



**NEW BUILDING SUPERVISION
SERVICES**

for
1 x 170,000 m³ FSRU
To be constructed in S. Korea

We, PEARL NAVAL, submit our generic proposal for Project Management Services, Plan Approval and Construction Supervision Services for 1 x 170,000 m³ FSRU to be designed and constructed in South KOREA.

Prepared by PEARL NAVAL



1. Background

PEARL NAVAL has a well-established set-up with offices in Istanbul and Korea for marine consultancy activities. With these locations, we are well suited towards providing project management support to ship-owners in all the major shipyards.

Our mission is to provide first class ship management, crew management, chartering, newbuilding contracting and construction supervision services that meet or exceed safety, environmental and customer requirements and conduct our operation in a good manner to ensure that Quality, Safety, Security, and Environmental considerations remain top priority for the Company's management and employees.

We at PEARL NAVAL, are confident that our technical management experience under modern leadership and innovative thinking, make us the most reliable, counter party and look forward to continue to successfully face the ever changing shipping industry's new challenges.

Within PEARL NAVAL we have personnel with wide experience from – Class Societies, ship yards, engine manufacturers/subcontracting companies and of course extensive sailing experience.

1.1 PEARL NAVAL Personnel

Between our offices we have a well-balanced team within Ship Building comprising of:

- Marine Engineers
- Naval Architects
- Ship Building Engineer
- Production engineers - specialists in hull/ steel fabrication
- Electrical engineers
- Master mariners

In addition to above we have site teams working at various locations with the following manning:

- Site Managers (Naval Architects/Marine Engineers)
- Hull Supervisor
- Paint Supervisors
- Machinery Supervisor
- Electrical Supervisors

1.2 Services

The services we offer for new building projects include:

- Plan approval and equipment review
- Site supervision using a team of experienced personnel
- FAT, Commissioning and trials
- Guarantee claims handling

2. Project Organization

For this project the overall responsibility for co-ordination and project cost control shall be by our project manager from our office at Istanbul.

We shall set up a site office at the shipyard. Site team management, all building activities and regular reporting shall be the responsibility of the site manager.

2.1 Offices:

All support functions for travel, logistics, accounting and project coordination shall be from our office at Istanbul.

2.2 Site Management

At the building yard we mobilize a supervision team headed by a Site Manager, who is in charge of all inspection work carried out at the yard and reporting to the Owners and the Project Management offices. For a project like this, Supervisors specialized in various fields shall be at site and the team will comprise of the following:

	Staff Grade	Qualification
1	Site Manager (Turkish)	Marine Chief Engineer with extensive NB experience
2	1st Senior Hull Inspector (Turkish)	Naval Architect and Marine Engineer with NB experience
3	2nd Hull Inspector (Turkish)	Naval Architect and Marine Engineer with NB experience
4	1st Coatings Inspector (Turkish)	Certified NACE or FROSIO Inspector
5	2nd Coatings Inspector (Turkish)	Certified NACE or FROSIO Inspector
6	Machinery Inspector (Turkish)	Marine Engineer with experience on Marine Systems
7	Cargo System Inspector, Cryogenic (Turkish)	Gas Engineers with experience on board LNG carriers
8	Electrical / Automation Engineer (Italian)	Chief Electrical Engineer with experience on Diesel Electric Systems

3. Project Management Support

We have prepared our offer based on our understanding of the project as construction of 1 x 170,000 m³ FSRU to be built in S. Korea. We have based our offer on the option of using Site team comprising of Turkish Site manager, hull, coating and machinery inspectors. Korean cargo system engineer and Electrical / Automation Engineer. We shall provide the necessary back-up and Project Management from our offices. The project shall therefore avail of complete logistics, technical and secretarial support.

4. Principal Assumptions

The principal assumptions for this project are:

- Vessel is FSRU
- Anticipated delivery date of the vessel is in end of 2020
- Project support shall be provided by our offices
- Block fabrication unit (subcontractors) are assumed to be in the yard's vicinity.

5. Work Scope

On confirmation of our services, we shall submit a detailed work-scope for the activities being undertaken. In general the following is the outline scope of services:

5.1 Project Management

The main task is to ensure that the construction and delivery of the vessel are in accordance with the terms and conditions of the Shipbuilding contract, specification, approved plans and applicable regulations. This will entail the co-ordinating of all resources employed by PEARL NAVAL for this project, as well as co-ordinating the flow of all specifications, plans, technical data, etc., submitted by the shipyard and the communication of project tracking reports and schedules to Owner.

5.2 Plan Approval

Covers the review and approval of the complete set of drawings including basic design drawings, hull structure, crane system, regasification system, hull piping, hull outfitting, accommodation, machinery, engine room plant, piping / outfitting drawings, electric drawings and manuals.

5.3 Site Supervision

PEARL NAVAL will provide a qualified and experienced team of representatives to attend at the shipyard during the construction, coating, outfitting, testing and sea trials of the vessels. During construction, the on-site representatives will perform the following tasks for compliance with the contract specifications.

5.3.1 Technical Specifications

Complete familiarization with the technical specifications and approved drawings to ensure builder's understanding. Communicate with Owners to clarify technical details as required.

5.3.2 Potential Problems

Provide accurate technical and background information to Owners concerning potential problems as they arise at building site and represent Owner during discussions of same with builder.

5.3.3 Yard supplied equipment and material specifications

Verify that yard supplied equipment and material is compliance with Owners technical specifications and approved plans.

Material inspection and verification of pertinent certification for all materials entering into the hull construction, machinery installation and piping systems to assure they are in accordance with the specifications and applicable regulations.

5.34 Fabrication

Inspection of fabrication procedures to assure that the builder maintains adequate standards of workmanship and acceptable shipbuilding practice and that all welders and procedures are pre-qualified for the work in hand.

5.35 NDT Testing

Verify all non-destructive testing results to ensure same is as required by the specifications and in accordance with the relevant codes and regulations.

5.36 Equipment

Verify at the shipyard that all equipment to be installed in the vessels, meets the specifications and that all equipment has sufficient technical information in regard to operation, maintenance and repairs.

5.37 Non Classified Material

Verify that non-classification construction materials such as furniture, fittings, panel's fixtures, etc. meet specific marine quality standards and are in good condition.

5.38 Storage

Verify storage condition and protection of materials and equipment both at the shipyard and on board. This also applies for any Owner supplied equipment.

5.39 Painting Specifications

In conjunction with paint manufacturer's inspector ensure that specifications in regard to surface preparations, film thickness, compatibility and method of application are strictly adhered to, especially for tank coatings.

5.3.10 Machinery Installation

Verify proper installation of all machinery and ensure that all relevant clearances, tolerances, and performance data are recorded for future reference.

5.3.11 Propulsion System

Verify proper installation of the propulsion system and ensure that all relevant clearances are recorded for future reference.

5.3.12 Closing Appliances

Verify the water-tightness of closing appliances for access openings in accordance with approved plans, their proper installation and operation.

5.3.13 Rudder and Steering Systems

Verify proper installation of rudder and steering systems and ensure that all relevant clearances are recorded for future reference.

5.3.14 Electrical

Monitoring the installations for Cable trays, cables and equipment required for DE propulsion, and Verify the insulation resistance for all motors, equipment and electrical circuits on board, and ensure that this data is recorded for future reference.

5.3.15 Regasification Systems

Verify proper installation of regasification systems and ensure that all relevant clearances are recorded for future reference.

5.3.16 Certification

Maintain close liaison with yard, class society representatives and other interested regulatory bodies to ensure that problems associated with the issuing of any required certification are identified early and resolved.

5.3.17 Owner's Supplied Items

Co-ordinate the delivery and installation of Owners supplied Equipment/spares and ensure that same is stowed and secured on board.

5.3.18 Trials and Tests

Participate in all shipboard equipment testing and quay trials. Verify the proper functioning and testing of load test and firefighting equipment.

Participate in scheduled operational trials in dock and at sea to ensure that the operation is in compliance with the specification. After each trial, recommend which machinery and/or equipment should be opened for post-trial examination, and defects to be noted for rectification. Upon completion of trials a final report listing all technical/operational deficiencies and contractual non conformities will be prepared.

5.3.19 Certificate and Documents

Ensure at completion of vessel that all necessary documentation is delivered to Owners along with any required hull and machinery material certificate and manufacturer's machinery records.



5.320 Spares

To verify that all spares and parts, as mentioned in the Building Contract and in accordance with the Classification Society requirements, have been supplied by the Shipyard and stored and secured on board.

5.321 Change Orders

Provide on-site review services for all builder proposals concerning minor modifications, repairs or alterations not noted on owner-approved drawings. Records of same to be maintained and procedure established with builder, which requires approval signature prior to any relevant work being carried out. Liaison to be maintained with Owner for any areas deemed to be of major significance and involving extra costs or credits.

Recommend and discuss with Owner and the Classification Society, and negotiate with the builder any alterations considered necessary to the building contract on both technical and economic grounds and keep records of all such changes.

5.322 Familiarization for vessel's crew

Arrange for the familiarisation of the crew with the vessel prior to departure from the yard if so required by Owners.

6. Commercial Offer will be given upon kind request in detail

6.1 Project Management

The normal Project Management fees for the Project Manager are included in the Supervision of Construction costs when the Project Manager is working on the project based in our Istanbul office. When the Project Manager is attending meetings, commissioning and sea trials, Factory Acceptance Tests (FAT's) or other duties away from the Istanbul office.

Anticipated travel days for meetings with the shipyard, acceptance trials and FAT's are as follows:

1. Steel cutting/Site Office Set-Up – 5 Days
2. For FAT's conducted outside the shipyard which require additional specialist inspections i.e. Main engines, main and auxiliary switchboards, main diesel generators, etc – (2 x15 days)_

Note: This is for budget purpose, whenever possible we will try to use site team member.

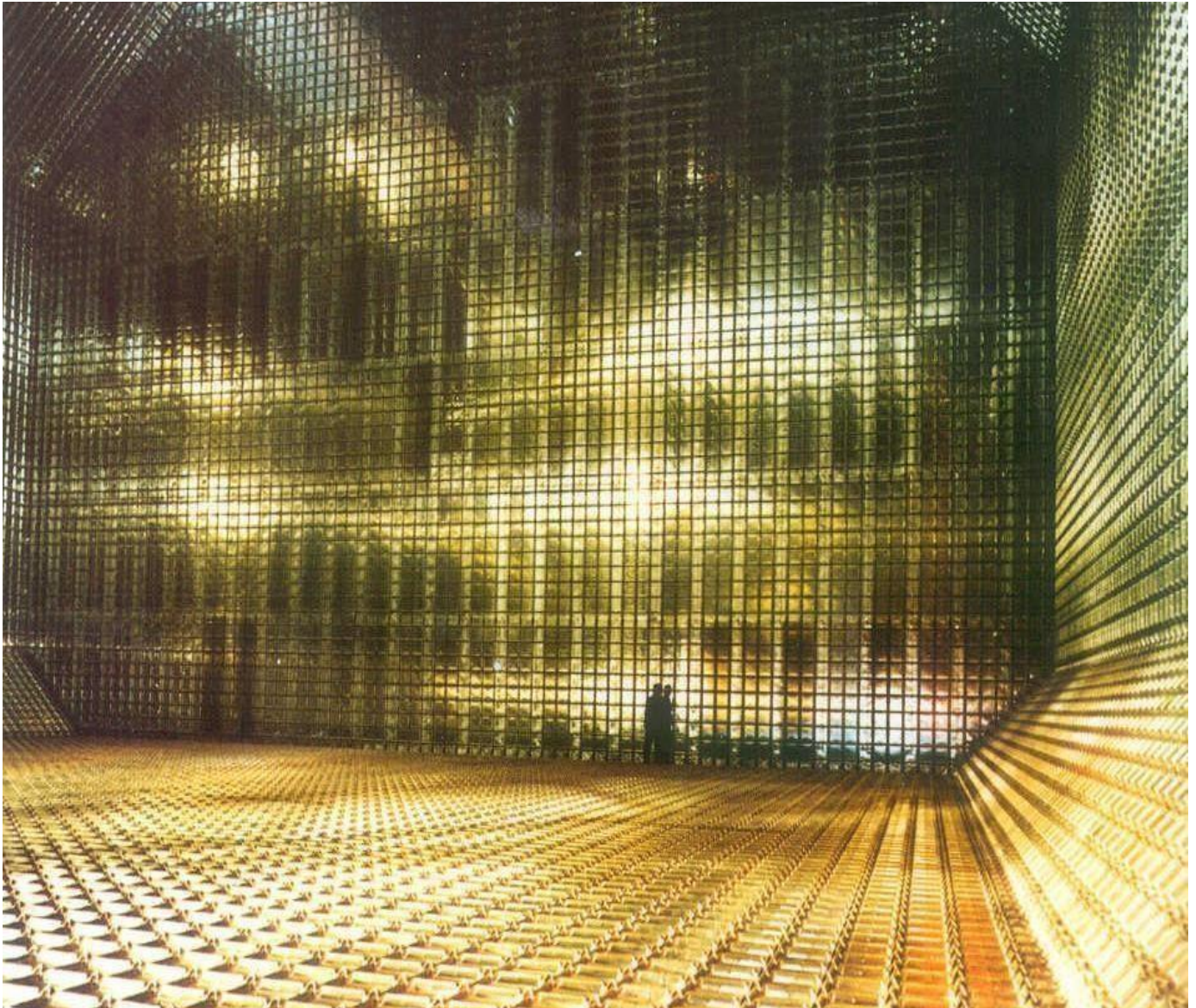
3. At launching – 7 days
4. At Sea Acceptance Trials –10 days
5. At Delivery – 10 days

6.2 Plan Approval

This service covers the review and approval of the complete set of drawings including basic design drawings, hull structure, crane system, regasification system, hull piping, hull outfitting, accommodation, machinery, engine room plant, piping / outfitting drawings, electric drawings and manuals. The fee will be invoiced monthly basis.

6.3. Supervision of Construction, Commissioning, Tests and Sea Trials

Fees and Expenses (budget) are applicable during the full period based on the project milestones have yet to be confirmed but the expected build period will start from Jan 2018 to Mar 2020. No expenses will be entered into without prior approval of Owner.





6.3.1 Project Milestones and Manning

The milestones presented below are estimated based on the project start around Jan 2018 and will be completed in Mar 2020 as advised to PEARL NAVAL and we assumed the milestone (Keel Laid, Launching) according to the given build period.

SOUTH KOREA	2019												201											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Manpower Requirement																								
Site Manager (Turkish)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1st Senior Hull Inspector (Turkish)					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2nd Hull Inspector (Turkish)						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1st Coatings Inspector (Turkish)				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2nd Coatings Inspector (Turkish)						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Machinery Inspector (Turkish)																	1	1	1	1	1	1	1	1
Cargo System Inspector, Cryogenic (Korean)																1	1	1	1	1	1	1	1	1
Electrical / Automation Engineer (Korean)												1	1	1	1	1	1	1	1	1	1	1	1	1
FSRU Schedule	SC			KL									L						D					

The above schedule indicates our estimates of manning required during the vessel build duration, please note the numbers vary across the build duration, with levels peaking towards the middle of the project.

