fabrication is based on Emtunga's Modular Section Principle. The standard Living Quarter Module contains all rooms and areas which are necessary in a typical Living Quarters Module.



Modular Sections Principle

For the last 35 years Emtunga has been one of the leading Living Quarters Module suppliers worldwide. Our design and fabrication principle is based on a so-called Modular Section Principle where the Living Quarters Module is divided into a number of smaller module sections, stacked side-by-side or on top of each other. This fabrication method has a number of advantages over traditional building methods. The most important being:

- Efficient production ensures excellent cost and time control
- Inherent module structural strength enables low overall weight
- Excellent control of production quality on all levels

The fabrication of the Living Quarters Module can be divided into three phases:

1. Fabrication Phase: Fabrication of module sections, where each module section is welded, insulated and outfitted with all necessary utilities and services at indoor workshops in Sweden.

2. Assembly Phase: Module sections are erected to form a complete Living Quarter Module at a West Swedish port or at customer sites anywhere in the world. The module sections are installed on a pre-levelled base frame which is part of the overall Living Quarter Module structure. The baseframe will be dimensioned as part of the load bearing structure to comply with the elevation and installation requirements of the customer. When all module sections are fully positioned on the base frame the final welding between the module sections and also between the module section and the base frame is performed. Other activities, such as interior installation and hook-up of ducts, pipe spools and cables between the module sections, can be done in parallel with the outside welding.

3. MC and Commissioning Phase: The Mechanical Completion check is completed discipline by discipline and the subsequent commissioning of each system takes over once all parts of a system are mechanically complete. The final MC and commissioning is performed in Sweden or on site.



Technical Description

STRUCTURAL

Once the welding between the modular sections is complete, the main structural elements are the outer bulkheads, top and bottom deck plates and some of the internal walls of the finished Living Quarters Module.

Each bulkhead will act as a beam with a high web plate and flanges formed by top and bottom beams. The web of this composite beam will have a profiled plate construction and theories of Stressed-skin analysis will be used when analyzing the overall structure.

The complete Living Quarters Module can be lifted either from four padeyes on the top or four trunions provided on the base frame. The Living Quarters Module requires a minimum of four support points, where the location of these points are very flexible and dependent mainly on the platform deck structure. Top-lift requires additional steel reinforcements to be integrated into the building, bottom-lift is thus more weight efficient.

The external bulkheads and decks can also be designed for various accidental loads, such as blast overpressure and dropped objects. The Living Quarters Module has enough structural capacity for a standard helideck to be installed on the top deck.

PAINTING

Due to the modular section system, each module will be blasted and painted indoors in heated surface treatment workshops. This gives each module section and the Living Quarters a durable long lasting surface covering.

ARCHITECTURAL

The Living Quarters Module is delivered complete with all necessary equipment and furniture.

The material selection criteria is always based on safety, working environment, Life Cycle Cost (LCC) and the availability of spare parts in the region where the Living Quarters Module will be operating.





Safety and Working Environment

The following factors are considered in the Living Quarters Module layout and design in accordance with regulations and safety studies:

- Segregation of certain areas such as clean/dirty areas, noisy/quiet areas etc.
- Escape route philosophy.
- Passive Fire Protection. A-60 decks and bulkheads will be provided for external decks and bulkheads in accordance with regulations. Other fire ratings such as H-rated decks and bulkhead can be provided if required by the project.
- Active Fire detection system.
- Fire fighting system (internal hose reels). The use of sprinkler system is not a standard requirement any more as all internal equipment and material is flameretadant or non-combustible. However sprinkler can be provided if required by the project.
- Fire suppression system in the galley hood.
- Reduction of internal noise levels and sound transmission from room to room.
- Internal air quality and number of air changes for various areas.
- Reduction of vibration transmission to the internal areas of the Living Quarter Module from adjacent equipment on the platform.



HVAC

A central HVAC unit is installed on the Living Quarters Module roof (can be integrated at other levels if required), providing internal ventilation and temperature control for personal safety and comfort.

We can design according to:

- Max outdoor climate for design: 35°C, 50% R.H.
- Min outdoor climate for design: -35°C, 50% R.H.
- Design indoor climate: 22°C ± 2°C. Max 60% R.H.
- Min outdoor airflow to the Living Quarters Module will normally be designed for 8 l/s (30 m³/h or 48 CFM) per person.
- Air changes (including return air) in any area will be according to regulations.
- The supply and extract units will provide 2x50% capacity with 60% redundancy.

The airflow is adjusted to obtain a slight overpressure in the Living Quarters Module. The room temperature in each room can be adjusted separately by means of a duct heaters and a thermostat. All penetration through A-rated bulkheads and decks are provided with a fire damper. Other design conditions can be adopted in order to fulfil project requirements.

EIT

The Living Quarters Module is provided with all necessary electrical, Fire & Gas and telecom system as per regulations and normal praxis. Such as:

- Internal lighting including emergency lighting.
- Electrical outlets and switches.
- Internal sub distribution boards.
- Addressable gas and smoke detectors and alarm bells, excluding central unit.
- PA alarm system (double zone A&B), excluding central unit.
- Telephone, data and entertainment outlets in common area.
- HVAC control system.

The Living Quarters Module will be designed for incoming power supplies which are compatible with the rest of the platform. The standard design is based on IEC (International Electro-technical Commission) standard, however NEC standards (National Electric Code) can also be adopted.





Piping

The Living Quarters Module has all necessary piping systems required for the operation. These are:

- Cold and hot potable water system.
- Seawater flushing system.
- Black and grey sewage systems (separate piping).
- Fire Water for hose reels.

The quality and standard of the selected materials is in accordance with normal offshore standards and regulations.

Tie-in Points

The Living Quarters Module is designed to minimise the integration and hook-up work when it is installed on the platform. We endeavour to concentrate all tie-in points in one location under the Living Quarters, with a single connection for each system. The final location of each tie-in point is rather flexible and will be coordinated with the platform system to ease the integration and final hook-up of the Living Quarters Module.

Helideck

As an option, a helideck (aluminium or steel) can be installed on the Living Quarters Module top deck. In this case the helideck will be provided with all necessary fire fighting, lighting and safety systems as per regulations.

Weight

Our stressed skin design will provide a robust but very light steel structure compared to a conventional steel fabrication method. There are several ways to reduce this weight if lowest possible weight is required by the project.

Regulations

The standard Living Quarters Module is designed and fabricated in accordance with following rules and regulations:

- SOLAS
- MODU/IMO code
- ILO

Other rules and recommendations such as NORSOK, ABS, USCG, DNV and LRS can also be adopted.



Delivery Alternatives

There are two delivery alternatives:

SINGLE LIFT

In this alternative the entire Living Quarters Module will be shipped in one piece for final installation on the platform or vessel. Once the module is positioned on its final location the hook-up connection between the Living Quarters Module and the platform can commence. Normally a period of two to three weeks should be allowed for this operation before the Living Quarters Module can be used for habitation.

MODULAR SECTION DELIVERY

In this alternative the Living Quarters Module will be shipped in smaller modular sections and installed on the platform one by one instead of one single lift unit as described above.

The advantage with this alternative is:

- Cheaper load-out and off-loading.
- Cheaper and faster shipping.
- Lower overall weight.
- Cheaper lifting operation, as a heavy lift crane is not required and the lifting can be done either by platform crane or the available cranes at the platform fabrication site.
- Shorter project period, as the hook-up between the Living Quarters Module and the platform can be performed at the same time as the connections between the module sections are performed.

The normal strategy for a Modular Section Delivery alternative is that the internal hook-up between the modular sections is performed by the local labour available at the platform fabrication site with Emtunga supervision.

Flexibility

As described earlier, our design and fabrication method is based on our modular section principle. This means that additional rooms (for instance cabins or offices) can be added if required.

This also means that the Living Quarters Module can be built completely according to the clients' choice and requirements. Or, to be able to offer our best price and performance, be built according to our standard modular sections of type 4, 5 or 6.





APPLY EMTUNGA AB

Apply Emtunga AB is the fastest steel Living Quarters supplier in the world. Emtunga, now part of the APPLY group, has delivered offshore Living Quarters since 1974. The company is located in Vara, Sweden.