PETROBRAS	TECHNICAL SPECIFICATION	Nr: I-ET-3010.1Y-5139-390-P4X-003	
	CLIENT: BÚZIOS		SHEET: 1 of 44
	JOB : HIGH CAPACITY FPSO		
	AREA: BÚZIOS		
SRGE	TITLE: HYDRAULIC VALVES REMOCON UNIT (HULL SYSTEMS) (UH-5139501)		INTERNAL
			ESUP

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1. INTRODUCTION

1.1. OBJECTIVE

The purpose of this technical specification is to describe the minimum requirements for the design, manufacturing, assembly, supply, installation, commissioning and tests of HYDRAULIC VALVES REMOCON UNIT (HULL SYSTEMS) (UH-5139501) in conformance with relevant regulations and High Capacity FPSO basic design documentation.

1.2. DEFINITIONS

PACKAGE: It is defined as an assembly of equipment supplied interconnected, tested and ready to operate, requiring only the available utilities from the Unit for the Package operation.

PACKAGER: It is defined as the responsible for project, assembly, construction, fabrication, testing and furnishing of the Package.

HYDRAULIC VALVES REMOCON UNIT (HULL SYSTEMS) (UH-5139501) the package name.

OWNER: PETROBRAS.

All definitions are found on I-ET-3010.00-1200-940-P4X-002 – GENERAL TECHNICAL TERMS.

1.3. ABBREVIATIONS

CCR Central Control Room

CS Classification Society

FAT Factory Acceptance Tests

FPSO Floating Production Storage and Offloading Unit

SOS…….Supervisory and Operation System

SOS-HMI…… Human Machine Interface of SOS

2. NORMATIVE REFERENCES

2.1. INTERNATIONAL CODES, RECOMMENDED PRACTICES AND STANDARDS

The equipment will be designed and manufactured in accordance with the following codes and standards, if not mentioned otherwise.

- ANSI American National Standards Institute
- API American Petroleum Institute

- ASME American Society Of Mechanical Engineers
- BGV German Safety Regulations
- DIN German National Standard Code
- EN European Standards
- ISO International Standard Organization
- IMO – International Maritime Organization
- VDE / IEC German National Electric Standard Codes / International Electric Codes
- Classification Society defined for the Hull scope.

2.2. BRAZILIAN CODES AND STANDARDS

- NR – Brazilian Federal Government Regulatory Norms (Normas Regulamentadoras NRs)
- NORMAM-01 – Normas da Autoridade Marítima para Embarcações Empregadas na Navegação em Mar Aberto.
- IEC 61892, INMETRO Resolution 179, May 18th 2010 and INMETRO resolution 89, February 23rd 2012.

2.3. CLASS APPROVAL AND CERTIFICATION

The PACKAGE shall be designed, manufactured and tested according to the design reference documents, normative requirements and in accordance with the latest editions of Classification Society Rules, Regulations and Standards.

3. REFERENCE DOCUMENTS

REF DOC NUMBER	REF DOC NAME
GENERAL	
I-DE-3010.1Y-1200-942-P4X-002	GENERAL ARRANGEMENT
I-DE-3010.1Y-5400-94A-P4X-001	AREA CLASSIFICATION – GENERAL
I-ET-3000.00-0000-940-P4X-002	SYMBOLS FOR PRODUCTION UNITS DESIGN
I-ET-3000.00-1200-940-P4X-001	TAGGING PROCEDURE FOR PRODUCTION UNITS DESIGN
I-ET-3010.00-1200-940-P4X-002	GENERAL TECHNICAL TERMS

I-RL-3010.1Y-1200-940-P4X-001	GENERAL SPECIFICATION FOR AVAILABLE UTILITIES
I-ET-3A36.00-1000-941-PPC-001	METOCEAN DATA
CONSTRUCTION	
I-ET-3010.00-1200-955-P4X-001	WELDING
I-ET-3010.00-1000-970-P4X-002	REQUIREMENTS FOR NDT
I-ET-3010.00-1200-955-P4X-002	REQUIREMENTS FOR WELDING INSPECTION
I-ET-3010.00-0000-970-P4X-001	REQUIREMENTS FOR PROCEDURES AND PERSONNEL QUALIFICATION AND CERTIFICATION
HULL SYSTEMS	
I-DE-3010.1Y-5139-944-P4X-003	PIPING AND INSTRUMENT DIAGRAM – HYDRAULIC VALVES REMOCON (HULL SYSTEMS)
I-MD-3010.1Y-1200-940-P4X-027	DESCRIPTIVE MEMORANDUM - HULL SYSTEMS
NAVAL	
I-DE-3010.1Y-1350-960-P4X-002	CAPACITIES PLAN
I-ET-3010.1Y-1350-960-P4X-002	DESIGN REQUIREMENTS - NAVAL ARCHITECTURE
I-RL-3010.1Y-1350-960-P4X-009	MOTION ANALYSIS
MECHANICAL	
I-ET-3010.00-1200-300-P4X-001	NOISE AND VIBRATION CONTROL REQUIREMENTS
PAINTING	
I-ET-3010.00-1200-956-P4X-002	GENERAL PAINTING
DR-ENGP-I-1.15	COLOR CODING
SAFETY	

DR-ENGP-M-I-1.3	SAFETY ENGINEERING GUIDELINE
I-ET-3010.00-5400-947-P4X-002	SAFETY SIGNALING
PIPING	
I-ET-3010.1Y-1200-200-P4X-002	PIPING SPECIFICATION FOR HULL
I-ET-3010.00-1200-251-P4X-001	REQUIREMENTS FOR BOLTING MATERIALS
ELECTRICAL	
I-DE-3010.00-5140-700-P4X-003	GROUNDING INSTALLATION TYPICAL DETAILS.
I-ET-3010.00-5140-700-P4X-001	SPECIFICATION FOR ELECTRICAL DESIGN FOR OFFSHORE UNITS
I-ET-3010.00-5140-700-P4X-002	SPECIFICATION FOR ELECTRICAL MATERIAL AND EQUIPMENT FOR OFFSHORE UNITS
I-ET-3010.00-5140-700-P4X-003	ELECTRICAL REQUIREMENTS FOR PACKAGES FOR OFFSHORE UNITS
I-ET-3010.00-5140-712-P4X-001	LOW-VOLTAGE INDUCTION MOTORS FOR OFFSHORE UNITS
INSTRUMENTATION AND AUTOMATION	
I-ET-3010.00-1200-800-P4X-002	AUTOMATION, CONTROL AND INSTRUMENTATION ON PACKAGE UNITS
I-ET-3010.1Y-1200-800-P4X-014	AUTOMATION INTERFACE OF PACKAGE UNITS
I-ET-3010.00-1200-800-P4X-013	GENERAL CRITERIA FOR INSTRUMENTATION PROJECTS
I-ET-3010.00-5520-888-P4X-001	AUTOMATION PANELS

Table 1 – Reference Documents

Note: Reference Documents latest revision shall be considered.

4. DESIGN REQUIREMENTS

4.1. DESIGN CONDITIONS

4.1.1. PACKAGE Equipment shall be designed for a 30-year life in a corrosive offshore environment without the need for replacement of any major component due to wear, corrosion, fatigue, or material failure.

4.1.2. PACKAGER shall design the equipment for the full range of operational conditions as specified in this technical specification.

4.1.3. PACKAGE Equipment shall be designed with the compliance of the normative and design requirements as stated in this specification and complying with the technical parameters stated on the above item 3 with the High Capacity FPSO basic design reference documents.

4.1.4. All elements of the PACKAGE shall be of proven design and well within the manufacturer's actual experience.

4.2. SAFETY REQUIREMENTS

4.2.1. Personnel safety protection shall be provided according to Brazilian Regulatory Norms (NR) issued by Brazilian Government.

4.2.2. Warning signs in Brazilian Portuguese language shall be provided where risk of personnel injury exist.

4.2.3. Rotating equipment outer parts, such as pulleys, couplings, belts and flywheels, shall have rigid protection, manufactured with aluminum ASTM B211 and shall be capable of being easily removed.

4.2.4. In accordance with the requirements of SOLAS II-1, Regulation 3-5, and MSC.1/Circ. 1379, all equipment and material to be supplied by PACKAGER must be "asbestos free".

4.2.5. Safety signaling shall be in full compliance with I-ET-3010.00-5400-947-P4X-002 – SAFETY SIGNALING.

4.2.6. Double block & bleed arrangements are required for isolation of equipment in piping classes of 300# and above.

4.3. NOISE AND VIBRATIONS

4.3.1. Noise and vibrations limits shall be in conformance with I-ET-3010.00-1200-300-P4X-001 – NOISE AND VIBRATION CONTROL REQUIREMENTS.

4.4. MOTIONS AND ACCELERATION

4.4.1. All equipment shall be able to withstand with the UNIT subjected to 100-year return period environmental conditions.

4.4.2. All equipment shall be able to operate with the UNIT subjected to 1-year return period environmental conditions.

4.4.3. All environmental conditions are defined in I-ET-3A36.00-1000-941-PPC-001 – METOCEAN DATA, at any draft from fully loaded to the minimum loaded / ballasted condition.

4.4.4. For the Hull loading conditions details and the maximum designed operational trim and heel inclinations refer to I-ET-3010.1Y-1350-960-P4X-002 – DESIGN REQUIREMENTS - NAVAL ARCHITECTURE.

4.4.5. For the design data and information regarding motion requirements refer to I-RL-3010.1Y-1350-960-P4X-009 – MOTION ANALYSIS.

4.4.6. PACKAGE is also to withstand inertial forces during transportation from construction site to the final offshore location.

5. PACKAGE SCOPE OF SUPPLY

5.1. SCOPE OF SUPPLY

5.1.1. PACKAGE minimum scope of supply is described as the components below detailed:

TAG	Equipment Title	Qty
UH-5139501	Hydraulic Valves Remocon Unit (Hull Systems)	1 x 100%
PN-UH-5139501	Hydraulic Valves remocon Unit (Hull Systems) Control Panel	1 x 100%
FT-UH-5139501	Hydraulic Oil Filter For Remocon Unit Filling	1x100%
PN-UH-5139501-01A/C	Engine Room Solenoid Valve Rack	3 x 100%
PN-UH-5139501-02A/H	Main Deck Cargo Area Solenoids Box	8 x 100%
PN-UH-5139501-03	Main Deck Aft Area Solenoids Box	1 x 100%
B-UH-5139501-A/T#V/X	Local Hydraulic Actuation Pump	21 x 100%
-	Portable hydraulic pumps	4 x 100%
-	Pump for fixed filtering system	1 x 100%

Table 2 – Scope of Supply

5.1.2. FT-UH-5139501 Hydraulic Oil Filter For Remocon Unit Filling is a portable filtering system.

5.1.3. Pump for fixed filtering system is to be included on HPU (UH-5139501) skid.

5.1.4. Hydraulic remotely actuated valves scope of supply is found on ANNEX I.

5.1.5. For PACKAGE equipment supplied within a Skid, all structure, outfitting, instrument, interconnection piping, valves, accessories, electrical terminations, junction boxes and all other items necessary for the safe and full operation of the PACKAGE shall be included on PACKAGER's scope of supply.

5.2. EQUIPMENT LOCATION

5.2.1. PACKAGE components will be installed on Hull Engine Room and Main Deck as below detailed on Table 2:

TAG	Equipment	Location
UH-5139501	Hydraulic Valves Remocon Unit (Hull Systems)	Engine Room (specific room)
PN-UH-5139501	Hydraulic Valves Remocon Unit (Hull Systems) Control Panel	Engine Room (specific room)
FT-UH-5139501	Hydraulic Oil Filter for Remocon Unit Filling	Portable
PN-UH-5139501-01A/C	Engine Room Solenoid Valve Rack	Engine Room
PN-UH-5139501-02A/H	Main Deck Cargo Area Solenoid Box	Main Deck Cargo Area
PN-UH-5139501-03	Main Deck Aft Area Solenoids Box	Main Deck Aft Area
B-UH-5139501-A/T#V/X	Local Hydraulic Actuation Pump	Engine Room / Main Deck

Table 3 – Equipment Location

5.2.2. UH-5139501 – Hydraulic Valves Remocon Unit (Hull Systems) and the PN-UH-5139501 – Hydraulic Valves Remocon Unit (Hull Systems) Control Panel shall be installed in a specific room on Engine Room, a closed and non-classified compartment.

5.2.3. For hydraulic remotely actuated valves location refer to ANNEX I and to the I-DE-3010.1Y-5139-944-P4X-003 – HYDRAULIC VALVES REMOCON (HULL SYSTEMS).

5.2.4. For other area as Main Deck and Tanks refer to I-DE-3010.1Y-5400-94A-P4X-001 – AREA CLASSIFICATION - GENERAL.

5.2.5. I-DE-3010.1Y-1200-942-P4X-001 – GENERAL ARRANGEMENT shall be used as reference for equipment location.

6. PACKAGE SPECIFICATION

6.1. GENERAL

6.1.1. PACKAGE Technical specification is herein detailed with some design premises:

a. Hydraulic system design and installation plan shall be submitted to the PACKAGER for approval.

b. All instrumentation and automation of the UNIT Hull hydraulic valves remocon system shall be designed by PACKAGER.

6.1.2. The Hull Systems Hydraulic valves actuation system operational pressure shall be defined by PACKAGER.

6.1.3. PACKAGE technical specification is below detailed with the main equipment and the minimum technical requirements.

6.2. HYDRAULIC VALVES REMOCON UNIT (UH-5139501)

6.2.1. Hydraulic Valves Remocon Unit (HPU) (UH-5139501) shall generate hydraulic power for the actuation (open / close) of the on / off hydraulic actuated valves listed on ANNEX I, as well as provide hydraulic power for the actuation of the proportional valves (opening from 0 to 100%).

6.2.2. HPU (UH-5139501) shall be made of stainless steel without painting, within a closed skid (s) with three main sections:

a. A panel for pumps control, emergency commands and others.

b. A skid containing: hydraulic fluid reservoirs (supply and return), supply and circulation pumps with filters.

c. A skid containing hydraulic accumulators.

6.2.3. All hydraulic lines, connections, valves and other accessories inside the panel and skids shall be made of ASTM A269 Gr. TP 316L, except where otherwise specified in this document.

6.2.4. HPU (UH-5139501) shall have local and remote start / stop command from SOS-HMI.

6.2.5. The following items 6.3, 6.4, 6.5, 6.6, 6.7 and 6.8 of this technical specification have the minimum requirements description of the HPU (UH-5139501) Skid components.

6.3. HYDRAULIC VALVES REMOCON UNIT (HULL SYSTEMS) CONTROL PANEL (PN-UH-5139501)

6.3.1. The dimensions of the panel supplied by PACKAGER shall be minimized to enable a feasible installation inside a specific room on Engine Room.

6.3.2. The panel shall be a standalone unit fitted with pad eyes for hoisting. All surfaces shall be perfectly smooth and free from burrs.

6.3.3. All access doors to the interior of the panel shall be in the front, at most 700 mm large and shall allow easy access to the whole extension of the HPU (UH-5139501). All doors shall be held by means of continuous hinges made of stainless steel AISI-316L. The doorknobs and hinges shall be robust and reinforced.

6.3.4. The panel shall be adequately constructed for indoor service use and shall have an IP-22 minimum protection level since will be installed inside Hull Engine Room.

6.3.5. AISI-316L Stainless Steel shall be the only material used in the manufacture of the panel, including the supporting skid. The plates that make the HPU control panel (PN-UH-5139501) shall be free from warping, wrinkling, roughness and signs of rust and corrosion,

6.3.6. All cuts and perforations shall be executed cold, and all plates shall be reinforced with steel bars welded internally.

6.3.7. The HPU control panel (PN-UH-5139501) shall include all the electric motor control devices, such as contactors and circuit breakers, PLC Control Panel, motor control center.

6.3.8. The internal layout of HPU control panel is under the responsibility of the PACKAGER / MANUFACTURER.

6.3.9. Valves Remote Control Unit Control Panel (PN-UH-5139501) shall include starter for motors, as per MANUFACTURER's standard and in compliance with the Rules and Regulations defined in item 2 Regulations Codes and Standard of this Specification, with at least the below control functions:

- Local starting / stopping.
- Remote starting / stopping by SOS-HMI.
- Hydraulic Power Unit pressure indication.
- Pump 1 running indication.
- Pump 2 running indication.
- Hydraulic oil temperature local indication.

6.3.10. As well, at least the following supervision functions shall be provided:

- Low level alarm in hydraulic oil tank.

- Low hydraulic oil pressure alarm.
- High hydraulic oil temperature alarm.
- Pump 1 failure alarm.
- Pump 2 failure alarm.
- Other as per PACKAGER's standard.

6.3.11. Electrical and Instrumentation Requirements are found on items 8.1 and 8.2 of this Specification, respectively.

6.4. HPU (UH-5139501) SKID FOR ACCUMULATOR BANKS

6.4.1. The accumulator bank shall be installed on an AISI-316L stainless steel supporting skid, capable of supporting its weight and still allow movements and installation on the unit.

6.4.2. The skid plates shall be free from warping, wrinkling, roughness and signs of rust and corrosion.

6.4.3. Accumulators' banks shall be designed to open/close the two hydraulic actuated valves of the hull systems with the largest diameter and largest distance from the referred accumulators, only in case of failure of the hydraulic power unit (UH-5139501) when pumps are out of service.

6.4.4. The hydraulic accumulators shall be of the bladder type pre-charged with nitrogen, maximum operation pressure, according to the pressure level to which it is associated. The accumulator's chassis shall be made of AISI-316L stainless steel or carbon steel and internally covered with Nickel coating.

6.4.5. All materials, such as gaskets and bladders and their coatings shall be compatible with hydraulic fluid used. It shall be provided with facilities (spaces, quick connections, manometers, etc.) for individual recharge from nitrogen cylinders.

6.4.6. The minimum pressure used to calculate the accumulator units shall be equal to or in excess of the highest pressure acceptable at the pressure regulator valve outlets.

6.4.7. The accumulator bank shall be provided with complete and independent manifold block for each accumulator with 3/4" NPT bulkhead as in the attached drawings, ball valves and piping in AISI-316L stainless steel.

6.4.8. The accumulator bank shall be provided with one (1) manometer with glycerin filling in the nitrogen pre-charge circuit of each accumulator to be designed and supplied by PACKAGER / MANUFACTURER.

6.4.9. PACKAGER shall supply a blader charging kit with connectors / adapters for the correct recharging of the bladers with nitrogen. The charging kit shall be provided with pressure regulator valve, pressure gauge and any other components

considered necessary by PACKAGER.

6.4.10. All hydraulic fluid drains shall converge to the same outlet.

6.4.11. Each accumulator of the bank shall have a block, bleed and safety valves and a safety drain.

6.4.12. Accumulator banks design and installation shall comply with NR-13 Brazilian Regulation for Pressure Vessels.

6.5. HPU (UH-5139501) SKID FOR HYDRAULIC RESERVOIRS

6.5.1. The reservoir shall be composed of two tanks: one to receive the return fluids and other to handle the fluids supply.

6.5.2. The hydraulic oil supply shall be performed from the hydraulic reservoir directly, no intermediary tanks shall be provided.

6.5.3. Hydraulic Reservoirs material shall be with AISI 316L or similar.

6.5.4. The hydraulic fluid reservoirs, together with the loading and circulation pumps, shall be assembled on an AISI-316L Stainless Steel supporting skid, capable of holding its weight and still allowing transportation and installation of the unit.

6.5.5. The hydraulic supply reservoir shall be geometrically vertical, allowing detection of hydraulic fluid leaks in the system, through variation of fluid level in the tank.

6.5.6. The plates and sheets shall be free from warping, wrinkling, roughness and signs of rust and corrosion.

6.5.7. The overflow of each reservoir shall be connected to the drainage line.

6.5.8. The hydraulic fluid reservoirs shall be made of AISI-316L stainless steel and shall have the following accessories: level sight, level transmitters, drains, vents and other necessary for the safe operation of the system.

6.6. HPU (UH-5139501) HYDRAULIC PUMPS

6.6.1. The Hydraulic Power Unit HPU (UH-5139501) shall have a loading and recirculation pump with minimum capacity of 40 l/min, to re-circulate the hydraulic fluid of the return reservoir tank, to replenish the hydraulic fluid to the reservoirs and to transfer the fluid from the return reservoir tank to the supply reservoir tank through the filter.

6.6.2. This loading and recirculation pump shall be sized to re-circulate all volume of reservoirs in less than 6 (six) hours.

6.6.3. Hydraulic Pumps shall be electrical driven type.

6.6.4. All hydraulic components shall be carefully selected so as to guarantee a level of tightness to the HPU (UH-5139501) (zero leakage) during the working life of the

UNIT.

6.7. HPU (UH-5139501) FILTERING SYSTEM

6.7.1. A filter shall be supplied installed at the HPU intake and other one at the discharge of the pumps. Filters specification are PACKAGER's standard design.

6.7.2. A fixed filtering system shall be provided to the HPU with the purpose to ensure the total water removal from the hydraulic oil down to a level accepted by the PACKAGER. HPU fixed filtering shall be performed in a closed circuit with the hydraulic oil reservoir and an independent pump.

6.7.3. Also, PACKAGER shall provide a portable filter skid Hydraulic Oil Filter For Remocon Unit Filling (FT-UH-5139501) with dedicated pumps for maintenance purpose with functions to feed hydraulic oil to the HPU (UH-5139501) reservoir and to adequate the NAS parameter of hydraulic oil when necessary.

6.8. HYDRAULIC VALVES REMOCON UNIT (UH-5139501) INTAKES AND OUTLETS

6.8.1. The HPU (UH-5139501) shall two segregated circuits as below described:

a. From / to the Engine Room Solenoid Valve Racks (PN-UH-5139501-01A/C) and.

b. From / to the Main Deck Cargo Area / Aft Area Solenoids Boxes (PN-UH-5139501-02A/H and -03A).

6.8.2. PACKAGER shall provide the detail design of intakes and outlets for UH-5139501 as the following:

a. connection with reservoirs, accumulator banks, solenoid valves racks and boxes.

b. intake with quick coupling connector for charging the hydraulic fluid,

c. a hose for charging, also fitted with quick coupling at one end and a check valve at the other end,

d. spares intake / outlet connections,

e. drains to supply and return reservoirs.

f. the return of the drains from the accumulator bank that shall be routed to the return reservoir.

g. electric signals and commands shall be routed to a junction box in the HPU PN-UH-5139501 control panel.

6.8.3. The fluid return to the reservoir shall be free from any obstruction and the routing of the lines shall remain independent, without reductions in diameter. The lines

shall be built so as to lead direct into the reservoir.

6.8.4. For Electrical connections refer to the I-ET-3010.00-5140-700-P4X-003 – ELECTRICAL REQUIREMENTS FOR PACKAGES FOR OFFSHORE UNITS and other references stated on the item 8.1 of this specification.

6.9. SOLENOID VALVES RACKS AND BOXES (PN-UH-5139501-01A/C, PN-UH-5139501-02A/H, PN-UH-5139501-03)

6.9.1. All solenoid valves for hydraulic actuators shall be installed in the solenoid valves panels (racks and boxes) PN-UH-5139501-01A/C, PN-UH-5139501-02A/H and PN-UH-5139501-03.

6.9.2. All solenoid valve racks and boxes panels shall have connections for portable hydraulic pumps.

6.9.3. All solenoids and limit switches shall be installed in solenoid valve racks and boxes. Valve limit switches must follow project's hazardous area classification and be volumetric type. “On-off” valves shall be provided with contacts for “open” and “close” indications on SOS-HMI. “Partial opening” valves shall be provided with 4-20 mA output for position indication on SOS-HMI (0 to 100%).

6.9.4. Solenoid valves racks panels PN-UH-5139501-01A/C shall be designed to control the hydraulic valves installed in Engine Room.

6.9.5. Solenoid valves installed on solenoid valves racks inside Engine Room shall be designed to operate in non-classified area and shall have an ingress protection rating of at least IP56.

6.9.6. Solenoid valves boxes panels PN-UH-5139501-02A/H and PN-UH-5139501-03 shall be designed to control the hydraulic actuated valves installed on Main Deck cargo area and Main Deck Aft area respectively.

6.9.7. Solenoid valves boxes panels shall be installed in exposed Main Deck (classified area), thus complying with the following requirements:

a. Electric components inside the boxes (i.e., solenoid valves, valve positioners, valve position indicators) shall be explosion proof or intrinsically safe designed for zone 1.

b. The solenoid boxes shall be in AISI 316L intrinsically safe.

c. Solenoid Panel Racks and Boxes design and components are subject to Classification Society approval.

d. Solenoid Valve Boxes design and components shall have maintenance watertight doors IP56.

e. In case of intrinsically safe, safety barrier/galvanic insulator shall be supplied.

6.9.8. Solenoid valves racks and boxes panels shall have internal layout design under responsibility of the PACKAGER / MANUFACTURER.

6.9.9. Solenoid valve boxes shall be painted external and internally with painting scheme marine corrosion resistant. For painting requirements and Color Coding, refer to item 8.3 of this technical specification.

6.9.10. The distribution of hydraulic actuated valves controlled by the Solenoid Valves Racks and Boxes are informed on I-DE-3010.1Y-5139-944-P4X-003 – HYDRAULIC VALVES REMOCON (HULL SYSTEMS).

6.9.11. The calculation of the torque required by actuators shall be according to I-ET-3010.00-1200-800-P4X-013 – GENERAL CRITERIA FOR INSTRUMENTATION PROJECTS (item 14.1.4.9.1).

6.9.12. For electric equipment and electric accessories installed inside the tanks, they shall, as an obligation, have an IP-68 protection level for at least 4 meters water depth.

6.10. HYDRAULIC ACTUATED VALVES

6.10.1. As mentioned on 5.1, PACKAGER shall supply all the hydraulic actuated valves which are controlled by the Hull systems Remocon system. Those valves are listed on ANNEX 1 with some minimum design parameters informed for reference.

6.10.2. The hydraulic actuators shall be directly assembled on the valves with mechanical indication of the opening and “open / close” position on the top end of the valve shaft.

6.10.3. Flanged valves shall be fitted with flanges as per ASME B16.5.

6.10.4. All hydraulic actuated valves shall be remotely driven through SOS-HMI.

6.10.5. All remotely actuated hydraulic valves shall have the position indication monitored by SOS, indicated on SOS-HMI, on the valves themselves and on the solenoid valves racks and boxes where they are connected.

6.10.6. All valve indicators shall be on/off type (XV or SDV) except where indicated for partial opening / closing (HV).

6.10.7. All materials specified for the valves shall be suitable for the fluid handled.

6.10.8. Valves indicated with “Class Type” shall be covered by Classification Society Certificate.

6.10.9. Hydraulic actuators shall be quarter turn balanced rotary type, including connection block and the following accessories:

a. Double pilot operated check valve.

b. Double release valve.

c. Double throttle valve.

d. Quick connections for portable hand pump

6.10.10. Valves actuating hydraulic design shall be according to PACKAGER's / MANUFACTURER'S standard.

6.11. LOCAL HYDRAULIC ACTUATION PUMP (B-UH-5139501-A/T#V/X)

6.11.1. Shipside valves (all "on/off" type, XVs) installed on areas with restricted access shall have a hydraulic contingency control provided by dedicated manual hydraulic pumps (Local Hydraulic Actuation Pump, B-UH-5139501-A/T#V/X).

6.11.2. Local Hydraulic Actuation Pump (B-UH-5139501-A/T#V/X) shall not have connection with hydraulic headers and shall have manual operation only.

6.11.3. Local Hydraulic Actuation Pump (B-UH-5139501-A/T#V/X) shall have the hydraulic circuit from itself to the corresponding hydraulic valve actuator.

6.11.4. Local Hydraulic Actuation Pump (B-UH-5139501-A/T#V/X) shall have limit switches for position monitoring in the Control Room (CCR) and local indication of the position status of the corresponding controlled valve.

6.11.5. Local Hydraulic Actuation Pump (B-UH-5139501-A/T#V/X) shall be installed on safe and accessible areas on Main Deck and Engine Room connected to the dedicated valves via AISI 316L hydraulic tubings which are not PACKAGER scope of supply.

6.11.6. PACKAGER shall provide recommendations for tubing connection design and assembly from the Local Hydraulic Actuation Pump (B-UH-5139501-A/T#V/X) and the corresponding valves.

6.11.7. Local Hydraulic Actuation Pump (B-UH-5139501-A/T#V/X) flow rate shall be 6.0 cm^3/s per double stroke/max 135 bar.

6.11.8. Local Hydraulic Actuation Pump (B-UH-5139501-A/T#V/X) shall have proper protection for operation on open areas submitted to different weather conditions.

7. HYDRAULIC REQUIREMENTS

7.1. GENERAL

7.1.1. The hydraulic power to open/close the hydraulic actuated valves and for the operation of all components shall be defined by PACKAGER.

7.1.2. The hydraulic system shall be sized to replenish the pressure of the accumulators from minimum to maximum pressure in 5 (five) minutes.

7.1.3. For the hydraulic system sizing criteria, the following parameters shall be taken into consideration:

a. At least, 2 (two) electric pumps shall be provided.

b. The two (2 x 100%) electric pumps shall have the overall capacity of hydraulic fluid supplying to the system (flow rate and pressure).

c. The second electrical pump is a stand-by of the first one and shall be automatically started in case of failure or need for back-up of the first one.

d. The selection of which pump shall be the primary one shall be made from the HPU local control panel (PN-UH-5139501).

e. Each pump shall have the capacity to operate simultaneously 2 (two) valves of Hull Systems with the largest diameter and largest distance from HPU (UH-5139501). Those valves shall be actuated from the totally opened position to the totally closed position and vice-versa at a maximum duration as defined on I-ET-3010.00-1200-800-P4X-013 – GENERAL CRITERIA FOR INSTRUMENTATION PROJECTS (item 14.1.1.3).

7.1.4. Relief valves shall be provided on the pump discharge, adjusted 10% higher than maximum work pressure of the line. They shall permit the fluid return to the reservoir in case of system overpressure.

7.1.5. The HPU (UH-5139501) hydraulic system shall also be provided with filters on the pump suction, safety valves, retaining and/or block valve when necessary and a manometer on the front panel of the HPU (UH-5139501) to indicate the levels of hydraulic supply.

7.1.6. Each HPU (UH-5139501) header shall have pressure transmitters with local indication as well as pressure safety valves (PSVs).

7.1.7. All components material of the hydraulic circuit shall be defined by PACKAGER / MANUFACTURER, except where otherwise specified in this document. Material selection shall ensure the compatibility with the hydraulic oil standard applied to the system to ensure the hydraulic oil quality degree for the whole UNIT design life.

7.1.8. The return reservoir shall be sized to store a volume two times the hydraulic oil inventory which includes actuators and the accumulator header volumes, to ensure enough capacity for the oil return during the de-pressurization of the HPU (UH-5139501).

7.1.9. The supply reservoir shall be sized to store all the fluid necessary for the actuation volume of all valves and the accumulator header. It shall be observed that the capacity be at least 1.5 times the total volume of the accumulators.

7.1.10. The supply and return reservoirs vent piping (HULL SUPPLIER scope) shall have flame arresters installed at the top of the vents on a specified above deck.

Those vent piping flame arresters are PACKAGER scope of supply.

7.1.11. The hydraulic supply pumps intake shall be done through a “fishing” U-tube with a retention valve and filter.

7.1.12. Pressure regulator valves shall be sized to supply a flow compatible with the required for the opening of the large valves and other consumers of the HPU (UH-5139501).

7.1.13. All hydraulic connections in the HPU (UH-5139501) shall be made of double ferrule compression type fittings, capable of preserving their sealing for at least 30 years of service.

7.2. HYDRAULIC PORTABLE PUMPS

7.2.1. PACKAGER shall provide four (04) portable hydraulic pumps to allow the valves emergency control at the HPU (UH-5139501) Room and at the Main Deck.

7.2.2. Hydraulic portable pumps shall be supplied for the emergency opening of the largest valve of the remocon system.

7.2.3. Portable pumps are to be equipped with the minimum devices:

a. A manual piston pump.

b. Oil reservoir.

c. Relief valve.

d. Pressure gauge.

e. Flexible hoses with self-seal connections of quick acting type to allow operation of the valves in the event of the hydraulic power unit failure, directly either from the solenoid valves boxes or panel, or directly connected to the valve’s actuators.

7.2.4. Portable Pumps shall be connected to the existing terminations on each solenoid rack and boxes panels (PN-UH-5139501-01A/C, PN-UH-5139501-02A/H, PN-UH-5139501-03).

7.3. HYDRAULIC FLUID

7.3.1. The hydraulic fluid selected for the UNIT Hull hydraulic remocon system operation shall be approved by the PACKAGER.

- NOTE: Water based type production control fluids **shall not be used** for the hydraulic remocon system. Also during Hull hydraulic system commissioning phase, hydrostatic tests with water based fluids are prohibited, N_2 shall be used for tests.

7.3.2. The cleanliness class of the hydraulic fluid shall be specified by the PACKAGER

/ MANUFACTURER.

7.3.3. It shall be supplied a fluid cleanliness analyses kit with consumables slides for a two year period of operation with two samples per week for use on the HPU (UH-5139501).

7.3.4. Compatibility Certificates with the mineral oil specified for the HPU (UH-5139501) shall be required for all components of the hydraulic system it shall attend.

7.4. HPU (UH-5139501) HYDRAULIC DIMENSIONING CALCULATION RECORD

7.4.1. PACKAGER shall submit the calculation record for the HPU hydraulic dimensioning, including the volume of reservoirs, volume of the accumulator units (number x capacity), volume of the actuators, operating pressures, flow capacity of all pumps, inner diameter of main headers and maximum considered distance from the valve actuators it served.

7.5. HYDRAULIC PARTS REQUIREMENTS

7.5.1. All components of the hydraulic systems shall be made of stainless steel, ASTM A 269 Gr. TP 316L, including the valve actuators, etc., except when expressly specified otherwise.

7.5.2. All components of the hydraulic systems shall have permanent stainless steel identification and name plates, with lettering in low relief according to the HPU (UH-5139501) flowchart.

7.5.3. All solenoid valve actuators shall be encapsulated in epoxy to avoid corrosion, with a minimum of class F isolation.

7.5.4. All pressure instruments in the pump header ahead of the regulators shall be fitted with pulse dampers.

7.6. CONNECTIONS AND TUBING

7.6.1. All hydraulic lines shall be made of stainless steel, ASTM A 269 Gr. TP 316L with molybdenum minimum content of 2.5% Mo EN 1.4435.

7.6.2. All connections shall be of stainless steel AISI 316L.

7.6.3. The connections between each solenoid valve rack and also between any solenoid valve rack and the field instruments / valves shall be done through the lower part of the rack.

7.6.4. The connections with the racks shall be made by means of bulkhead type unions, in line, or, at least, in two lines. Each line shall be shifted related to the other by a distance corresponding to a half distance between two consecutive connections, in order to permit the connection and disconnection of any line without affecting any other.

7.6.5. The mounting and dismounting of any component in the rack shall be done

through the front part of the panel and in no way will require the dismounting of other circuit unless the one under maintenance.

7.6.6. All lines shall be properly supported and arranged to avoid damage during operation, facilitate maintenance and keep the respective lengths as short as possible.

7.6.7. Material of the system components shall be selected by PACKAGER considering the hydraulic oil quality degree for the whole design life of the UNIT.

8. GENERAL REQUIREMENTS

8.1. ELECTRICAL REQUIREMENTS

8.1.1. All electrical equipment installed in hazardous areas (see Area Classification documentation) or installed outdoors and kept on during emergency condition (ESD) shall be certified according to IEC 61892, INMETRO Resolution 179, May 18th 2010 and INMETRO resolution 89, February 23rd 2012.

8.1.2. All electrical signal connections for external interconnection with the panel shall be clustered in junction boxes with at least IP-56 level of protection, located inside the panel and grouped according to the different types of signals involved.

8.1.3. Electrical equipment and material shall comply with requirements of I-ET-3010.00-5140-700-P4X-002 – SPECIFICATION FOR ELECTRICAL MATERIAL AND EQUIPMENT FOR OFFSHORE UNITS.

8.1.4. Electrical induction motors shall comply with requirements of I-ET-3010.00-5140-712-P4X-001 – LOW-VOLTAGE INDUCTION MOTORS FOR OFFSHORE UNITS.

8.1.5. Concerning electrical system voltages and quantity of feeders for motors, panels and auxiliaries, centrifugal pumps shall be fed according to definitions of I-ET-3010.00-5140-700-P4X-003 – ELECTRICAL REQUIREMENTS FOR PACKAGES FOR OFFSHORE UNITS.

8.1.6. Power lighting and grounding installations inside the package shall comply with requirements of I-ET-3010.00-5140-700-P4X-003 – ELECTRICAL REQUIREMENTS FOR PACKAGES FOR OFFSHORE UNITS.

8.1.7. Grounding installations shall comply with I-ET-3010.00-5140-700-P4X-001 – SPECIFICATION FOR ELECTRICAL DESIGN FOR OFFSHORE UNITS and I-DE-3010.00-5140-700-P4X-003 – GROUNDING INSTALLATION TYPICAL DETAILS.

8.2. INSTRUMENTATION AND AUTOMATION REQUIREMENTS

8.2.1. PACKAGE shall be protected with all necessary instruments to operate safely, adequately and without interruption in a tropical marine environment.

8.2.2. The instrumentation and control design shall fulfill the requirements of the

following technical specifications:

i. I-ET-3010.00-1200-800-P4X-002 – AUTOMATION, CONTROL AND INSTRUMENTATION ON PACKAGE UNITS.

ii. I-ET-3010.00-1200-800-P4X-013 – GENERAL CRITERIA FOR INSTRUMENTATION PROJECTS.

8.2.3. The minimum requirements for the adequate interfacing of the PACKAGE Automation and Instrumentation System with the UNIT are described on I-ET-3010.1Y-1200-800-P4X-014 – AUTOMATION INTERFACE OF PACKAGE UNITS.

8.2.4. For the control and automation panels design requirements I-ET-3010.00-5520-888-P4X-001 – AUTOMATION PANELS shall be considered.

8.3. PAINTING REQUIREMENTS

8.3.1. Painting and coating in accordance with I-ET-3010.00-1200-956-P4X-002 – GENERAL PAINTING and DR-ENGP-I-1.15 COLOR CODING.

8.3.2. All components shall be delivered fully painted/coated, unless otherwise indicated on this specification.

8.3.3. The performed pre-treatment and complete coating shall be in accordance with the paint manufacturer's data sheets.

8.4. SKIDS LAYOUT AND FOUNDATION REQUIREMENTS

8.4.1. PACKAGE components detailed on item 5.1 which are supplied assembled on skids shall follow the below minimum requirements.

8.4.2. PACKAGE skid structure shall be designed to withstand the design conditions mentioned on item 4.4 and also to ensure the lifting conditions on manufacturing site and shipyard. Lifting lugs shall be provided according to PACKAGER lifting procedure.

8.4.3. The Skid main frame shall be all welded construction. Structural skid welds, including lifting facilities shall be continuous and shall comply with AWS D1.1 (structural welding code) and CS Rules.

8.4.4. Skid structure shall be designed to be welded to the supporting structure unless otherwise specified.

8.4.5. PACKAGE skid layout and arrangement shall be designed to provide sufficient access to pumps, instruments, equipment, and control panels so as to ease the operability and maintenance with safe conditions. Instruments and alves shall be installed on a suitable height to allow safe access for monitoring, operation, and maintenance.

8.4.6. All necessary maintenance davits, monorails, padeyes or trolleys shall be

provided to ensure the safe and easy maintenance conditions.

8.4.7. Access ladders, platforms, gratings and any other access device shall be metallic type and designed according to PACKAGER / MANUFACTURER standard and to the industrial recognized international codes.

8.4.8. PACKAGE skid shall have a drip pan to collect drained water from the equipment with drain flanges for the connection with the Hull draining system.

8.4.9. PACKAGE Equipment and components shall be located entirely within the skids / equipment base perimeter, including all equipment, piping, valves, electrical, instrumentation and controls.

8.5. NAMEPLATES AND TAG NUMBERING

8.5.1. PACKAGER / MANUFACTURER Equipment shall have nameplates in Brazilian Portuguese language, made of stainless steel AISI 316L, with 3 mm minimum thickness and fixed by stainless steel (AISI 316L) bolts or fasteners on visible and accessible location.

8.5.2. Tagging of all instruments, electrical, mechanical and piping items, including valves, shall be carried out.

8.5.3. Tags shall be supplied with the number and description in the Brazilian Portuguese Language, unless otherwise stated in the technical data sheets.

8.5.4. For TAG numbering refer to I-ET-3000.00-1200-940-P4X-001 – TAGGING PROCEDURE FOR PRODUCTION UNITS DESIGN

8.5.5. For Instrumentation tagging the ISA –5.1 and N-1710 shall be followed.

9. PACKAGE MANUFACTURING

9.1. GENERAL

9.1.1. All materials and equipment supplied by PACKAGER / MANUFACTURER shall be brand new (not overhauled), field proven, free from defects and accepted by Owner and the Classification Society.

9.1.2. Materials and equipment shall be manufactured according to internationally recognized standards for the offshore oil drilling and production industries, and shall be in conformance with the Basic Design and Agreement specifications and requirements.

9.1.3. Field proven definition: Systems and equipment shall demonstrate satisfactory operation at least in 3 floating offshore installation units, operating under process conditions (pressure, flow, capacity and similar fluids) for a minimum of 24,000 hours. For rotating equipment, they must demonstrate operation with fluid, flow and discharge pressure similar to the design. Unproven designs or prototypes (including components) without offshore service will not be accepted.

9.2. QUALITY ASSURANCE AND CONTROL SYSTEM

9.2.1. PACKAGER shall submit his Quality Assurance / Quality Control handbook to HULL SUPPLIER for information.

9.2.2. Engineering, fabrication and manufacturing shall conform to good manufacturing practices. Quality system according to ISO 9001 in relevant extent shall be in place and implemented.

9.3. WELDING AND NDT

9.3.1. All equipment, structures and piping welds shall be performed according to the requirements described in the latest revision of I-ET-3010.00-1200-955-P4X-001 – WELDING.

9.3.2. Welding shall be carried out with procedures and welders qualified in accordance with ASME Section IX. Welding shall not be performed before qualified welding procedures have been approved.

9.3.3. Intermittent fillet welds are not acceptable.

9.3.4. Welding inspection and NDTs shall be performed according to the requirements described in the latest revision of

- I-ET-3010.00-1000-970-P4X-002 – REQUIREMENTS FOR NDT and
- I-ET-3010.00-1200-955-P4X-002 – REQUIREMENTS FOR WELDING INSPECTION.

9.3.5. Qualification and Certification for procedures and personnel shall be in accordance with I-ET-3010.00-0000-970-P4X-001 – REQUIREMENTS FOR PROCEDURES AND PERSONNEL QUALIFICATION AND CERTIFICATION.

9.3.6. Final NDTs, for acceptance purposes shall be carried out after completion of any post weld heat treatment (when applicable) and before the applications of painting, hydrostatic testing, etc.

9.4. INSPECTION AND TESTS

9.4.1. PACKAGER / MANUFACTURER shall develop and implement an Inspection and Test Plan (ITP) containing hold points, review and witness points following the schedule of the PACKAGE inspections, tests and events accordingly.

9.4.2. PACKAGE inspection, tests and events shall be attended by the MANUFACTURER, PACKAGER, HULL SUPPLIER, CS and OWNER inspection team whenever necessary.

9.4.3. PACKAGE shall be tested according to the design codes, applicable industry standards, CS Rules and any other one requirement stated on this technical specification.

9.4.4. Unless waive by OWNER, the following PACKAGE inspections and checks shall be witnessed by OWNER inspector:

i. Verification of equipment construction materials (vessels, heat exchangers, pumps, etc.) for conformity with the specification requirements.

ii. Verification of piping, fittings and valves conform to specification of materials and fabrication.

iii. Reports for all NDT performed on the pressure retaining parts (radiographic, dye penetrant, magnetic particles and ultrasonic inspection).

iv. Approval of the relief valve settings and witness of their testing after setting.

v. Review of Inspection and Test Records.

vi. Visual check.

vii. Electrical tests as:

- a MEGGER test for cables and electric motors.

- all tests stated in the respective motors and power / control panel respective specifications.

9.5. FACTORY ACCEPTANCE TEST (FAT)

9.5.1. FAT is a set of functional and performance tests to be executed in any equipment, electrical, instrumentation and telecom panels or any other commissionable item carried out on the PACKAGER / MANUFACTURER factory or in specialized test facilities, in order to demonstrate its compliance with the project specifications and allow its release to shipyard.

9.5.2. For Factory Acceptance Test (FAT) minimum scope requirements:

i. Pressure test (usually hydrostatic) test of all vessels, heat exchangers, tanks, pumps, pipes and valves.

  - Note: All piping systems and equipment shall be drained and dried after hydrostatic testing.

ii. Performance test, NPSH test and Mechanical running test of all pumps.

iii. Electrical continuity checks on all wiring and earthing.

iv. Functional checks on all instruments and valves.

v. Alarms and Equipment Protection Tests.

vi. All other equipment tests and factory checking to be carried out according to the FAT procedure approved by parts.

9.5.3. For Factory Acceptance Test (FAT) event invitation e reports:

i. OWNER, CS and HULL SUPPLIER shall be communicated about the FAT event following ITP and the fabrication schedule. FAT invitation schedule shall be negotiated during PACKAGE kick-off meeting on the detail design phase.

ii. PACKAGER shall issue the FAT procedure for all parts involved as OWNER, HULL SUPPLIER and CS, where applicable, and submit to them for approval.

iii. PACKAGER shall issue the FAT report with all test results and duly signed or stamped by all parts that witnessed the FAT and with the test reference documentation attached.

iv. Acceptance of FAT will not be considered as the final acceptance test of the PACKAGE.

9.6. PRE-COMMISSIONING AND COMMISSIONING

9.6.1. PACKAGER / MANUFACTURER shall be required to provide any necessary support for installation, assembly, pre-commissioning and commissioning of the PACKAGE either at a shore based fabrication yard or onboard the FPSO.

9.6.2. PACKAGER / MANUFACTURER is responsible for assembly supervision of the PACKAGE equipment, including the assembly of components to be delivered loose (for example, some components of the pumps, like stuffing box, etc.).

9.6.3. Final acceptance will be on satisfactory completion of commissioning tests as specified by OWNER.

10. PACKAGE DELIVERY REQUIREMENTS

10.1. PRESERVATION, PACKING AND TRANSPORTATION

10.1.1. PACKAGER / MANUFACTURER shall ensure all the conditions and practices of preservation, packing and transportation are fulfilled and following the PACKAGE / Equipment specific and technical characteristics recommendations.

10.1.2. PACKAGER / MANUFACTURER shall submit to HULL SUPPLIER the PACKAGE preservation requirements and recommendations with all necessary considerations for the PACKAGE Equipment preservation during the UNIT whole design life.

10.1.3. Preservation and packing shall be proper for transportation and storage in a marine environment and protected against moisture and damage during transport, handling and lifting.

10.1.4. In any case, suitable preservation and protective measures shall be provided to prevent equipment deterioration prior to entering into service.

10.1.5. All packing shall be clearly marked for shipping, including lifting points, gross weight, dimensions and center of gravity.

10.1.6. All sea fastening and temporary supports used on the equipment for shipment shall be clearly identified.

10.1.7. PACKAGER / MANUFACTURER shall ensure that all loose valves, tubes and instruments are supplied with plastic caps.

10.1.8. PACKAGER / MANUFACTURER shall also ensure that all electric panels and motors will be supplied with Volatile Corrosion Inhibitor (VCI) impregnated plastic protection or similar, and external plug for space heater connection.

10.1.9. PACKAGER / MANUFACTURER shall provide clear and comprehensive instructions on the exterior of all packages advising the necessary warning notices for unpacking, handling and installing the equipment on arrival at destination.

10.1.10. The equipment shall be thoroughly cleaned internally and be free of all loose foreign materials.

i. The preparation shall make the equipment suitable for outdoor storage in a coastal tropical climate from the time of Shipment.

ii. If there is a risk of damage to valves and other appurtenances during transportation, they shall be disconnected and tagged. All components shall then be securely packed as above.

iii. Spare parts and tools to be packed separately and clearly marked “Spare Parts” and “Tools” respectively.

10.2. SPARE PARTS, CONSUMABLES AND TOOLS

10.2.1. All equipment / material consumable and spare parts recommended by PACKAGER / MANUFACTURER for the construction, testing, commissioning, pre-operation and start-up phases.

10.2.2. All spare parts recommended or required by the CS, such spare parts will be delivered together with the relevant equipment.

10.2.3. All special tools required for construction, pre-commissioning, commissioning and all levels of maintenance and operation.

10.2.4. Spare parts list recommended by PACKAGER / MANUFACTURER for two years of operation.

10.3. DOCUMENTATION

10.3.1. Drawings and Weight Control

For Engineering Documentation minimum requirements:

i. PACKAGER / MANUFACTURER design drawings shall show all necessary dimensions and details required for interface information and installation.

ii. Clearances for maintenance shall be shown on the drawings.

iii. Drawings and documents shall be clear and completely legible with all text in the English language.

iv. Instruction manuals for operation and maintenance of the PACKAGE equipment shall be provided in Portuguese language.

v. Drawings are only accepted when signed by PACKAGER as checked and approved. All revised editions of drawings or documents shall show the revisions clearly marked up, the issue date and PACKAGER's checked and approved signatures.

vi. PACKAGER / MANUFACTURER shall produce a weight / center of gravity data sheet considering each PACKAGE component with the respective assembly dry and operational weight and CoG.

- Note: Operational weight means the component dry weight added to the respective component fluid weight on operational condition.

vii. PACKAGER shall send in advance all recommendations for PACKAGE installation, maintenance and commissioning.

10.3.2. Data Book

PACKAGER shall issue a PACKAGE / Equipment Data Book to be delivered to HULL SUPPLIER for approval. Data Book minimum content shall be as the following:

i. Certified drawings, data sheets, technical specifications, performance curves and calculation memorandum.

ii. Construction, maintenance and operating manuals, instructions for preservation and commissioning, and all catalogs, including of the sub-suppliers.

iii. All certificates of materials and equipment, certificates of electrical cables and equipment to hazardous areas, all tests, destructive and non-destructive examinations, test reports (including FAT), certificates and reports of classification society, procedures for welding qualifications and welding processes.

iv. The documentation requested by Brazilian law NR-13, subdivided for equipment (if applicable).

v. The documentation requested by Brazilian law NR-10, subdivided for equipment (if applicable).

Data Book delivery standard and conditions including number of parts and sections, number of printed and electronic copies will be further defined by OWNER on detail design phase.

10.4. TRAINING

10.4.1. PACKAGER shall provide training to qualify OWNER technicians for operation and maintenance (install, dismantle, replace parts, make adjustment, etc.) of each equipment.

ANNEX 1 – VALVE LIST

The control signals for opening/closing hydraulic remote valves and the status valves shall be connected to the subsystem (HCS, HSD, HFGS, or PAS) indicated in following list:

Item TAG	Sub System	Diam.	Fluid Code	Valve Type	Drawing Nº	Area	Fail Action
HV-1350553	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-1350554	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-1350555	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-1350556	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-1350557	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-1350558	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-1350559	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-1350560	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-1350561	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-1350562	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-1350564	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-1350565	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-1350571	HCS	6"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350573	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350579	HCS	14"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350580	HCS	14"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350581	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350582	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350583	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350584	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350585	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL

ANNEX 1 – VALVE LIST

The control signals for opening/closing hydraulic remote valves and the status valves shall be connected to the subsystem (HCS, HSD, HFGS, or PAS) indicated in following list:

Item TAG	Sub System	Diam.	Fluid Code	Valve Type	Drawing Nº	Area	Fail Action
HV-1350586	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350587	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350588	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350589	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350590	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350591	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350592	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350593	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350602	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350603	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350604	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350605	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350637	HCS	10"	SW	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350641	HCS	10"	SW	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
HV-1350642	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-1350644	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-1350648	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-1350650	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-1350652	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-1350654	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
HV-5120513	HCS	18"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5120-944-P4X-001	ENGINE ROOM	FL
HV-5271519	HCS	14"	TC	Bi Offset Butterfly	I-DE-3010.1Y-5336-944-P4X-005	MAIN DECK	FL
HV-5271521	HCS	14"	TC	Bi Offset Butterfly	I-DE-3010.1Y-5336-944-P4X-005	MAIN DECK	FL

ANNEX 1 – VALVE LIST

The control signals for opening/closing hydraulic remote valves and the status valves shall be connected to the subsystem (HCS, HSD, HFGS, or PAS) indicated in following list:

Item TAG	Sub System	Diam.	Fluid Code	Valve Type	Drawing Nº	Area	Fail Action
HV-5271525	HCS	14"	TC	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271528	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271531	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271536	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271539	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271540	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271543	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271544	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271546	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271549	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271550	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271553	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271554	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271559	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271562	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271569	HCS	10"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271571	HCS	14"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271576	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271577	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271578	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271582	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271583	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271584	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL

ANNEX 1 – VALVE LIST

The control signals for opening/closing hydraulic remote valves and the status valves shall be connected to the subsystem (HCS, HSD, HFGS, or PAS) indicated in following list:

Item TAG	Sub System	Diam.	Fluid Code	Valve Type	Drawing Nº	Area	Fail Action
HV-5271585	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5271594	HCS	10"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
HV-5335527	HCS	14"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
HV-5335528	HCS	14"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
HV-5336507	HCS	6"	AO	Bi Offset Butterfly	I-DE-3010.1Y-5336-944-P4X-005	MAIN DECK	FL
HV-5336510	HCS	6"	AO	Bi Offset Butterfly	I-DE-3010.1Y-5336-944-P4X-005	MAIN DECK	FL
HV-5336512	HCS	20"	AO	Bi Offset Butterfly	I-DE-3010.1Y-5336-944-P4X-005	HULL	FL
HV-5336550	HCS	6"	AO	Bi Offset Butterfly	I-DE-3010.1Y-5336-944-P4X-005	MAIN DECK	FL
HV-5336552	HCS	6"	AO	Bi Offset Butterfly	I-DE-3010.1Y-5336-944-P4X-005	MAIN DECK	FL
SDV-1350566	HSD	16"	PLD	Triple Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FC
SDV-1350599	HSD	20"	PCG	Triple Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FC
SDV-1350600	HSD	20"	PCG	Triple Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FC
SDV-5120509	HFGS	24"	W	Triple Offset Butterfly	I-DE-3010.1Y-5120-944-P4X-001	ENGINE ROOM	FC
SDV-5120510	HFGS	16"	W	Triple Offset Butterfly	I-DE-3010.1Y-5120-944-P4X-001	ENGINE ROOM	FC
XV-1350570	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
XV-1350575	HCS	32"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
XV-1350577	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
XV-1350578	HCS	16"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
XV-1350595	HCS	32"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
XV-1350596	HCS	32"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
XV-1350597	HCS	32"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
XV-1350598	HCS	20"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
XV-1350601	HCS	20"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL

ANNEX 1 – VALVE LIST

The control signals for opening/closing hydraulic remote valves and the status valves shall be connected to the subsystem (HCS, HSD, HFGS, or PAS) indicated in following list:

Item TAG	Sub System	Diam.	Fluid Code	Valve Type	Drawing Nº	Area	Fail Action
XV-1350608	HCS	6"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
XV-1350609	HCS	6"	PCG	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
XV-1350620-1	HCS	18"	CV	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-001	MAIN DECK	FO
XV-1350620-2	HCS	18"	CV	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-001	MAIN DECK	FO
XV-1350622	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
XV-1350623	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
XV-1350624	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
XV-1350625	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
XV-1350626	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
XV-1350629	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
XV-1350630	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
XV-1350631	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
XV-1350632	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
XV-1350633	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
XV-1350634	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
XV-1350635	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
XV-1350636	HCS	10"	SW	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
XV-1350640	HCS	10"	SW	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-003	MAIN DECK	FL
XV-1350643	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
XV-1350647	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
XV-1350649	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
XV-1350651	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL
XV-1350653	HCS	16"	PLD	Bi Offset Butterfly	I-DE-3010.1Y-1350-944-P4X-002	MAIN DECK	FL

ANNEX 1 – VALVE LIST

The control signals for opening/closing hydraulic remote valves and the status valves shall be connected to the subsystem (HCS, HSD, HFGS, or PAS) indicated in following list:

Item TAG	Sub System	Diam.	Fluid Code	Valve Type	Drawing Nº	Area	Fail Action
XV-5111523	HCS	24"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5111-944-P4X-004	ENGINE ROOM	FL
XV-5111524	HCS	24"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5111-944-P4X-004	ENGINE ROOM	FL
XV-5111525	HCS	16"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5111-944-P4X-004	ENGINE ROOM	FL
XV-5111526	HCS	14"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5111-944-P4X-004	ENGINE ROOM	FL
XV-5111527	HCS	16"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5111-944-P4X-004	ENGINE ROOM	FL
XV-5111528	HCS	14"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5111-944-P4X-004	ENGINE ROOM	FL
XV-5111530	HCS	16"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5111-944-P4X-004	ENGINE ROOM	FL
XV-5111531	HCS	14"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5111-944-P4X-004	ENGINE ROOM	FL
XV-5111532	HCS	24"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5111-944-P4X-004	HULL	FL
XV-5111533	HCS	24"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5111-944-P4X-004	HULL	FL
XV-5115502	HCS	4"	W	Ball Valve	I-DE-3010.1Y-5115-944-P4X-002	ENGINE ROOM	FL
XV-5115503	HCS	4"	W	Ball Valve	I-DE-3010.1Y-5115-944-P4X-002	ENGINE ROOM	FL
XV-5115504	HCS	6"	W	Bi Offset Butterfly	I-DE-3010.1Y-5115-944-P4X-002	MAIN DECK	FL
XV-5115505	HCS	4"	DW	Ball Valve	I-DE-3010.1Y-5115-944-P4X-002	ENGINE ROOM	FL
XV-5115506	HCS	4"	DW	Ball Valve	I-DE-3010.1Y-5115-944-P4X-002	ENGINE ROOM	FL
XV-5115509	HCS	4"	DW	Ball Valve	I-DE-3010.1Y-5115-944-P4X-002	ENGINE ROOM	FL
XV-5115510	HCS	4"	DW	Ball Valve	I-DE-3010.1Y-5115-944-P4X-002	ENGINE ROOM	FL
XV-5120504	HCS	1-1/2"	W	Ball Valve	I-DE-3010.1Y-5120-944-P4X-001	ACCOMMODATION	FL
XV-5120505A	HCS	16"	W	Bi Offset Butterfly	I-DE-3010.1Y-5120-944-P4X-001	ENGINE ROOM	FL
XV-5120505B	HCS	16"	W	Bi Offset Butterfly	I-DE-3010.1Y-5120-944-P4X-001	ENGINE ROOM	FL
XV-5120505C	HCS	16"	W	Bi Offset Butterfly	I-DE-3010.1Y-5120-944-P4X-001	ENGINE ROOM	FL
XV-5120505D	HCS	16"	W	Bi Offset Butterfly	I-DE-3010.1Y-5120-944-P4X-001	ENGINE ROOM	FL
XV-5120506	HCS	18"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5120-944-P4X-001	HULL	FL

ANNEX 1 – VALVE LIST

The control signals for opening/closing hydraulic remote valves and the status valves shall be connected to the subsystem (HCS, HSD, HFGS, or PAS) indicated in following list:

Item TAG	Sub System	Diam.	Fluid Code	Valve Type	Drawing Nº	Area	Fail Action
XV-5133501	HCS	6"	D	Bi Offset Butterfly	I-DE-3010.1Y-5133-944-P4X-004	ENGINE ROOM	FL
XV-5133504	HCS	6"	D	Bi Offset Butterfly	I-DE-3010.1Y-5133-944-P4X-004	ENGINE ROOM	FL
XV-5133506	HCS	4"	D	Ball Valve	I-DE-3010.1Y-5133-944-P4X-004	ENGINE ROOM	FL
XV-5133508	HCS	6"	D	Bi Offset Butterfly	I-DE-3010.1Y-5133-944-P4X-004	ENGINE ROOM	FL
XV-5133510	HCS	4"	D	Ball Valve	I-DE-3010.1Y-5133-944-P4X-004	ENGINE ROOM	FL
XV-5133512	HCS	6"	D	Bi Offset Butterfly	I-DE-3010.1Y-5133-944-P4X-004	ENGINE ROOM	FL
XV-5133514	HCS	6"	D	Bi Offset Butterfly	I-DE-3010.1Y-5133-944-P4X-003	ENGINE ROOM	FL
XV-5133518	HCS	6"	D	Bi Offset Butterfly	I-DE-3010.1Y-5133-944-P4X-003	ENGINE ROOM	FL
XV-5133521	HCS	3"	D	Ball Valve	I-DE-3010.1Y-5133-944-P4X-003	ENGINE ROOM	FL
XV-5133523	HCS	3"	D	Ball Valve	I-DE-3010.1Y-5133-944-P4X-003	ENGINE ROOM	FL
XV-5133525	HCS	6"	D	Bi Offset Butterfly	I-DE-3010.1Y-5133-944-P4X-003	ENGINE ROOM	FL
XV-5133526	HCS	6"	D	Bi Offset Butterfly	I-DE-3010.1Y-5133-944-P4X-003	ENGINE ROOM	FL
XV-5133527	HCS	2"	D	Ball Valve	I-DE-3010.1Y-5133-944-P4X-003	ENGINE ROOM	FC
XV-5133528A	HCS	6"	D	Bi Offset Butterfly	I-DE-3010.1Y-5133-944-P4X-003	ENGINE ROOM	FC
XV-5133528B	HCS	6"	D	Bi Offset Butterfly	I-DE-3010.1Y-5133-944-P4X-003	ENGINE ROOM	FC
XV-5133559	HCS	1"	D	Ball Valve	I-DE-3010.1Y-5241-944-P4X-003	FORECASTLE	FL
XV-5138502	HCS	1"	D	Ball Valve	I-DE-3010.1Y-5138-944-P4X-001	POOP CABIN	FL
XV-5241521	HCS	3/4"	W	Ball Valve	I-DE-3010.1Y-5241-944-P4X-004	MAIN DECK	FL
XV-5241529	HCS	24"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5241-944-P4X-003	HULL	FL
XV-5241530	HCS	1-1/2"	D	Ball Valve	I-DE-3010.1Y-5241-944-P4X-003	FORECASTLE	FL
XV-5241532	HCS	3"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5241-944-P4X-002	ENGINE ROOM	FL
XV-5241534	HCS	3"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5241-944-P4X-002	ENGINE ROOM	FL
XV-5241541	HCS	2-1/2"	SW	Ball Valve	I-DE-3010.1Y-5241-944-P4X-002	ENGINE ROOM	FL

ANNEX 1 – VALVE LIST

The control signals for opening/closing hydraulic remote valves and the status valves shall be connected to the subsystem (HCS, HSD, HFGS, or PAS) indicated in following list:

Item TAG	Sub System	Diam.	Fluid Code	Valve Type	Drawing Nº	Area	Fail Action
XV-5241544	HCS	24"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5241-944-P4X-003	HULL	FL
XV-5241545	HCS	2-1/2"	SW	Ball Valve	I-DE-3010.1Y-5241-944-P4X-002	ENGINE ROOM	FL
XV-5241547	HCS	14"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5241-944-P4X-002	ENGINE ROOM	FL
XV-5241548	HCS	2"	FG	Ball Valve	I-DE-3010.1Y-5241-944-P4X-003	MAIN DECK	FC
XV-5241549	HCS	12"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5241-944-P4X-002	ENGINE ROOM	FL
XV-5241551	HCS	12"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5241-944-P4X-002	ENGINE ROOM	FL
XV-5241552	HCS	14"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5241-944-P4X-002	ENGINE ROOM	FL
XV-5241554	HCS	3"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5241-944-P4X-003	HULL	FL
XV-5241558	HCS	2"	FG	Ball Valve	I-DE-3010.1Y-5241-944-P4X-003	MAIN DECK	FC
XV-5241563	HSD	1-1/2"	D	Ball Valve	I-DE-3010.1Y-5241-944-P4X-003	FORECASTLE	FL
XV-5241579	HCS	3"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5241-944-P4X-003	HULL	FL
XV-5260501	HSD	1"	D	Ball Valve	I-DE-3010.1Y-5260-944-P4X-001	POOP DECK	FL
XV-5260503	HSD	1"	D	Ball Valve	I-DE-3010.1Y-5260-944-P4X-001	POOP DECK	FL
XV-5262501	HCS	1-1/2"	D	Ball Valve	I-DE-3010.1Y-5262-944-P4X-001	M-15B	FL
XV-5271501	HCS	3/4"	W	Ball Valve	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271529	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271530	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271537	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271538	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271541	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271542	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271545	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271547	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL

ANNEX 1 – VALVE LIST

The control signals for opening/closing hydraulic remote valves and the status valves shall be connected to the subsystem (HCS, HSD, HFGS, or PAS) indicated in following list:

Item TAG	Sub System	Diam.	Fluid Code	Valve Type	Drawing Nº	Area	Fail Action
XV-5271548	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271551	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271552	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271555	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271558	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271563	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271567	HCS	14"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271575	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271579	HCS	10"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271580	HCS	10"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271586	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271587	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271588	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271589	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271590	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271591	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271594	HCS	16"	TR	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271595	HCS	10"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5271596	HCS	10"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5271-944-P4X-001	MAIN DECK	FL
XV-5310501	HCS	4"	GW	Bi Offset Butterfly	I-DE-3010.1Y-5310-944-P4X-001	HULL	FL
XV-5310502	HCS	4"	GW	Bi Offset Butterfly	I-DE-3010.1Y-5310-944-P4X-001	HULL	FL
XV-5310503	HCS	4"	GW	Ball Valve	I-DE-3010.1Y-5310-944-P4X-001	HULL	FL
XV-5310504	HCS	4"	GW	Ball Valve	I-DE-3010.1Y-5310-944-P4X-001	HULL	FL

ANNEX 1 – VALVE LIST

The control signals for opening/closing hydraulic remote valves and the status valves shall be connected to the subsystem (HCS, HSD, HFGS, or PAS) indicated in following list:

Item TAG	Sub System	Diam.	Fluid Code	Valve Type	Drawing Nº	Area	Fail Action
XV-5310507	HCS	6"	GW	Bi Offset Butterfly	I-DE-3010.1Y-5310-944-P4X-001	ENGINE ROOM	FL
XV-5320501	HCS	1/2"	SA	Ball Valve	I-DE-3010.1Y-5320-944-P4X-001	MAIN DECK	FL
XV-5320502	HCS	1/2"	SA	Ball Valve	I-DE-3010.1Y-5320-944-P4X-001	MAIN DECK	FL
XV-5320503	HCS	1/2"	SA	Ball Valve	I-DE-3010.1Y-5320-944-P4X-001	MAIN DECK	FL
XV-5320504	HCS	1/2"	SA	Ball Valve	I-DE-3010.1Y-5320-944-P4X-001	MAIN DECK	FL
XV-5330511	HCS	8"	BWG	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330513	HCS	8"	BWG	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330514	HCS	3"	BR	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-004	ENGINE ROOM	FL
XV-5330515	HCS	8"	BR	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-004	ENGINE ROOM	FL
XV-5330516	HCS	8"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330517	HCS	8"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330518	HCS	8"	BWG	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330519	HCS	8"	BWG	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330528	HCS	8"	BR	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-004	ENGINE ROOM	FL
XV-5330529	HCS	3"	BR	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-004	ENGINE ROOM	FL
XV-5330531	HCS	3"	BR	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330533	HCS	2"	BR	Ball Valve	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330534	HCS	2"	BR	Ball Valve	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330535	HCS	2"	BR	Ball Valve	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330538	HCS	8"	BR	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-004	ENGINE ROOM	FL
XV-5330539	HCS	8"	BWG	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330540	HCS	2"	BR	Ball Valve	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330541	HCS	12"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL

ANNEX 1 – VALVE LIST

The control signals for opening/closing hydraulic remote valves and the status valves shall be connected to the subsystem (HCS, HSD, HFGS, or PAS) indicated in following list:

Item TAG	Sub System	Diam.	Fluid Code	Valve Type	Drawing Nº	Area	Fail Action
XV-5330542	HCS	12"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330545	HCS	1/2"	SA	Ball Valve	I-DE-3010.1Y-5330-944-P4X-003	FORECASTLE	FL
XV-5330546	HCS	1/2"	SA	Ball Valve	I-DE-3010.1Y-5330-944-P4X-003	FORECASTLE	FL
XV-5330551	HCS	8"	SW	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330552	HCS	8"	BWG	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330553	HCS	8"	BWG	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330554	HCS	8"	BWG	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330555	HCS	8"	BWG	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330556	HCS	8"	BWG	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330557	HCS	8"	BWG	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330558	HCS	2"	BR	Ball Valve	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330559	HCS	2"	BR	Ball Valve	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5330560	HCS	8"	BR	Bi Offset Butterfly	I-DE-3010.1Y-5330-944-P4X-001	ENGINE ROOM	FL
XV-5335501	HCS	16"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335502	HCS	16"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335503	HCS	18"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	MAIN DECK	FL
XV-5335504	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335505	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335506	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335507	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335508	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335509	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335510	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL

ANNEX 1 – VALVE LIST

The control signals for opening/closing hydraulic remote valves and the status valves shall be connected to the subsystem (HCS, HSD, HFGS, or PAS) indicated in following list:

Item TAG	Sub System	Diam.	Fluid Code	Valve Type	Drawing Nº	Area	Fail Action
XV-5335511	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335512	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335513	HCS	16"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335514	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335515	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335516	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335517	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335518	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335519	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335520	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335521	HCS	16"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335522	HCS	16"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335523	HCS	16"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335524	HCS	16"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335525	HCS	14"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335529	HCS	16"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335530	HCS	16"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335531	HCS	16"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335532	HCS	14"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335533	HCS	16"	BWG	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335534	HCS	16"	BWG	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335535	HCS	16"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335536	HCS	16"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL

ANNEX 1 – VALVE LIST

The control signals for opening/closing hydraulic remote valves and the status valves shall be connected to the subsystem (HCS, HSD, HFGS, or PAS) indicated in following list:

Item TAG	Sub System	Diam.	Fluid Code	Valve Type	Drawing Nº	Area	Fail Action
XV-5335537	HCS	16"	BWG	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335538	HCS	16"	BWG	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335540	HCS	16"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335541	HCS	1-1/2"	CN	Ball Valve	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335542	HCS	1-1/2"	CN	Ball Valve	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335543	HCS	1-1/2"	CN	Ball Valve	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335544	HCS	1-1/2"	CN	Ball Valve	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335545	HCS	14"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335546	HCS	16"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335547	HCS	16"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335548	HCS	14"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335549	HCS	14"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335550	HCS	14"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335551	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5335552	HCS	12"	BWH	Bi Offset Butterfly	I-DE-3010.1Y-5335-944-P4X-001	HULL	FL
XV-5336504	HCS	6"	AO	Bi Offset Butterfly	I-DE-3010.1Y-5336-944-P4X-005	MAIN DECK	FL
XV-5336511	HCS	20"	AO	Bi Offset Butterfly	I-DE-3010.1Y-5336-944-P4X-005	HULL	FL
XV-5336513	HCS	20"	AO	Bi Offset Butterfly	I-DE-3010.1Y-5336-944-P4X-005	HULL	FL
XV-5336514	HCS	20"	AO	Bi Offset Butterfly	I-DE-3010.1Y-5336-944-P4X-005	HULL	FL
XV-5336517	HCS	6"	AO	Bi Offset Butterfly	I-DE-3010.1Y-5336-944-P4X-005	MAIN DECK	FL
XV-6650501	PAS	2"	DTH	Ball Valve	I-DE-3010.1Y-6650-944-P4X-001	HULL	FC
XV-6650503	PAS	2"	DTH	Ball Valve	I-DE-3010.1Y-6650-944-P4X-001	HULL	FC
XV-6650505	PAS	2"	DTH	Ball Valve	I-DE-3010.1Y-6650-944-P4X-001	HULL	FC

ANNEX 1 – VALVE LIST

The control signals for opening/closing hydraulic remote valves and the status valves shall be connected to the subsystem (HCS, HSD, HFGS, or PAS) indicated in following list:

Item TAG	Sub System	Diam.	Fluid Code	Valve Type	Drawing Nº	Area	Fail Action
XV-6650507	PAS	2"	DTH	Ball Valve	I-DE-3010.1Y-6650-944-P4X-001	HULL	FC
XV-6650509	PAS	2"	DTH	Ball Valve	I-DE-3010.1Y-6650-944-P4X-001	HULL	FC
XV-6650511	PAS	2"	DTH	Ball Valve	I-DE-3010.1Y-6650-944-P4X-001	HULL	FC