



5 November 2020

UNOPS OPERATIONS RELATED TO FSO SAFER ASSESSMENT AND LIGHT MAINTENANCE SCOPE OF WORK



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Background

The FSO "SAFER" was converted to FSO in 1986 from the single hull oil carrier "Esso Japan", initially built in 1976. The vessel is located approximately 8 km (4.8 n. miles) SW of the Ras' Isa peninsula on the West coast of Yemen, permanently anchored at the same location for more than 30 years, without any dry-docking or shipyard repairs. The vessel is connected to shore via a 24" pipeline on the seabed, and two 12" oil hoses leading up to a turret facility installed at the bow of the FSO, enabling the vessel to weather-vane free around the anchoring point.

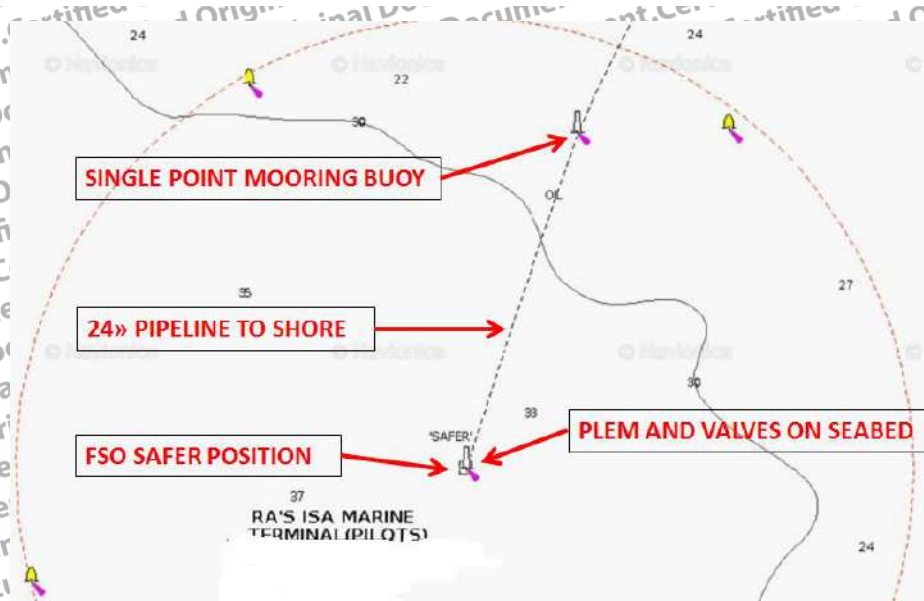


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Background

The location showing the positions of the FSO, Pipeline End Manifold (PLEM), pipeline to shore and SPM buoy:

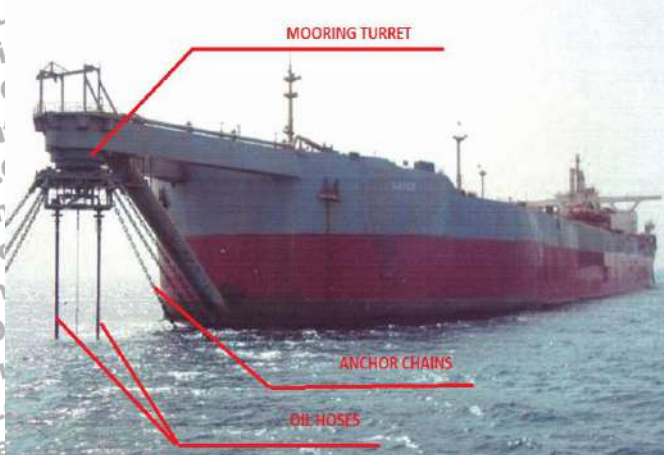


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Basic parameters of FSO "SAFER":

- Length overall (incl. turret): 400 m
- Length of hull: 362 m
- Breadth: 70 m
- Depth (centreline): 30 m
- Draught (currently): approx. 12 m (max 22.15 m)
- Number of oil tanks: 33 (22 combined cargo/w ballast)
- Deadweight (max. cargo capacity): 406,600 t (approx. 3,000,000 bbls)



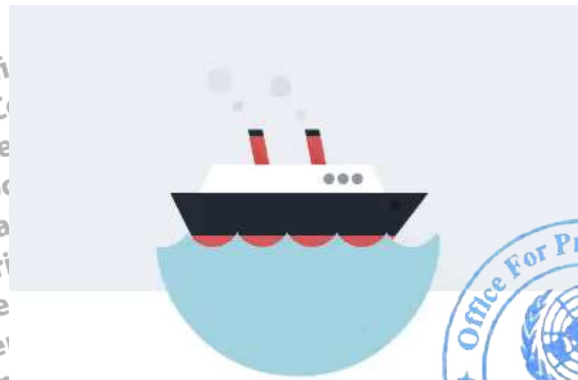
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FSO "SAFER" at location

5 November 2020

Reports indicate that the vessel is partly loaded with approximately 1,148,000 barrels of Marib light crude oil in the 11 center tanks, and with 7 of the wing tanks partly filled with ballast water. The 24" pipeline from shore and the two 12" oil hoses from the seabed to the FSO turret are reported still oil filled (assumed volume approximately 4,500 m³).



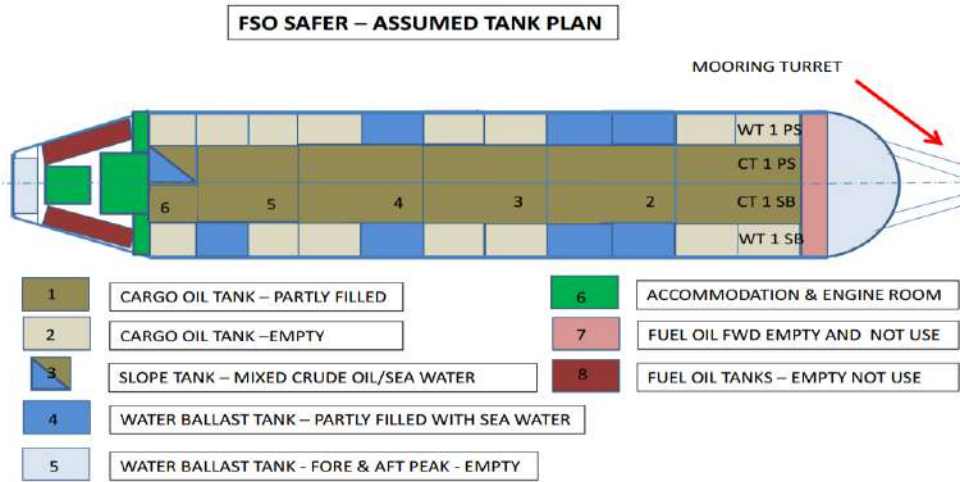
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FSO "SAFER" at location

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The following sketch is showing the FSO tank plan, with reported distribution of oil cargo in the tanks:



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When the normal operations of the FSO were halted, the vessel ran short of fuel, causing the main steam boilers to shut down, leaving only a small diesel engine generator for supply of electrical power. These boilers were initially supplying power for the large oil cargo pumps being used for discharging the stored oil cargo. They are now considered out of order, as they have not undergone any maintenance for 5 years. The boilers were also used for supply of non-flammable inert gas to the cargo tanks, keeping the tanks and nearby surroundings explosion-free. However, due to the lack of topping-up of inert gas to the tanks after the shut-down of the steam boilers, the cargo tanks as well as the main deck and surrounding area is considered subjected to hydrocarbon gases leaking from the tanks resulting in danger of explosion or severe fire.



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It is assumed that the lack of normal operation and maintenance for 5 years has resulted in a further deterioration of the vessel and equipment, as well as the oil hoses and pipeline to shore.



Due to lack of access for inspections, the American Bureau of Shipping (ABS) has withdrawn all certificates for FSO Safer, which invalidated all insurance agreements.

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Due to the assumed poor condition of the FSO and the associated connections to shore, the lack of protection against explosion/fire, the risk for an uncontrolled incident has significantly increased, such as large oil pollution and/or explosion/fire onboard, which may cause environmental impact on the coastline, ship traffic and the sensitive marine life. Efforts are ongoing in cooperation with the Special Envoy of the United Nations Secretary-General for Yemen and OCHA over the last 18 months to facilitate access of an international expert team to inspect the FSO, evaluate and assess the current condition, undertake light maintenance designed to reduce the risk of an oil spill, and present recommendations for follow-up actions to be taken.

Efforts to secure access for the expert team are ongoing. This document has been developed on the basis of technical exchanges with the authorities, including technical meetings held on 29 August 2020 and 10 October 2020.

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FSO CONDITION ASSESSMENT

There is no basic data available; beyond the information provided by the Sana'a authorities, the only known data of drawings, specifications, reports and procedures are reported to be filed onboard the Tanker. The review of this documentation is considered essential both to facilitate the condition assessment, and to support the development of recommendations for follow-up action needed to reduce the risk of an oil spill from the tanker into the Red Sea.

The SOW has been organized in a way that will ensure the safety and security of the team and prevent any potential safety incident on the vessel while the team is conducting the assessment and maintenance activities.

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FSO LIGHT MAINTENANCE

The purpose of the light maintenance is to reduce the risk of a potential oil spill. The assessment recommendations will provide evidence-based options for the needed and feasible follow-up actions, including their scale and scope. Implementation of any of the assessment options would proceed based on consultations with and agreement by the relevant parties and stakeholders following the assessment.

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FSO LIGHT MAINTENANCE

The different tasks will be conducted in accordance with the agreed SOW for light maintenance as far as possible, taking account of personal safety, integrity of vessel and systems, practical access, and environmental limitations.

With reference to the intended light maintenance, It should be noted that no systems and components onboard any ship can ever be restored to permanent working condition, as these systems are de continuous maintenance over the lifespan of the vessel.

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SUB-TASK #1: CONDITION ASSESSMENT

STAFFING

The inspections are planned to be executed with the following team:

A. Vessel inspections:

- 2 senior marine inspectors
- 1 Chief Engineer with local experience from FSO Safer
- 3 experienced technical inspectors

B. Sub-sea ROV inspections

- 2 ROV operators
- 2 " NDT Operators
- 4 divers
- Will be conducted from the service vessel (tugboat)

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Main Inspection Work

- Turret, Anchor Lines, Risers/Hoses

Visual inspections and condition evaluation of the following items:

- Close Visual Inspection (CVI) of turret bearings, potential rotation problems, pipe swivels, and structural deviations, cracks, etc.
- CVI of piping, valves and hoses
- CVI of chain stoppers and chain links locked into the stoppers
- Visual inspection of 6 x 6" anchor chains condition and corrosion levels near water line/splash zone
- Visual inspection of 2 x 12" risers/hoses above waterline
- Non Destructive Testing (NDT) / Ultrasonic Testing (UT) Spot checks of structural components and piping may be conducted, pending on safe access
- Any NDT checks of other components at the turret area will not be conducted, as components like anchor chain, chain stopper, valves, bearings and oil hoses is not applicable for this type of inspection.

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Main Inspection Work FSO

- Hull Sides and Weather Deck

Documentation from ABS reports and recommendations filed onboard should be reviewed and evaluated, in order to identify specific weak areas in the hull due to extensive corrosion.

The following should be subject to visual inspection, close visual inspection where found applicable with regard to safe access, especially with regard to indents, heavy corrosion and pitting:

- Hull sides in the waterline area (from the service vessel - tug)
- Weather deck, especially in the cargo tank area
- Fore peak tank with structural interfaces with the turret frames
- Wing tanks both empty and used as ballast tanks

The visual inspection of hull sides will also be made with NDT/UT spot checks, provided weather condition and access from the service vessel. No climbing will be conducted.

Inspection of cargo tank internals should be avoided due to gas.



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Main Inspection Work FSO

- Deck Equipment

The different systems and equipment located on deck shall be subject to visual inspection and condition checked, as follows but not limited to:

- Cargo deck piping, including cross-over manifolds with associated valves – condition, corrosion level and operability (end valves on crossover with size 16")
- Fuel oil and diesel oil piping and associated valves - condition, corrosion level and operability (end valves on crossover size 12")
- Fire lines and fire extinguishers with associated valves - condition, corrosion level and operability
- Steam lines and associated valves to deck machinery such as mooring winches and old anchor windlasses- condition, corrosion level and operability
- Inert gas piping with associated valves, check valves and P/V valves as well as gas deck seal - condition, corrosion level and operability. Possibilities for connecting an external inert gas incinerator should be investigated.

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Main Inspection Work FSO

- Deck Equipment

The different systems and equipment located on deck shall be subject to visual inspection and condition checked, as follows but not limited to:

- Deck machinery, mooring winches anchor windlass, etc. - condition, corrosion level and operability shall be checked.
- Deck machinery, 16 t lifting booms with rigging and winches - condition, corrosion level and operability
- Deck machinery, 25 t rotating crane on starboard side - condition, corrosion level and operability
- Metering unit with associated equipment (located PS amidships) - condition, corrosion level
- Emergency fire pump and associated equipment, condition, corrosion level and operability
- Fixed and loose firefighting equipment - condition, corrosion level and operability

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Main Inspection Work FSO

- Transfer Equipment

The different components and systems needed for discharging of the crude oil cargo shall be subject to Close Visual Inspection and the actual conditions determined, such as, but not limited to:

- Piping and associated valves on deck (20") - condition, corrosion level and operability.
- Condition of the transfer "goose neck" including ESD (Emergency Shut Down) valve PS aft with regard to general condition, corrosion and operability.
- Mooring hawser gear at stern, with accessories like, nylon hawser, chafing chain, associated shackles, pick-up lines, etc

The SOW includes inspection of all systems onboard the FSO, which will give a comprehensive analysis of the state of the FSO and all its structures and systems. The assessment of any equipment onboard used for transferring the oil cargo would include only inspection of that equipment as part of the larger assessment of the SAFER vessel. Maintenance of this systems is outside this SOW.

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Inspection of Engine Room - General

The engine room should be overlooked, checked and reported with respect to:

- Presence of toxic or explosive gases
- Humidity
- Cleanliness
- Corrosion
- Condition of access ladders, platforms, railings, etc.
- Lighting

General recommendations for necessary maintenance and repairs shall be presented.

Specific listing of actions and recommendations related to maintenance, repair, replacements and testing of all components and systems as listed below shall be presented, together with any other systems/components considered important to be included and implemented.

The recommendations should reflect maintenance and modifications/repairs needed for neutralizing the threat of an oil spill.

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Inspection of Engine Room - Cooling water system

Investigations and inspections shall be conducted on all parts of the cooling system, such as

- Sea chests (both sides)
 - Corrosion – NDT/UT thickness measurements should be made
 - Plating condition
 - Valve conditions and operability
 - Corrosion protection system – condition, operability
- Piping system with associated valves - condition, corrosion level and operability shall be checked
- Investigations to be made of the status and condition of the protection covers that are installed for securing the sea water inlets (sea chests) in case of internal water leakages due to improper tightness of valves or corroded pipelines

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Inspection of Engine Room – Steam system

All components and piping system (including insulation) to be inspected and checked out, such as – but not limited to:

- Boilers with associated valves and instrumentation
- Fuel oil system with burners and associated valves, piping and instrumentation
- Feed water systems with associated valves and instrumentation
- Evaporator
- Condenser
- Auxiliary systems

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Engine Room – Cargo pump system

All cargo pumps and associate steam turbines shall be inspected with respect to condition, and tightness, inclusive associated valves, piping, insulation and instrumentation/control system. Piston type stripping pumps shall be inspected with respect to condition and tightness.

Evaluations should be made if the systems should be maintained and upgraded for future operations, as a part of the condition assessment.

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Inspection of Engine Room – Bilge system

All pumps, wells, pipes and associated monitoring/instrumentation shall be checked against corrosion and operability, and if possible tested.

Engine Room – Ballast and Fire system

All components and piping system with associated instrumentation/control systems shall be inspected, incorporating, but not limited to:

- Ballast pumps and associated valves
- Ballast pump steam turbines, inclusive associated valves, insulation, instrumentation and control system
- Fire pumps and associated valves and control system
- Fire extinguishers
- Fire hoses
- Fire alarm system

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Inspection of Engine Room - Inert gas system

All components and piping system with associated instrumentation/control system shall be inspected, incorporated, but not limited to:

- Exhaust fans/supply fans
- Scrubber and uptakes
- Boosting fans

Inspection of Engine Room - Control Room/CCR

The control room shall be inspected with respect to general condition, humidity, cleanliness and lighting. Communication system, PA, internal and external communication shall be checked and if possible tested.

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Inspection of Engine Room – Electrical system

All components necessary for running of safety systems, cargo control, pumps, inert system, and living quarter should be subject to inspection and if possible testing, including but not limited to:

- MSB (Main Switch Board)
- Diesel generator set on deck (Caterpillar) – condition, corrosion, control systems, cooling
- Emergency diesel generator set – condition, corrosion, control systems, cooling
- Turbo generator set #1 – condition, corrosion, control systems, cooling, insulation
- Turbo generator set #2 – condition, corrosion, control systems, cooling, insulation
- Distribution and cabling system
- Evaluations should be made if the systems should be upgraded for future operations

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Engine Room - Electrical system

The tasks related to the electrical systems will include inspections and testing of conductivity and resistance, and immediate maintenance conducted on vital systems related to the safety of the vessel, such as diesel driven generators, seawater discharge pumps, air ventilation, inert and fire systems, etc.

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Inspection of Superstructure - General

The superstructure shall be overlooked and inspected with respect to condition, corrosion, and weather tightness.

The accommodation should be inspected with respect to condition, access humidity, ventilation and lighting.

The mess rooms, galley and provision stores shall be inspected with respect to condition, cleanliness, humidity and lighting.

The superstructure condition shall be evaluated, and recommendations presented for any maintenance/upgrade considered necessary for future use.



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Subsea Inspections

All the actions below shall be documented with video tapes, and reports attached.

Anchor chain

The Anchor chains should be subject to Close Visual Inspection (CVI) with respect to corrosion reduction and marine growth from water level/splash zone to 10 m below waterline.



Riser/Oil Hoses

The two 12" oil hoses shall be subject to CVI with respect to integrity down to the pipe connection at the Pipeline End Manifold (PLEM), including interfaces/flanges at the Buoyancy Tank and the PLEM.

Buoyancy Tank and Chain Tethers

The riser/oil hose buoyancy tank shall be subject to CVI, especially with respect to the corrosion of the chain tethers and their attachment shackles to buoy and PLEM.

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Subsea Inspections

All the actions below shall be documented with video tapes, and reports attached.

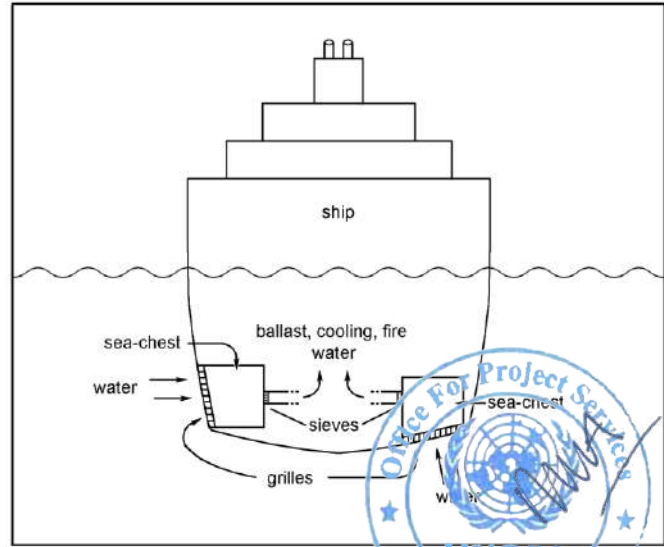
Pipe Line End Manifold (PLEM)

All units on the PLEM shall be subject to CVI, with respect to interfaces between pipes and valves, corrosion rates, marine growth, and potential cracks.

The valves shall be monitored for correct position of all valves, in order to verify being in closed position.

Sea Chest Inlets

All sea chests STB and PS shall be subject to CVI, with respect integrity, marine growth and corrosion level. Position and condition of closing covers at the seawater inlets shall be verified.



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SUBTASK #2 - Light Maintenance

The below is an overall description of the work that shall be conducted during the inspection and maintenance campaign onboard the FSO SAFER, to serve primarily as a guidance and priority listing.

The team management will always have the overall responsibilities for the safety of its personnel, and to make the decisions how and when the different tasks shall be conducted, in consultation with the Safer Exploration and Production Operation Company (SEPOC) representatives.

UNOPS acknowledges that work permits will be required for all activities undertaken by the technical experts onboard the vessel. To expedite this process, UNOPS proposes that SEPOC and UNOPS each designate one authorized focal point for work permits. These two focal points will work together onboard the vessel to issue daily work orders for mission personnel and to issue any required work permits for mission activities.

One of the team members will be a trained officer for risk assessment work. In addition, the team manager has extensive experience of risk assessment in the offshore oil industry.



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Light Maintenance - Safety

1. Safety Plan

The safety for personnel, environment and equipment will always be the highest priority for the overall mission onboard.

- a. During the initial bordering, evaluations should be made if a few key personnel should enter the FSO through the crane/basket access, and secure the stern area. Alternatively, the access can be conducted with one of the new pilot ladders being lifted onboard and installed/secured by the local watch/duty personnel staying onboard. Adequate instructions for installation will be necessary to provided.
- b. This first group should at least consist of the "local" Chief Engineer, and the Medic, the latter for performing adequate testing of the existing personnel onboard against Covid-19 virus.
- c. The second duty will be to perform initial inspection of the stern crane, and evaluate if the unit is secure for further use, or if some maintenance will be needed before further use.
- d. Thereafter, the accommodation area should be checked with regard to condition and safety for gas.
- e. The Escape Chute should be lifted onboard and installed as soon as found practicable.
- f. The tank deck should be checked for flammable gas level.



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Light Maintenance - Safety

The stores crane aft with personnel basket initially is the sole entry/exit to/from the FSO, also in the case of any emergency. UNOPS will provide a new personnel basket for this purpose. In order to increase the safety and reduce time for evacuation of personnel, a secondary crane will be provided with a personnel basket positioned on a barge that will be stationary at the FSO stern during the overall mission period. In addition to that UNOPS will also provide and install an Escape Chute at the FSO stern, enabling personnel to jump directly from deck to the sea in a safe manner.

a) Stores crane aft

The crane should be subject to inspection and necessary repairs/upgrade performed in order to ensure safe operation for access and escape of personnel and equipment to and from the FSO. Load testing and/or changing of wire ropes shall be evaluated and agreed upon. Vital structural parts will be checked by NDT/UT.

b) Caterpillar diesel generator on deck

As this unit has only been run on a non-regular basis, all systems should be checked and tested. Oil, filters, etc. may be changed as found appropriate.



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Light Maintenance - Safety

c) Emergency diesel generator in engine casing

This unit has been occasionally in operation, but should be subject to same inspections and maintenance as for the Caterpillar (b).

d) General Service pump in engine room.

This unit is today the only component in operating condition for evacuating of bilge water and water from possible major leakages. The pump should be examined and necessary upgrade/repairs performed to ensure safe function.

e) A second electrical driven pump in the engine room should be identified and the same work performed to ensure safe function as specified for the general service pump under (d). The upgrade and maintenance specified under items b) to e) should ensure a system for evacuating water from the engine room with full redundancy for power and pumping.

The fire-fighting system on deck, together with an applicable seawater pumps in the engine room and the diesel driven emergency fire pump forward will be given priority in accordance with the work plan.

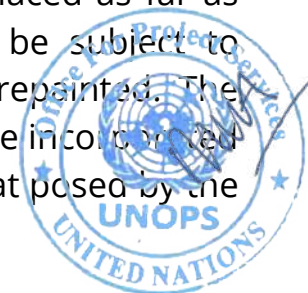
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Light Maintenance - Safety

- f) Inspection and necessary maintenance of the ventilation system for accommodation, engine room and pump room in order to keep these area free for flammable gases, and provide fresh air for the maintenance work
- g) Particular attention is to be paid to presence of flammable gases on deck, and action taken for arresting possible leakages
- h) The inert gas (IG) system shall be subject to inspection with regard to integrity, condition and corrosion level. All valves on tanks are intended to be inspected and tested, and repaired or replaced as found applicable. Spare valves for replacement and repair kits shall be brought onboard in accordance with the applicable listing. Pipe couplings (Dresser type) shall be inspected, maintained, and repaired with applicable repair kits. Heavily corroded piping and fittings shall be repaired or replaced as far as available materials. Once this maintenance has been undertaken, the system shall be subject to component and system tests. All repaired and replaced components/piping shall be repainted. The technical assessment will identify any further appropriate steps to be taken. These shall be incorporated as part of the overall and comprehensive expert recommendations to neutralize the threat posed by the FSO Safer



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Light Maintenance - Safety

- i) The firefighting system on main deck shall be inspected with regard to integrity, condition and corrosion level. The emergency fire pump located forward under the forecastle deck shall be inspected, maintained and tested. All valves are intended to be inspected and maintained. Components shall be repaired or replaced as found applicable. Heavily corroded pipes and fittings shall be repaired or replaced as far as materials are available. The maintained system shall be subject to component and system testing. All repaired and replaced components/piping shall be repainted.
- j) The cargo tank pressure relief valves (P/V valves) together with main P/V safety valves related to the cargo tanks shall be subject to inspection, maintenance, testing and re-calibration. The maintained system shall be subject to component and system testing. All repaired or replaced components/piping shall be repainted.
- k) Seawater inlet valves, sea chests and associated piping shall be inspected, and NDT/UT spot checks on plating and piping will be conducted, as applicable. Possible repairs shall be conducted as long as the seawater integrity of the engine room and associated systems are not compromised.

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Light Maintenance - Safety

- l) The NDT inspections will mainly be conducted by either Ultrasonic Testing (UT) or Eddy-Current Inspection (ECI) techniques. Gear for other techniques will also be mobilized, and actual methods chosen in each case per the discretion of the attending operators.
- m) The tank deck shall be inspected with special attention to severe corrosion degradation, including spot checks by NDT/UV, alternatively ECI. Number of spot checks will have to be decided locally, after assessment of the actual areas, access and weather conditions. Local possible repairs shall be conducted where found applicable, and surface corroded spots to be repaired with Belzona coating and Epoxy paint as found suitable.
- n) Hull sides shall be spot checked above waterline, and Local painting applied where severe corrosion detected, pending safe access from boat. Additional protection with Belzona may be used where safe access and application can be achieved, pending access from boat. Hull sides in splash zone and below waterline are covered under the Subsea Section. Special diver team equipped with scrubbing and cleaning gear will be engaged for cleaning of the hull sides from water line level and down 3-m in order to remove seaweed and other marine growth in the area. Some NDT/UT spot checks may be conducted by divers on hull sides below water line, pending conditions.

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Light Maintenance - Safety

- o) Hull flat bottom in cargo tank areas will be spot checked by ROV with NDT/UV equipment, alternatively ECI. Furthermore the sacrificial anodes on the hull shall be inspected by ROV or divers.

- p) In accordance with the primary mission objective of reducing the risk of a spill from the FSO, it is the intention to provide a continuous oil boom of 1,000 m length encompassing the FSO hull, acting as first defence line if an oil spill should occur. This oil boom will be connected to the bow of the FSO, enabling the boom to follow the weather-vaning of the vessel around the turret anchoring.

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Equipment Needed

The following equipment has been identified to ensure safety and efficiency in conducting inspection, additional modifications, and repairs.

Equipment List - Containers and Tooling		Description	QTY
	20ft DNV Containers	DNV Containers for offshore use	10 EA
1	20Ft Workshop Container	Fully equipped container with tools & Equipment	1 EA
2	20Ft Rigging Container	Fully equipped container with Rigging and Lifting Equipment	1 EA
3	3m Half Height Basket	Off-shore specification c/w Side Loading	1 EA
4	Water Bags 0-7T	Water bags for proof load testing crane 1x3T, 4x1T	1 lot
5	High Pressure Water Jet	30K PSI - Subse Water Jet c/w High pressure gun and 250m Hose	1 EA
6	Poly-Text Polyester Cargo Net	15ft x 15ft @1T / 15ft x 15ft @ 3T	2 EA
Equipment List - Power and Welding		Description	QTY
7	Mobile Drive Diesel Generators	ATLAS COPCO QAS 150 S2 60Hz 400V	1 EA
9	Mobile Driven Air compressor	ATLAS COPCO U175 c/w Spillage and lifting frame	2 EA
10	Welding Habitats 3mx2mx2m	Welding in Zone rated c/w monitors and extractors 3m x 2m x 2m	1 EA
11	Welding Units	Danox DC400 / AC440-50/60 Hz	2 EA
12	Cutting Equipment	Oxy./Acet./regulators/cutting torch	2 Sets
13	Cylinder Rack Gas	Oxy/Act cylinder rack for Offshore	1 SET

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Equipment Needed

Equipment List - Lighting and Cables		Description	QTY
14	Megger	MIT310-EN; 250/500/1000V Insulation Tester	1 EA
15	ATEX Lighting	Lighting: Flood, Worklights, Torches	1 Lot
16	Extension Cables ATEX	ATEX 110V - 10 x 25mtres	10 EA
17	ATEX Splitter Box	ATEX 110V	1 EA
18	440v stepdown Transformers 110V	ATEX Electrical 3kVA for 110V Tools	2 EA

Equipment List - Safety		Description	QTY
19	Emergency Escape Breathing Device (EEBD)	Sabre ELSA 15B –“Hood Type”, EC/MED Approved	20 EA
20	Portable Gantry	Aluminium W:2.5m, H:3.0 @ 2t c/w chain block	1 EA
21	Whip Checks	Hose Retainers 1/8" & 1/4"	50 EA
22	Blower Fan 110V	110v Blower for Ventilation with Venting	1 EA
23	Tool Bags	Bag, Canvas	4 EA
24	Safety Harness	Delta Harness (Mx10/Lx15/XLx15)	1 Lot
25	Retrieval Inertia Safety Reel	Sealed Block SRL Retrieval System	2 EA
26	Inertia Safety Reel	Rebel SRL 11ft Web	5 EA
27	Fire Extinguisher	Dry Chemical 6Kg	10 EA
28	Fire Extinguisher	CO2 Gas 5 Kg c/w Hose & Fishtail Horn Assembly	5 EA



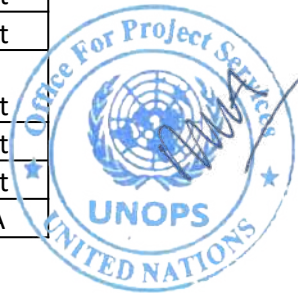
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Equipment Needed

29	Basket Stretcher	Stretcher c/w 4 Point Lifting Sling 278KG	1 EA
30	AED Machine	Life Point- Portable	1 EA
31	Billy Pugh	8 Man/ ABS Type Approval Cert, PN:X-904-8	1 EA
32	Emergency Pilot Ladder	c/w Spreader Bar, 20m length, Load Test certificate	2 EA
33	Emergency Escape Chute Deployment system	Model BWSE-275-15000,c/w 15m adjustable chute	1 EA
34	Personnel PPE Filtration Helmets	Hoods, 3M Battery, Filtration helmet and Filters/Batteries	2 EA
35	Medic Kit - Remote Trauma	Contains Emergency Drugs and Supplies	1 EA
36	Personal Gas Monitor	Gas Alert Max XT II, 4 Gas Monitor	30 EA
Equipment List - Additional Hand Tools		Description	QTY
37	Flogging Spanner	Spanners for Flange Management	2 Sets
38	Hammers	Sledge Hammers	2 EA
39	Impact Sockets	Impact Sockets for Flange Management	1 Set
40	Wrenches	Adjustable and Chain	1 Lot
41	Threading Set & Tools for Crane	Taps and Dies Set & Sliding Socket Handles/Solder Iron	1 Lot
42	Files	Assortment of metal files, clamps and drills	1 Lot
43	Pipe Cutters	Range from 1/8" to 8"	1 Lot
44	Pipe Stands Adjustable Height 20" - 38"	RIDGID 56657 V HEAD LOW PIPE STAND 300mm	4 EA

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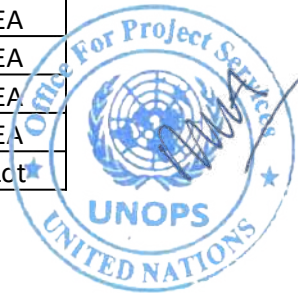




Equipment Needed

Equipment List - Additional Hand Tools		Description	QTY
37	Flogging Spanner	Spanners for Flange Management	2 Sets
38	Hammers	Sledge Hammers	2 EA
39	Impact Sockets	Impact Sockets for Flange Management	1 Set
40	Wrenches	Adjustable and Chain	1 Lot
41	Threading Set & Tools for Crane	Taps and Dies Set & Sliding Socket Handles/Solder Iron	1 Lot
42	Files	Assortment of metal files, clamps and drills	1 Lot
43	Pipe Cutters	Range from 1/8" to 8"	1 Lot
44	Pipe Stands Adjustable Height 20" - 38"	RIDGID 56657 V HEAD LOW PIPE STAND 300mm	4 EA
Equipment List - Hydraulic and Pneumatic Tools		Brief Description	QTY
45	Pneumatic hand tools	Needle Gun x 1, Air Chisel x 1	2 EA
46	Impact Wrench	1/2" x 1 and 3/4 x 1 Drive	2 EA
47	Portable Hacksaw	Portable Hacksaw with pipe clamp	1 EA
48	Reciprocating Saw	Reciprocating Saw c/w 2 sets of blades	1 EA
49	Hydraulic Flange Spreader	125Kn Spreader Set / 80mm Spread	2 EA
50	Nut Cutter / Splitter	Nut Splitter for Bolt Range 0.5" - 1.38"	1 Lot

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Equipment Needed

Equipment List - Electrical Power Tools		Description	QTY
51	Grinders	110v Grinder, 4" and 9" 2 Ea	4 EA
52	Drills	110V Hand Held Drills 10mm & 16mm	2 EA
53	Magnetic Drill	Magnetic Base 110V c/w Rotor Broach Attachment	1 EA
54	Drop Saws	110v Reciprocating & Cut-off Saw 14"	2 EA
Equipment List - Measuring Equipment		Description	QTY
55	Tape measuring	Steel metal & Fibre glass 100ft / Test Pen	1 Lot
56	Calipers	Layout Inside/Outside 0-12" / Vernier's	1 Lot
57	Electrical measuring Equipment	Multi-meters and clamp meters 2 EA	4 EA
58	PRV Test Equipment	Calibration and test equipment	1 Set
59	Load Link for Load Test	10t Load Shackle c/w Digital Readout	1 EA
Equipment List - Pumping equipment		Description	QTY
60	Storage IBC	1000 litres storage Tank	2 EA
61	Manual Drum Pump	Manual Operated to transfer liquids such as Fuel	2 EA
62	Wilden Diaphragm Pump	2" BSP / 617LPM c/w Discharge/suction Hose	1 EA
63	Wilden Diaphragm Pump	1" BSP / 617LPM c/w Discharge/suction Hose	1 EA
65	Hose and Fittings	1/4" Air Hose 20m c/w quick connect couplings	10 EA
66	Hose and Fittings	3/4" Air Hose 20m c/w Chicago fittings	10 EA
67	Zone II Pressure Washer	4GPM @ 3000PSI, 185F LPM @ 206.9 Bar, 85 C)	1 EA

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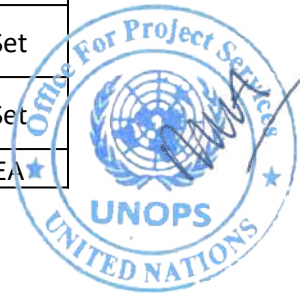




Equipment Needed

Equipment List – Diving		Description	QTY
68	Diving Equipment - Power packs	Diesel Powered Hydraulic Power Packs	2 Sets
69	Diving Equipment - Cleaning Tools	Mini Pamper and Hull Cleaning	2 Sets
70	Diving Equipment - Cleaning Tools	Hydraulic Polishing Hand Tools	1 Set
71	Diving Equipment - Welding Equipment	Subsea Welding and Cutting System	1 Set
72	Diving Equipment - Decompression Chamber	Containerised Air Drive Control with Decompression Chamber	1 Set
Equipment List – Additional Equipment			QTY
73	Booster Pump	Booster pump c/w manifold / Hose / pressure gauge	1 Set
74	Bolt Tensioners Equipment	Torque Guns and Tooling	1 Set
75	Bolt Tensioning Torque Wrenches	Manual Torque Wrenches	1 Set
76	Hart Communicator	Rosemount TREX Device Communicator	1 EA
77	Calibrator and Injector for (RTD, TC and mA)	Metrology Well Calibrator (Model 9172)	1 Set
78	Instrument Hand Pump (Low Pressure/ High Pressure)	Comparator & Digital Pressure Gauge	1 Set
79	Gas Detector XI-1/7	Riken Model GX-8000 (LEL) & (O2)	2 EA

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Equipment Needed

Equipment List – Team gear		Description	QTY
80	Mission Safety / Survey		1 EA
81	NDT	UT	1 EA
82	SAT & Tact Comms - Comms - Data	Phones	1 EA
83	ROV	SEABOTIX	2 EA
84	NDT	PEC	1 EA
85	Crawler	Magnetic Crawler	1 EA

Equipment List – Vessels			QTY
73	Base vessel	AHTS vessel with tem accommodation, and fuel storage	1 EA
74	Service vessel	AHTS w/firfighting gear, accommodation for divers and ROV personnel – installation vessel for oil booms	1 EA
75	Tug for crane barge		1 EA
76	Crane barge	Crawler crane for personnel basket and equipment	1 EA

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Consumables

Consumable - Power and Welding		Brief Description	QTY
86	Spare Cables and Plugs	Electrical wiring, plugs and sockets	1 Lot
87	Oil Boom	Norlense Oil Boom 1000m	1 Set
88	Heavy Duty Welding Cables	300amp cable with Earth and Electrode Holder	1 lot
89	Disinfectants / Sprays / Sanitisers	Backpack Sprayer & Disinfectants	2 Lot
90	Face Protection	Goggles, Shield, Glasses, Masks	1 Lot
91	Ear Protection	Earmuffs / ear plugs	1 Lot
92	Hand Gloves	Cotton, Rigger, Welding, Mechanic	1 Lot
93	Oil Spill Kit	95 GAL Overpack Drum 152 piece	1 EA
94	Universal Spill Kits	Universal/ portable /refill spill kits	5 EA
95	Oil Spill Kit	280L Portable Spill Response Kit	4 EA
96	Portable First Aid Kits	Small First Aid Kits	2 EA
97	Large First Aid Kit	255 Pc Large Size First Aid Kit	2 EA
98	VHF Portable Radio	Sailor SP3540 Portable VHF ATEX GMDSS	26 EA
99	Ropes	8mm , 12mm, 1-3/4" Mooring Rope 50t	1 Lot
100	Fire Hose - Exclude fittings	5 rolls x 1-1/2" and 5 rolls x 2"	1 Lot
101	Gasket Material	3mm Gasket Paper	4 Rolls
102	Oils and Lubricants	Grease Gun & Rags	1 Lot
103	Aerosol sprays	WD40. Primer paint, contact cleaner	1 Lot
104	Flange gaskets	Sizes 2-1/2" to 14" x 30 each	1 Lot
105	Tapes, Adhesives	Thread tapes, Duct tape, Insulation etc	1 Lot
106	Band-It tool / Strapping and Buckles	3/8" strapping and buckles for fire hose Assembly	1 SET
107	Welding Consumables	Chippers Wire Brushes, Anti-Spatters, hoods	1 Lot
108	Welding Electrodes	2.6mm to 4mm rods	1 Lot
109	Cutting Discs and Blades	Grinding & Cutting Discs	1 Lot
110	Covid 19 Test Kits	c/w lancets / disposable sharps containers / PPE	175 test kits

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Consumables

111	Portable Airconditioners	Freestanding 110v c/w Transformer 110-240v	2 EA
112	Main Hoist and Boom Hoist ropes	18mm & 20mm wires with termination	1 Lot
113	Paint Brushes and Rollers	paint roller trays, rollers, brushes etc	1 Lot
114	Caterpillar Genset Spares for Safer	consist of: 4 x fuel filters; 1 x Air filter; 2 x lube filter.	1 Set
115	Genset 2 Spares - Detroit	fuel and oil filters	1 Set
116	SS304 Mesh 30 for Flame Arrestors	30 x 0.24mm wire x 1M width x 20M length	1 Roll
117	Niikura Butterfly Valves	10" Butterfly Valves & Refurb Kits (8 x valve, 2 x kit)	10 EA
118	Niikura Butterfly Valves	14" Butterfly Valves & Refurb Kits (6 x valve, 4 x kits)	10 EA
120	Belzona 1111 Supermetal	1111 Supermetal (1kg)	200 EA
121	Belzona 1121 Supermetal XL	1121 Supermetal XL (1kg)	200 EA
122	Belzona 1982	3 Litre tins	40 Tins
123	Belzona 9381	(254mm x 64m)	20 Rolls
124	Belzona 9382	(1000mm x 500m)	20 Rolls
125	Seal Stic SS106 Underwater epoxy Stick	SS106 -125 grams	40 Sticks
126	SealXpert Expanding PTFE Tape	PTFE05 - 900 grams	40 Rolls
127	SealXpert Ultra Sealing Tape	UST5010 - 460 grams	20 Rolls
128	SealZpert PS106 Underwater Repair Putty	PS106 - 620 grams	10 Package
129	Wrap Seal PLUS Fibreglass Repair Tape	WS4100 - 4kg	6 Rolls

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Consumables + Vessels

130	SealXpert PS107 5 Min (SF) Repair Putty	PS107 - 620 grams	10 Package
131	Wrap Seal PLUS Standard Resin and Activator	WSP500 - 700 grams	20 Package
132	Wrap Seal PLUS Fibreglass Repair tape	WS2100 - 3kg	4 Rolls
133	Wrap Seal PLUS Chopped Strand Mat	CM450 - 33kg	10 Rolls
134	Wrap Seal PLUS Surface Tissue	ST200 - 7.5kg	20 Rolls
135	Paint Sigma	1st Sigma Cover 630 colour code 6179	5000 Ltr
136	Paint Sigma	2nd Sigma Cover 630 colour code 6188	5000 Ltr
137	Paint Sigma	3rd Sigma Signadur colour code 5177	5000 Ltr
138	Thinners Sigma	Thinner 91-92 for Sigma Cover	2500Ltr
139	Thinners Sigma	Thinner 21-06 for Signadur	2500Ltr
140	Thinners Sigma	Cleaning Thinner	2500 Ltr

Equipment List – Vessels			QTY
73	Base vessel	AHTS vessel with tem accommodation, and fuel storage	1 EA
74	Service vessel	AHTS w/firfighting gear, accommodation for divers and ROV personnel – installation vessel for oil booms	1 EA
75	Tug for crane barge		1 EA
76	Crane barge	Crawler crane for personnel basket and equipment	1 EA

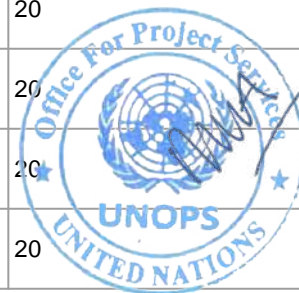
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Pipe Fittings and Flanges

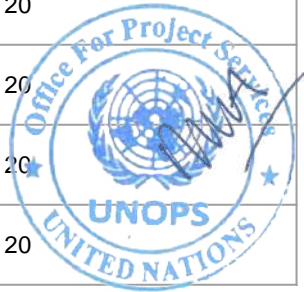
Pipe fittings and flanges		Brief Description (Flange Size)	Annex 4 Qty (Proposal 3.3)	Additional Requirement (Qty)	Total Qty Required
1	JIS 10k Blinds	2-1/2"	4	16	20
2	JIS 10k Blinds	3"	4	16	20
3	JIS 10k Blinds	5"	4	16	20
4	JIS 10k Blinds	6"	4	16	20
5	JIS 10k Blinds	8"	4	16	20
6	JIS 10k Blinds	10"	4	16	20
7	JIS 10k Blinds	12"	4	16	20
8	JIS 10k Blinds	14"	0	20	20
9	JIS 16k Blinds	2-1/2"	4	16	20
10	JIS 16k Blinds	3"	4	16	20



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Pipe Fittings and Flanges

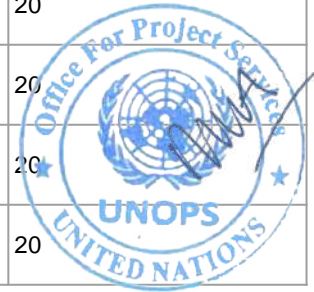
Pipe fittings and flanges		Brief Description (Flange Size)	Annex 4 Qty (Proposal 3.3)	Additional Requirement (Qty)	Total Qty Required
11	JIS 16k Blinds	5"	4	16	20
12	JIS 16k Blinds	6"	4	16	20
13	JIS 16k Blinds	8"	4	16	20
14	JIS 16k Blinds	10"	4	16	20
15	JIS 16k Blinds	12"	4	16	20
16	JIS 16k Blinds	14"	0	20	20
17	JIS 10K Slip on Weld	2-1/2"	4	16	20
18	JIS 10K Slip on Weld	3"	4	16	20
19	JIS 10K Slip on Weld	5"	4	16	20
20	JIS 10K Slip on Weld	6"	4	16	20



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Pipe Fittings and Flanges

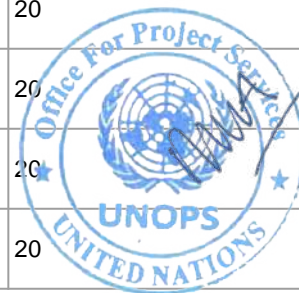
Pipe fittings and flanges		Brief Description (Flange Size)	Annex 4 Qty (Proposal 3.3)	Additional Requirement (Qty)	Total Qty Required
21	JIS 10K Slip on Weld	8"	4	16	20
22	JIS 10K Slip on Weld	10"	4	16	20
23	JIS 10K Slip on Weld	12"	4	16	20
24	JIS 10K Slip on Weld	14"	0	20	20
25	JIS 16K Slip on Weld	2-1/2"	4	16	20
26	JIS 16K Slip on Weld	3"	4	16	20
27	JIS 16K Slip on Weld	5"	4	16	20
28	JIS 16K Slip on Weld	6"	4	16	20
29	JIS 16K Slip on Weld	8"	4	16	20
30	JIS 16K Slip on Weld	10"	4	16	20



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Pipe Fittings and Flanges

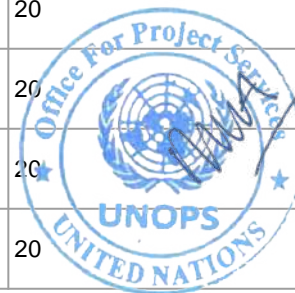
Pipe fittings and flanges		Brief Description (Flange Size)	Annex 4 Qty (Proposal 3.3)	Additional Requirement (Qty)	Total Qty Required
31	JIS 16K Slip on Weld	12"	4	16	20
32	JIS 16K Slip on Weld	14"	0	20	20
33	Long radius Butt weld 90 degree	2-1/2"	4	16	20
34	Long radius Butt weld 90 degree	3"	4	16	20
35	Long radius Butt weld 90 degree	5"	4	16	20
36	Long radius Butt weld 90 degree	6"	4	16	20
37	Long radius Butt weld 90 degree	8"	4	16	20
38	Long radius Butt weld 90 degree	10"	4	16	20
39	Long radius Butt weld 90 degree	12"	4	16	20
40	Long radius Butt weld 90 degree	14"	0	20	20



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Pipe Fittings and Flanges

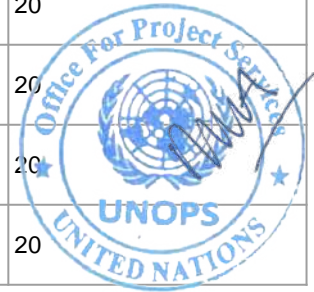
Pipe fittings and flanges		Brief Description (Flange Size)	Annex 4 Qty (Proposal 3.3)	Additional Requirement (Qty)	Total Qty Required
31	JIS 16K Slip on Weld	12"	4	16	20
32	JIS 16K Slip on Weld	14"	0	20	20
33	Long radius Butt weld 90 degree	2-1/2"	4	16	20
34	Long radius Butt weld 90 degree	3"	4	16	20
35	Long radius Butt weld 90 degree	5"	4	16	20
36	Long radius Butt weld 90 degree	6"	4	16	20
37	Long radius Butt weld 90 degree	8"	4	16	20
38	Long radius Butt weld 90 degree	10"	4	16	20
39	Long radius Butt weld 90 degree	12"	4	16	20
40	Long radius Butt weld 90 degree	14"	0	20	20



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Pipe Fittings and Flanges

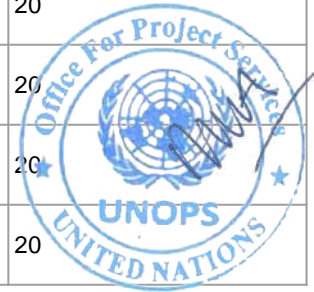
Pipe fittings and flanges		Brief Description (Flange Size)	Annex 4 Qty (Proposal 3.3)	Additional Requirement (Qty)	Total Qty Required
41	Short radius Butt weld 90 degree	2-1/2"	4	16	20
42	Short radius Butt weld 90 degree	3"	4	16	20
43	Short radius Butt weld 90 degree	5"	4	16	20
44	Short radius Butt weld 90 degree	6"	4	16	20
45	Short radius Butt weld 90 degree	8"	4	16	20
46	Short radius Butt weld 90 degree	10"	4	16	20
47	Short radius Butt weld 90 degree	12"	4	16	20
48	Short radius Butt weld 90 degree	14"	0	20	20
49	Long radius Butt weld 45 degree	2-1/2"	4	16	20
50	Long radius Butt weld 45 degree	3"	4	16	20



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Pipe Fittings and Flanges

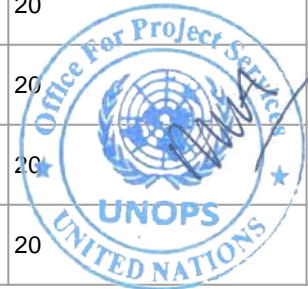
Pipe fittings and flanges		Brief Description (Flange Size)	Annex 4 Qty (Proposal 3.3)	Additional Requirement (Qty)	Total Qty Required
51	Long radius Butt weld 45 degree	5"	4	16	20
52	Long radius Butt weld 45 degree	6"	4	16	20
53	Long radius Butt weld 45 degree	8"	4	16	20
54	Long radius Butt weld 45 degree	10"	4	16	20
55	Long radius Butt weld 45 degree	12"	4	16	20
56	Long radius Butt weld 45 degree	14"	0	20	20
57	Tee Butt Weld	2-1/2"	4	16	20
58	Tee Butt Weld	3"	4	16	20
59	Tee Butt Weld	5"	4	16	20
60	Tee Butt Weld	6"	4	16	20



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Pipe Fittings and Flanges

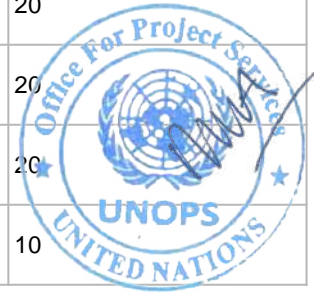
Pipe fittings and flanges		Brief Description (Flange Size)	Annex 4 Qty (Proposal 3.3)	Additional Requirement (Qty)	Total Qty Required
61	Tee Butt Weld	8"	4	16	20
62	Tee Butt Weld	10"	4	16	20
63	Tee Butt Weld	12"	4	16	20
64	Tee Butt Weld	14"	0	20	20
65	Long radius Butt Weld 180 degree	2-1/2"	4	16	20
66	Long radius Butt Weld 180 degree	3"	4	16	20
67	Long radius Butt Weld 180 degree	5"	4	16	20
68	Long radius Butt Weld 180 degree	6"	4	16	20
69	Long radius Butt Weld 180 degree	8"	4	16	20
70	Long radius Butt Weld 180 degree	10"	4	16	20



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Pipe Fittings and Flanges

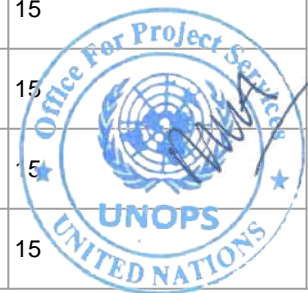
Pipe fittings and flanges		Brief Description (Flange Size)	Annex 4 Qty (Proposal 3.3)	Additional Requirement (Qty)	Total Qty Required
71	Long radius Butt Weld 180 degree	12"	4	16	20
72	Long radius Butt Weld 180 degree	14"	0	10	10
73	Short radius Butt Weld 180 degree	2-1/2"	4	16	20
74	Short radius Butt Weld 180 degree	3"	4	16	20
75	Short radius Butt Weld 180 degree	5"	4	16	20
76	Short radius Butt Weld 180 degree	6"	4	16	20
77	Short radius Butt Weld 180 degree	8"	4	16	20
78	Short radius Butt Weld 180 degree	10"	4	16	20
79	Short radius Butt Weld 180 degree	12"	4	16	20
80	Short radius Butt Weld 180 degree	14"	0	10	10



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Pipe Reducers

Pipe Reducers		Reduced to:	Annex 4 Qty (Proposal 3.3)	Additional Requirement (Qty)	Total Qty Required
1	Pipe Reducer 2"	1-1/2"	8	7	15
2	Pipe Reducer 2-1/2"	1-1/2"	8	7	15
3	Pipe Reducer 2-1/2"	2"	8	7	15
4	Pipe Reducer 3"	1-1/2"	8	7	15
5	Pipe Reducer 3"	2"	8	7	15
6	Pipe Reducer 3"	2-1/2"	8	7	15
7	Pipe Reducer 6"	3-1/2"	8	7	15
8	Pipe Reducer 6"	4"	8	7	15
9	Pipe Reducer 6"	5"	8	7	15
10	Pipe Reducer 8"	5"	8	7	15



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Pipe Reducers

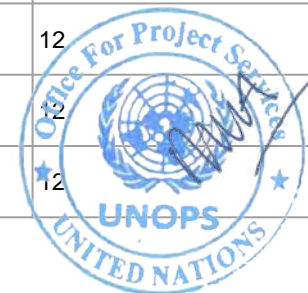
5 November 2020

Pipe Reducers		Reduced to:	Annex 4 Qty (Proposal 3.3)	Additional Requirement (Qty)	Total Qty Required
11	Pipe Reducer 8"	6"	8	7	15
12	Pipe Reducer 10"	6"	8	7	15
13	Pipe Reducer 10"	8"	8	7	15
14	Pipe Reducer 12"	6"	8	7	15
15	Pipe Reducer 12"	8"	8	7	15
16	Pipe Reducer 12"	10"	0	15	15
17	Pipe Reducer 12"	14"	8	7	15



Valves

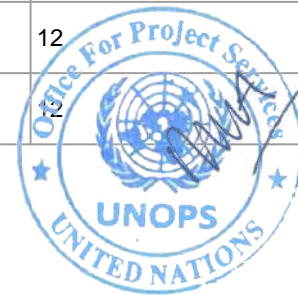
Valves		Type	Flange	Annex 4 Qty (Proposal 3.3)	Additional Requirement (Qty)	Total Qty Required
1	2"	SDNR Globe Valves	JIS 10K	6	6	12
2	2-1/2"	SDNR Globe Valves	JIS 10K	6	6	12
3	6"	SDNR Globe Valves	JIS 10K	6	6	12
4	8"	SDNR Globe Valves	JIS 10K	6	6	12
5	2"	SDNR Globe Valves	JIS 16K	6	6	12
6	2-1/2"	SDNR Globe Valves	JIS 16K	6	6	12
7	6"	SDNR Globe Valves	JIS 16K	6	6	12
8	8"	SDNR Globe Valves	JIS 16K	6	6	12
9	8"	Gate Valves	JIS 10K	6	6	12
10	10"	Gate Valves	JIS 10K	6	6	12



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Valves

Valves		Type	Flange	Annex 4 Qty (Proposal 3.3)	Additional Requirement (Qty)	Total Qty Required
11	12"	Gate Valves	JIS 10K	6	6	12
12	14"	Gate Valves	JIS 10K	6	6	12
13	8"	Gate Valves	JIS 16K	6	6	12
14	10"	Gate Valves	JIS 16K	6	6	12
15	12"	Gate Valves	JIS 16K	6	6	12
16	14"	Gate Valves	JIS 16K	6	6	12
17	2-1/2"	Butterfly Valve	JIS 10K	6	6	12
18	6"	Butterfly Valve	JIS 10K	6	6	12
19	8"	Butterfly Valve	JIS 10K	6	6	12



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JIS 10kg Flange Bolts & Nuts

Nominal Pipe Size	Flange Qty	Number of Holes	Bolt Diameter	Bolt Length	No. of Bolts Required
1-1/2"	20	4	M16	60	80
2"	20	4	M16	60	80
2-1/2"	20	4	M16	65	80
3"	20	8	M16	65	160
6"	20	8	M20	80	160
8"	20	12	M20	80	240
10"	20	12	M20	90	240
12"	20	12	M22	90	240
14"	20	16	M22	90	320



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JIS 16kg Flange Bolts & Nuts

Nominal Pipe Size	Flange Qty	Number of Holes	Bolt Diameter	Bolt Length	No. of Bolts Required
1-1/2"	20	8	M16	60	160
2"	20	8	M16	60	160
2-1/2"	20	8	M16	60	160
3"	20	8	M20	75	160
6"	20	12	M22	90	240
8"	20	12	M22	90	240
10"	20	12	M24	100	240
12"	20	16	M24	105	320
14"	20	16	M24	115	320



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Bolts and U-Bolts

Flange Size	Bolt Size	Bolt Length	Annex 4 Qty (Proposal 3.3)	Additional Requirement (Qty)	Total Qty Required	Comment
1-1/2"	M16	60	80	80	160	Bolts for 40 Flanges
2"	M16	60	80	80	160	Bolts for 40 Flanges
2-1/2"	M16	65	80	80	160	Bolts for 40 Flanges
3"	M16	65	160	160	320	Bolts for 40 Flanges
6"	M20	80	160	160	320	Bolts for 40 Flanges
8"	M20	80	240	240	480	Bolts for 40 Flanges
10"	M20	90	240	240	480	Bolts for 40 Flanges
12"	M22	90	240	240	480	Bolts for 40 Flanges
14"	M22	90	320	320	640	Bolts for 40 Flanges

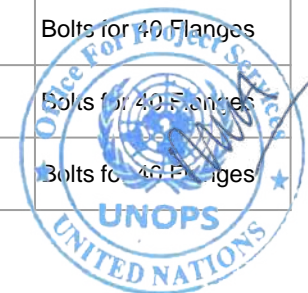


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Bolts and U-Bolts

Flange Size	Bolt Size	Bolt Length	Annex 4 Qty (Proposal 3.3)	Additional Requirement (Qty)	Total Qty Required	Comment
1-1/2"	M16	60	160	160	320	Bolts for 40 Flanges
2"	M16	60	160	160	320	Bolts for 40 Flanges
2-1/2"	M16	65	160	160	320	Bolts for 40 Flanges
3"	M16	65	160	160	320	Bolts for 40 Flanges
6"	M20	80	240	240	480	Bolts for 40 Flanges
8"	M20	80	240	240	480	Bolts for 40 Flanges
10"	M20	90	240	240	480	Bolts for 40 Flanges
12"	M22	90	320	320	640	Bolts for 40 Flanges
14"	M22	90	320	320	640	Bolts for 40 Flanges



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Required personnel Roles

	MANAGEMENT/ONSHORE PERSONNEL	3	CHIEF ENGINEER SAFER		EXTENDED OFFSHORE CREW
1	PROJECT DIRECTOR	4	SAFETY SYSTEM ENGINEER - ELECTRICIAN	1	ELECTRICIAN
2	ENGINEERING MANAGER	5	SAFETY SYSTEM ENGINEER - MECHANICAL	2	MECHANIC
3	OPERATION MANAGER	6	SAFETY SYSTEM ENGINEER – CRANE/LIFT	3	MECHANIC /PRV TECHNICIAN
4	PROJECT SUPPLY CHAIN	7	ROV PILOT and TECHNICIAN	4	PAINTER / BLASTER / HANDS
5	PROJECT ADMINISTRATION/MANAGEMENT	8	MECHANIC & DRAWING COORDINATOR	5	DIVERS
6	HSE (HEALTH/SAFETY/ENVIRONMENT)	9	NDT UT/ PEC	6	DIVER SUPERVISOR
7	ENGINEERING SUPPORT	10	WELDER	7	DIVER TECHNICIAN
8	STRUCTURAL ENGINEER/NAVAL ARCHITECT	11	MEDIC	8	DIVER MEDIC
	BASIC OFFSHORE CREW	12	RISK MANAGEMENT OFFICER		
1	TEAM MANAGER/CHIEF ENGINEER	13	OSESGY LIAISON OFFICER		
2	MASTER MARINER/OIM				

Please note the exact numbers of mission personnel will vary depending on

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5 November 2020

Details about selected service providers have been redacted in line with UNOPS's procurement procedures

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