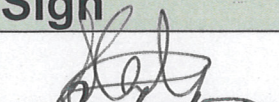
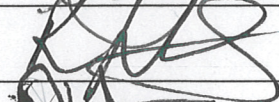

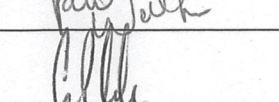
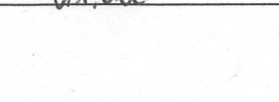


**FUNCTIONAL SPECIFICATION
FOR DIESEL-HYDRAULIC
PEDESTAL CRANE FOR THE
ROUGH 47/3B BD & BP PLATFORMS
(Deviation comments included)**

ISSUED FOR MANUFACTURE

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Richard Lamb	Offshore Maintenance Manager		23/6/16
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**FUNCTIONAL SPECIFICATION
FOR DIESEL-HYDRAULIC
PEDESTAL CRANE FOR THE
ROUGH 47/3B BD PLATFORM**

Sparrows Job No. JU027297

Revision C
Date 28/07/15

JOB NO: JU27297

REVISION: C

PREPARED BY: 

CALUM MACKENZIE
Senior Project Engineer


DATE: 29th July 2015

SPECIFICATION FOR DIESEL-HYDRAULIC
PEDESTAL CRANE FOR THE
ROUGH 47/38 PLATFORM

CHECKED BY: 

JAMES MCLEOD
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DATE: 29th July 2015

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DATE: 29th July 2015

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DATE: 29th July 2015

REVISION

Revision	Date	Description
P	6/07/15	Issued for Comment
P1	15/07/15	Issued for Updates
R1	17/07/15	Issued to Client for Review
R2	23/07/15	Updated to Reflect Client Requirements
C	28/07/15	Client Acceptance/ Submission

Additions to this version of the specification

Insertions in green color	Deviations to this specification proposed by Kenz during the bid phase of the project and accepted by Client.
Insertions in orange color	Eventual reaction to the deviations proposed by Kenz, given by Client during the bid phase of the project.
Insertions in purple color	Kenz' proposed deviations to this specification during the engineering phase of the project.
Insertions in blue colour	Client comments

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1.0 INTRODUCTION / GENERAL REQUIREMENTS

1.2 Introduction

This document is intended to be used as a functional specification for a pedestal crane destined for use on the Rough 47/3B offshore installation.

The crane is to be designed and supplied to meet the requirements of BS EN 13852-1:2013 Part 1: General-purpose offshore cranes.

The purpose of this document is to detail any additional requirements for the crane that are specific to Centrica 47/3B BD as it will be the crane Manufacturers responsibility to ensure the requirements of BS EN 13852-1 are followed.

Compliance with this specification and other referenced specifications does not relieve crane Manufacturer from the responsibility of providing equipment complete in every respect and of proper design, workmanship and materials, to meet the specified design conditions.

At the time of compiling the preliminary specification document, it has yet to be determined if the crane will be installed on the East or West side of the 47/3B platform, therefore the handing of the cab, boom walkway and associated equipment is to be determined.

1.3 Codes / Standards and Compliance

BS EN 13852-1, section 2 refers to the relevant codes specific with that code and will not be repeated in this document, Appendix 1 covers the additional specific codes relevant to the crane purchase.

1.4 Crane Requirements and Operating Conditions

1.4.1 General Descriptions

The crane shall be pedestal mounted and specifically designed for marine application and is to be located on the Rough 47/3B BD, a fixed offshore Installation.

The crane shall be powered by a diesel engine, fitted with such ancillaries as necessary to provide self-starting capability.

Each motion of the crane shall have fail-safe braking system and perform smoothly without shock or vibration from zero speed to full speed.

It is extremely important that the control system provides accurate control for “inching” operations, and that the settings are not subject to drifting or in need of continuous fine tuning. In particular, “load drop” shall not occur on the automatic release of the winch holding brakes.

Components shall be so designed that they may be readily assembled, inspected, adjusted, maintained and replaced.

Steelwork and other parts of the crane which may be adversely affected by harsh offshore environmental conditions shall be designed and constructed to eliminate inaccessible and moisture retaining pockets.

1.4.2 **General Operational Requirements**

The duties of the crane will typically include the following;

- (a) Offloading and backloading materials to and from supply vessels to support the production, life support and maintenance operations on the platform.
- (b) Deck Lifting to support platform operations on a day to day basis.
- (c) Well workovers.
- (d) Removing / replacing equipment from modules for maintenance.
- (d) Handling hoses for bulk materials.

1.4.3 **Crane Location**

The existing crane location can be seen on the supplied layout drawing in Appendix 4. The crane is to be fitted to the existing pedestal structure; pedestal drawings are contained in Appendix 3

The L.A.T. (lowest astronomical tide) from below the existing slewing is approximately 54m.

The MANUFACTURER shall specify his preferred and alternative points at which the boom can be supported in a boom rest. Additionally the MANUFACTURER shall specify any particular requirements for leaving the boom self supported by the crane itself, i.e. without external boom rests when the crane is parked. For rope luffing cranes it is expected that the boom would be supported by the boom hoist ropes only.

1.4.4 **Lifting Duties**

When lifting from supply vessels, the duties shall be factored to take account of dynamic forces due to supply vessel heave, hoist rope velocity, sideleads and offleads. Unless otherwise specified, the derived dynamic coefficients shall be calculated in accordance with EN 13852-1

Crane Capacity

Ongoing discussions around the pedestal capacity require to be completed to fully detail the new crane capacity. The pedestal structure is being modelled and structural assessment being carried out to API 2C 7th Edition.

Below is the best information available at time of completing the specification.

Existing Crane

Existing Maximum Working Radius (Aux Hoist):	40m
Existing Minimum Working Radius (Aux/ Main Hoist):	9.1m
Existing Maximum Working Radius (Main Hoist):	38.1m <u>New</u>

Crane

New Maximum Working Radius (Aux Hoist):	43m New
Minimum Working Radius (Aux/ Main Hoist):	8.0m

Kenz Comment: 8.0 m radius is only duable with the main hoist (7.3m) not with the Aux hoist. Aux hoist min radius is 8.2m.

Client response: Accepted

New Crane Optimum Lifting Capacity (Aux Hoist):	13Te New
Crane Optimum Lifting Capacity (Main Hoist):	56Te.

Pedestal Capacity

Total Crane Pedestal Reaction - with hoisting factor and additional pedestal design factor: (1.5)

Total Axial force:	1388.39 kN
Total radial force:	109.49 kN
Total Overturning moment:	18158.39 kNm
Total Torque:	1006.05 kNm

Kenz Comment: Pedestal reaction forces will be issued where the Axial force is slightly higher than required.

Client response: Accepted

A new version of document 0310_002 will be issued (rev A). The loads are being revised.

[See Action Log](#)

[Pedestal loads document 0310-002 has been revised to Rev C and is accepted by CSL. DNV-GL have carried out all the structural assessments based on Rev C.](#)

Total Crane Pedestal Reaction - with hoisting factor but excluding additional pedestal design factor:

Total Axial force:	1143.92 kN
Total radial force:	95.26 kN
Total Overturning moment:	12938.43 kNm

Total Torque:

764.03 kNm

A table of lifting duties for the existing crane is contained in Appendix 2. It is expected that a replacement crane as a minimum meets the existing crane duties. It is anticipated that the replacement crane will operate in single and 2 fall although if possible single fall only operation would be suitable.

The replacement crane load curves shall cover all rope configurations in all possible load conditions as per the existing load curves in Appendix 2.

It is desirable that the replacement crane should have a hoist rope speed of 120m/min in single fall. This is noted to be slightly above the BS EN 13852-1 2013 Part 1 requirements.

The boom speed is of significant importance as due to the supply vessel operations imposes constraints that the majority of supply vessel operations are carried out between 30-39m radii.

1.4.5 **Area Classification**

Boom Equipment:

All electrical equipment installed on the boom shall be suitable as a minimum for ATEX zone 2, Gas group IIA Temperature Class T3

Machinery House / Cab:

All electrical equipment installed in the machinery house / cab shall be suitable as a minimum for ATEX zone 2, Gas group IIA, Temperature Class T3

Equipment that is required to remain energised in an emergency e.g. emergency lighting shall be suitable for zone 1 operation.

Kenz Comment: With exception of the Diesel Engine.

CSL response: Accepted

1.3.6 Existing MK100 Crane General Arrangement

1.5 **CE Marking**

In accordance with the applicable Statutory Instruments, the MANUFACTURER shall provide the 'Technical file', the EC Declaration of Conformity and shall affix to the Crane the CE mark. The MANUFACTURER is responsible for maintaining the 'Technical File' for each item and retaining it for 10 years.

1.6 **Units of Measurement**

Units shall be in accordance with the 'Système International' (SI) form of units, unless otherwise stated.

1.7 **Order of Precedence**

The normal order of precedence of documentation specified (or not as the case may be) in this specification or associated requisition / data sheets

- Government Legislation / Statutory Regulations (as applicable)
- National / International Codes and Standards (whether referenced or not)
- Project Standards (Specifications / Drawings)
- Supplier Manufacturing Standards

In the event of any conflict or ambiguity between this specification, other related documents, National Standards, or any of the applicable codes and regulations, the MANUFACTURER shall inform the PURCHASER in writing and receive written clarification from the PURCHASER before proceeding with the work. The PURCHASER's decision shall prevail.

1.8 **Deviations**

Should the MANUFACTURER wish to deviate in any way from the requirements of this Specification and Standards referenced within, then a written application must be made to PURCHASER stating ALL exceptions and deviations. Where no deviations from this Specification are stated then it will be assumed that the equipment complies in full in all respects. Costs for any subsequent modifications necessary to comply in addition to those previously agreed with the PURCHASER shall be borne by SUPPLIER. These modifications shall be carried out without detriment to the schedule.

2.1 REPLACEMENT CRANE REQUIREMENTS

2.2 **General Project Requirements**

The basis of this specification is such that the crane shall be designed and supplied in accordance with this specification and the requirements of EN 13852-1.

Design and calculations shall be developed to guarantee component construction and system performance in accordance with this specification, drawings, standards and other PURCHASER supplied information including a failure mode assessment in accordance with Annex D of BS EN 13852-1.

2.2.1 **Certifying Authority**

The MANUFACTURER shall appoint an Independent Verification Body and/or a third party inspectorate to certify that the crane design, fabrication and testing meets the statutory requirements for the intended use, and the requirements of this standard. In such cases, the Manufacturer shall provide the necessary information and conduct the required tests to meet the requirements of the Independent Verification Body and third party inspectorate as applicable. Additionally, the Manufacturer shall ensure that the crane design is accepted by the Independent Verification Body for all specified operating duties.

Note: The Independent Verification Body and/or third party inspectorate shall be approved by the PURCHASER before contract award.

2.2.2 **Installation Requirements**

For installation purposes, the crane shall be capable of being installed in a modular fashion.

There are currently 2 options, which have yet to be confirmed

Option 1: Utilising existing platform cranes to remove and install new crane with assistance from a temporary crane.

Restriction for this method is that the maximum lift from the supply vessel should be approx. 25Te

DNV 2.7.1 or equivalent approved padeyes will be required for the modular lifts.

(Note; site survey has just taken place and temporary crane options being reviewed, therefore there may be potential to increase/ decrease this weight)

The MANUFACTURER shall supply drawings showing the quantity and estimated weights for the modular lifts along with the quotation.

Option 2: Utilising a heavy lift barge.

Each module or lift shall incorporate certified padeyes, which should be certified for lifting for each option and sling sets in order that they may be lifted to / from its pedestal in accordance with UKOOA Guideline for Safe Packing and Handling of Cargo to and from Offshore Installations.

2.3 **Technical Requirements**

These technical requirements are seen as the additional requirements to the Manufacturers standard build and should not be used as a minimum requirement.

2.3.1 **Boom**

Walkway:

It shall be possible to obtain access to the boom for the purposes of inspection / maintenance, access to lighting, sheaves, safety devices and lubrication points. This should be by means of full walkway complete with non slip grating with no requirement to come off a dedicated walkway. If required consideration to be given for remote greasing by means of a manifold and hard piping. Each grease line should be dedicated to a specific grease point and not to be shared.

A safety line shall be fitted to allow the attachment of a safety harness. This safety line shall run the entire length of the boom and it is preferential that no hooking/unhooking is required whilst walking the boom.

Electrics:

The boom electrics shall be fitted with electrical junction boxes located on the boom foot section or on the chassis near to the boom foot clevis, to allow connection between crane and boom cabling. The cabling must be located on the same side of the boom as the boom walkway. The boom electrical cables should be secured to the cable tray utilising S316 plastic coated cable ties.

Boom Connection Bolts

If the boom sections are to be connected using bolted flanges, all connecting fasteners are to be fitted with Type 1 Rotabolts.

Protection:

Suitably adequate protection, i.e. rubber fendering, shall be fitted to the underside of the boom head section to give protection against hook block impact. Also along the top of the boom to prevent damage from the ropes.

Hook storage facility may be considered on the boom for the main hoist when not in use.

Kenz Comment: Hook storage will be offered as an option.

Client response: Accepted

2.3.2 **'A' Frame**

The 'A' frame should be of a fixed design. Where a bolted flange design is proposed, the following shall apply:

- All 'A' frame fasteners should be fitted with Type 1 Rotabolts.

Kenz Comment: The A-frame is connected to the main frame by means of pins, not welded. Rotabolts are not used in the A-frame.

CSL response: Accepted.

2.3.3 **Chassis**

The chassis should incorporate interface points at suitably strong locations to allow connection of a jacking system for slew bearing maintenance.

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Kenz Comment: Jacking system is not part of the supply only jacking supports mounted on the mainframe.

Client response: Accepted

The interface points on the chassis must be positioned to accommodate removal of the slew bearing between the jacking columns taking into consideration the platform layout.

2.3.4 **Prime Mover**

The prime mover shall be a diesel engine, preferably Caterpillar brand, which shall be intermittently rated in accordance with ISO 3046 (BS 5514). The engine and associated transmission system shall comply with ATEX Directive 94/9/EC and be suitable for Zone 2 Gas group IIA Temperature Class T3.

The engine shall be sized and details given of any reductions in speed in the motions as the crane becomes more loaded

Engine shall have fuel pump priming system to purge air from injector lines if engine runs out of fuel.

Oil, fuel and air filters shall be readily accessible for changeout.

The engine sump, which shall incorporate an easy drain facility, shall be removable with the engine in position, to permit bottom end maintenance.

A mechanical hour meter shall be fitted in a readily accessible and readable position.

Comment KENZ: Mechanical hour counter will not be part of supply; hours can be read from EMC Instrument mentioned (a) up to (e) is capture in the diesel messenger display. Messenger display is located direct on engine and in driver's cabin RPM control is with fixed set point, and set point can be selected by RPM selector switch

- Idle speed @ example 800rpm
- Operation speed @ example 1750rpm
- High speed.@ example 2050rpm

Note: final RPM setting are displayed on the engine datasheet "Reason for fix set point RPM is to protect the hydraulic system to operate the crane on a too low RPM setting". The total running hours will be recorded in the EMC unit, and a download from the messenger display is possible via a data-link cable to a PC 27.08.15 - This needs to be clear in the OMM.

Client response: Please confirm how the hours will be recorded in the event of messenger display failure/ change out.

Response KENZ: In the event of messenger display / failure /change out the running hours will not be lost as they are stored in the EMC of the diesel engine itself.

Client response: **accepted**

Other instruments, which shall be mounted on a single panel adjacent to the engine and also in the operator's cabin shall include:

- (a) Water temperature gauge

- (b) Engine oil temperature gauge
- (c) Engine oil pressure gauge
- (d) Fuel pressure gauge
- (e) Tachometer

Audible and visual alarm which shall annunciate in the drivers cabin shall be provided for:

- (a) Low engine oil pressure
- (b) High engine oil pressure
- (c) High water temperature
- (d) Low Fuel Level
- (e) Low level water level
- (f) Low level engine oil

Comment KENZ: (a) up to (f) will be adopted in to the crane control system, alarms audio and visual will be display in the HMI

Client response: Accepted

An engine overspeed shutdown device “Rigsaver” shall be provided. When triggered, the device shall simultaneously shut off the fuel supply and the air supply at the inlet manifold and shall be annunciated in the driver’s cabin, together with an audible alarm. Resetting of the system shall be effected manually at the engine. The engine shall have a variable speed governor and be fitted with a full flow oil filter and dry type air filter. Suitable testing methods must be provided.

Comment KENZ: Fail safe rig saver will be installed with positioning switches for feedback to PLC /HMI. Reset of Rig saver is done by solenoid (not manual).

RPM control box is installed with pre RPM settings.

Client response: Accepted

Kenz note: Prime mover will be equipped with overspeed protection test facility.

The water jacket shall be fitted with temperature controlled heating elements, or alternatively, heating by thermo-syphonic action is acceptable.

All belt drives used on the engine shall be manufactured from anti-static fire resistant materials and guarded. The drives shall be designed to permit easy adjustment and change of belts without the need to remove and re-align mounting brackets or other elements in the drive system.

Where air blast hydraulic oil coolers are required, these shall be units separated from the radiator.

The engine cooling water radiator shall be fitted with easy fill and drain facilities and be located in an easy accessible area, fitted with an expanded metal protective guard. The radiator shall be constructed of materials resistant to offshore marine environment or suitably coated to resist corrosion.

A spark arrestor shall be fitted to the discharge end of the exhaust system. Spark arrestors shall normally be of the dry cyclone type and constructed from corrosion resistant materials. The spark arrestor proposed, shall have been type tested for effectiveness under the conditions of intended service. These tests shall have been witnessed by a third party inspectorate and copies of the test certificates shall be supplied to the PURCHASER.

Guards shall be provided around all accessibly exposed hot areas of the engine such

as turbo charger, exhaust manifold piping and silencer system. Environmentally exposed guards shall be manufactured in non-corrodible materials.

Note: Lagging is not permitted on any part of the engine or exhaust system.

Kenz Comment: Due to space constraints it is not possible to use save guards inside the machinery house. A mechanical barrier will be applied on the exhaust system of the diesel engine for protection of operators. The engine will be installed in the same way it will be tested at manufacturers dependances.

Special safeguards shall be taken to ensure that all ancillary equipment fitted to the engine, such as electrical junction boxes, heating elements, etc. do not serve as foot steps or are open to other inadvertent abuses.

A silencer shall be provided, manufactured in corrosion resistant materials and positioned as far as possible from the driver's compartment. Its location shall also ensure that the exhaust gases are directed away from the driver's cabin and that it does not compromise routine maintenance or inspection activities in or above the machinery house.

The Manufacturer shall provide written verification from the engine supplier that the prime mover is fully compatible with the environmental and operational requirements specified; reference should be made to ISO 8178. The verification should encompass acceptability of coupling drive, cyclical loadings and torsional vibration affects.

The prime mover is to be provided with fully detailed parts and maintenance manuals. This is also applicable to all ancillary components such as Zone 2 engine kits, radiators, starter systems, etc.

Fuel Tank

The fuel tank should be considered for location be located below the level of the engines crankshaft centre line and shall have a capacity for at least 12 hours operation with the engine running continuously at maximum rated power.

Comment KENZ: 12 hours of normal crane operation. It's impossible to operate a crane for 12 hours at max diesel rated power.

Client response: It is understood that the crane prime mover/ pumps/ max load would not be possible for 12hrs, however, please confirm that that tank is capable of 12hrs normal operation at full speed.

Response KENZ: The Fuel tank is sufficient for 12hrs normal operation at full speed.

Note: Fuel tanks located directly above the engine are not permissible.

A fuel level sight gauge shall be fitted to the tank and local to the 'fill' point – fuel level measurement by dipstick is not permitted. Additionally, a level indication shall be provided in the driver's compartment. The tank should be manufactured from type 316 stainless steel plate, with a minimum thickness of 5mm.

The tank shall be provided with a Bowser type fill point and a suitably type 316 stainless steel piped to the crane access ladder at which point it shall have a ball valve and quick connect coupling whereby it can be connected to the platform fuel supply line. This alleviates the requirement to manually pull a fuel delivery hose up the crane each time fuel filling is required A proximity switch or interlock shall be provided to prevent the crane being started during tank filling.

Kenz Comment: Filling point for the fuel tank will be an external 1" hard-piped filling connection, down to slew bearing level, with a valve at the tank filling point. The return fuel running to the engine back to the tank will be cooled.

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CSL comment: Accepted.

A manually operated valve (lockable open) for fuel shut off shall be provided between the diesel fuel tank and the engine fuel pump.

Starting Systems

The MANUFACTURER shall offer a suitable starting system for the specified zone , i.e. hydraulic, or air. The starting system shall provide sufficient capacity to permit six starts of the engine under normal conditions of use. The duration of start shall be that recommended by the engine Manufacturer. Full details of the proposed system should be included with the bid.

Where a hydraulic starter system is proposed by the Manufacturer it should contain the following:

- Unit shall automatically recharge the start system accumulator to full pressure while running.
- Hand charging pump handle shall be removable and be bracket mounted if not in use.
- In addition electrical driven hydraulic pump, shall be installed on the crane to recharge the accumulator.

Note: Start motor will be equipped with RPM setting of 400 as a maximum, to prevent overspeed of the motor.

Air

Air receiver(s) to PD 5500 shall be provided of sufficient capacity to permit six starts of the engine under normal conditions of use. The duration of start shall be that recommended by the engine Manufacturer.

The air receiver(s) shall be fitted with suitable auto and manual drain cocks, relief valves, anti-leak check valves, pressure gauges with isolating cocks, and with means of coupling a hose for an emergency air supply.

The MANUFACTURER shall determine the size and set pressure of the air receiver relief valve(s), which shall not be greater than the maximum allowable working pressure and not less than 1 bar above compressor rated pressure.

Primary air supply to the air receiver(s) shall be from the cranes own engine driven compressor – preferably gear driven and rated to meet all air demand requirements of the crane.

Additionally, means shall be provided for coupling an emergency air supply to the air receiver(s), by hose direct from the platform.

All piping and fittings associated with the air system shall be provided in corrosion resistant materials.

The Manufacturer shall ensure that the quality of air is compatible with all user elements in the system.

2.3.5 **Power Transmission**

Power transmission from the prime mover to the pumps shall be by means of a splitter gearbox. The rating of the gearbox will be consistent with the power output of the prime mover, and the power requirement of the pumps.

Gearboxes used in the transmission system shall be designed to permit insitu maintenance of the enclosed components such as gears, brakes, bearings, seals, etc.

All drain plugs shall incorporate a magnetic element.

Spline shaft drives shall be oil flood lubricated.

Gearboxes which employ pressurised lubrication systems shall be provided with local pressure gauges, and loss of pressure shall be annunciated in the driver's cabin.

Splitter gearboxes shall be fitted with a means of cooling if the gearbox temperature is found to be within 10 degrees of the oil or gearbox Manufacturer's maximum specification. Included in the documentation shall be a drawing stating the specific points the temperature reading was taken for future monitoring purposes.

Kenz will supply a separate cooling system for the splitter gearbox.

All rotating machinery shall be guarded. Cardan shaft drives are preferred between prime mover and pump splitter gearbox if they are separate items.

2.3.6 **Hydraulic Transmission**

2.2.6.1 **Hydraulic Design**

The power to each crane motion shall be transmitted hydraulically.

A closed loop system is preferred; however, if open loop is proposed it would require to be reviewed on an individual basis. The MANUFACTURER shall state which type of system is proposed as part of the tender package and provide any details if an open loop system is employed.

The hydraulic system should be as simple as possible, to minimise maintenance and increase reliability without adversely affecting the control or failure modes of the crane.

The total power demand by the hydraulic transmission at any one instant shall not exceed the power capacity of the prime mover. The MANUFACTURER shall specify at bid stage the power limitation of the proposed system.

On a closed loop system there should be only one main pump and one removable booster pump to fulfil each hydraulic function.

Comment KENZ: Crane is provided with one booster pump for the whole hydraulic system not for each hydraulic function.

Client response: Understood, Client to review.

Kenz will inform CSL on old/new hydraulic pump configuration.

See Action Log Item 5

The hydraulic system shall be designed such that the prime mover cannot be run in reverse.

The hydraulic system shall be designed such that any failure in hydraulic pressure due

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to system leakage or other reason leaves the crane in a safe condition whatever load is on the hook.

Hydraulic filters, components, including winches, shall be surrounded by sealed drip pans with drains where practical. Any such drip pans shall not create a tripping hazard when installed.

Comment KENZ: Winch area will not be provided with drip pan. This is not possible due to routing of hydraulic hoses.

Client response: Understood, Client to review.

CSL comment: Accepted

Isolation valves shall be provided in the suction lines to each pump. These shall be capable of being locked in the fully open position. All other components shall be provided with suitable break flanges/couplings for maintenance purposes.

Full details of the hydraulic equipment original Manufacturer's identification shall be included as part of the manufacturing data book.

Comment KENZ: All hydraulic equipment is supplied with standard ID KENZ tag. Hydraulic piping is not tagged.

CSL comment: Accepted.

Lock off valves should be included for stall testing.

2.2.6.2 Hydraulic Tank

The hydraulic tank should be constructed of type 316 stainless steel.

The position of the tank should be such that a positive suction head is maintained for the hydraulic pumps.

All gravity outlet points on the hydraulic tank shall be fitted with lockable open isolation valves and be fitted with proximity switches to prevent inadvertent starting if the valves are closed.

Check valves shall be installed in the hydraulic return lines.

Means of filling the tank either by airlift pump or hand pump shall be provided. Fill points shall be not less than 60mm (2.375") diameter or equivalent area, and drain points shall not be less than 25mm (1.0") diameter. All drain plugs shall incorporate a magnetic element.

Comment KENZ: Special filling point will be supplied within the hydraulic system including 3µm filter.

A filter should be fitted to the hydraulic tank filling line to ensure adequate filtration when replacing the hydraulic oil. The fill line shall be supplied complete with quick connect male and female couplings.

Hydraulic oil level indicators shall be provided, both on the tank and in the driver's compartment. A low level alarm together with a high temperature alarm shall give visual warning to the driver.

The tank should be designed so that the ingress of dirt or moisture is prevented.

A thermostatically controlled immersion heater shall be installed in the tank.

Provision shall be made for isolating the tank from the hydraulic system to enable maintenance to be carried out on system components, e.g. pumps and filters.

Provision shall be made for easy removal of any internal filters or strainers.

The tank should include an access panel for inspection and cleaning.

The tank should have internal baffles to separate the fluid return from the pump suction outlets. The pump suction outlets shall be towards the top end of the sloped tank and the return line towards the bottom end. The return line should be fitted with a diffuser.

2.2.6.3 Filtration

Suitable filtration should be provided such that a system cleanliness is maintained which is in accordance with system component requirements.

The PURCHASER'S full flow filtration systems requirements are as follows:

- 100 mesh field replaceable strainers on suction side of pumps.
- 10 micron field replaceable elements for overall hydraulic system and pilot circuit.
- Filters mounted externally to hydraulic tank.
- Built-in differential pressure indicators across each filter set.

Filtration should also be in line with the following:

- Return line filter going into tank.
- Case drain filtration for all circuits.

The level of contamination that the system is designed to operate at should be stated by the MANUFACTURER. Suitable points should be made available for sampling and pressure testing.

An offline filtration system is to also be integrated to provide continuous contamination control to ensure more "dirt" capture and retention is achieved independent of crane operation. This is to be supplied as an option in the pricing.

Comment KENZ: Hydraulic system will be delivered against ISO 4406 with cleanliness 17/15/13.

2.2.6.4 Piping

Hard piping should be used wherever possible on equipment skids and should be 316 stainless steel. Pipework to be seamless were applicable. Couplings should also be of a corrosion resistant material. All fittings shall be DIN metric threads and suitable for the appropriate pressures. Piping shall be compliant with The Pressure Equipment Regulations 2002 No.1267

*Comment KENZ: Piping is formed by wall form (KENZ standard for piping)
Client response: Understood.*

Flexible hoses should be used wherever possible on runs between equipment not mounted on a common skid base.

Pipework shall be laid out in a neat manner, adequately supported to prevent vibration and shall not cause undue obstruction to items of machinery being serviced or removed. Pipes should be suitably sized to ensure they can easily be removed.

All piping and all hydraulic components other than fittings shall be clearly numbered

with stainless steel tags attached with stainless steel wire and with matching identification on the circuit diagram and piping drawings. All components shall be tagged with appropriate tag numbers submitted by the PURCHASER.

Comment KENZ: KENZ standard ID plates are applicable. Hoses and PIPING plastic numbers on plastic sleeve with ID number. Components will be marked with plastic engraved plates which is secured by stainless steel wire to component

Client response: Example of this to be viewed if purchase goes ahead.

Pressure test certificates shall be required for all flexible hoses and hard piping.

All hydraulic hoses and hard piping shall be tested to 1.5 times the maximum design pressure, and cleaned in accordance with SAE AS 4059D Class 5, ISO 15/12 or Nas class 1638 Level 6 prior to installation, MANUFACTURER to confirm if this is required.

Comment KENZ: Hydraulic system will be delivered against ISO 4406 with cleanliness 17/15/13. Hydraulic record will be issued from filling until delivery.

The number of fittings should be minimised to reduce the possible leak paths.

The PURCHASER'S hydraulic hose criteria is:

1. Hydraulic hoses shall:

- a) Be heavy duty type.
- b) Have a safety factor in excess of 4 to 1.

Comment KENZ: All hydraulic hoses are from the brand AEROQUIP, not all hydraulic hoses in the system can comply with 4 to 1.

Client response: Accepted.

- c) Be protected against chaffing and other mechanical damage.
- d) Have steel wire braid internal reinforcement.
- e) Be tagged and detailed accordingly on a hose register to be supplied with crane Hose register to be submitted to purchaser for review and acceptance
- f) Be clamped and laid out in a tidy manner where possible

2. High pressure lines shall:

- a) Have minimum working pressure equal to or greater than the maximum operating pressure.
- b) Be furnished with permanent type, machine swaged fittings and shall be DIN female swivels.
- c) Not have pipe threads.

3. Low pressure lines shall:

- a) Have a minimum working pressure of 500 psig.
Kenz comment: Minimum pressure for testing piping will be not less than 33 barg.
CSL comment: Accepted.
- b) Be fitted with double acting bolted fittings.
- c) Have hose ends, cadmium or zinc plated steel.
- d) Be marked at both ends with permanent identification tags.

2.2.6.5 Hydraulic Cooler

A hydraulic cooler should be provided and shall be sized considering the minimum and

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maximum design temperatures.

It shall be of robust construction and suitable for the external offshore environment.

2.2.7 **Control System**

It is anticipated that all crane motions would be controlled using a hydraulic based system. Controls using other operating agents such as an Electrical/ PLC may be submitted for review. Any Electrical/ PLC systems shall be accessible at various levels of access for fault finding and maintenance purposes without the requirement of Manufacturer assistance.

CSL to confirm by end of week 02, 2016 which system is to be used: either fully hydraulic control system or electric controls.

Kenz to confirm that PLC system will be SIL 2 certified and where applicable deviations will be send to CSL for final confirmation.

[See Action Log](#)

[Comment Kenz: PLC system is SIL2 confirmed](#)

So the suggested design change to increase operational safety and maintain compliancy with the standard, is to install electrical joysticks to control the crane.

All PLC and safety systems should be assessed as per BS EN 62061 and where applicable the minimum requirement should be SIL 2. (Reference also to be made to BS EN 61508 1-7) Where the compliance with SIL may affect the process for any testing, a facility should be made available within the system for testing as may be required on a monthly, 3 monthly, 6 monthly and yearly routines.

The control system shall be capable of providing fully modulating control to all three crane functions simultaneously.

Kenz comments: The three crane functions will be simultaneously available at reduced speed, fully in accordance to EN 13852-1: 2013. Power management system will be provided by Kenz PLC in accordance with EN 13852-1.

The system offered must provide smooth, progressive control with good response and automatically apply and release the motion brakes.

It is extremely important that the control system provides accurate control for “inching” operations, e.g. for wire lining work, and that the settings are not subject to drift or in need of continuous fine tuning. In particular, load drop shall not occur on the automatic release of the winch holding brakes.

To achieve satisfactory sensitivity to fine control movements it may be necessary to use a non-linear control characteristic. A controller ramp up/down time should be implemented to ensure smooth crane controls while assuring additional loading on the crane is kept to a minimum. It is acknowledged that EN 13852-1 specifies a response time of 2 seconds for the hoist to full speed, however, it is recommended that there is due consideration given to the system design to prevent a “deadband” area in the control system within the specified 2 second duration.

The MANUFACTURER should propose a suitable time for approval by the PURCHASER.

When the motion controllers are returned to neutral the brakes should apply automatically. The system should be set up to ensure that when the brakes are released the load cannot momentarily lower or fall.

Electronic over hydraulic control systems shall function independently of main platform supplies and stabilised voltages should be used. The MANUFACTURER should submit details on how this would be achieved.

Comment KENZ: With a battery backup system and engine alternator

Client response: Accepted.

The system should be kept as simple as possible for ease of maintenance and fault finding and to enhance reliability.

The electrical equipment used must be suitable for the appropriate zone requirements.

2.2.8 **Winches**

2.2.8.1 **Drum Design (Hoists and Luff)**

The crane shall be equipped with a single hoist drum arrangement to allow the crane to be reeved in single or multi fall and achieve the specified duties. It is preferred if the crane duties are covered using single fall duties only to save the requirement to reeve crane.

Kenz Comment: For the luffing winch, an arrangement including one drum with two wire ropes is used (1x RHS and 1x LHS). CSL comment: Accepted.

The ratio between the drum diameter and the rope diameter (rope centre basis) shall not be less than 20:1.

Drums shall incorporate Lebus or Lebus type grooving. A maximum of three layers shall be wound on the drum unless it can be shown that provisions to ensure good spooling and to minimise wear have been taken. Any such provisions shall be subject to approval by the PURCHASER.

Comment KENZ: Both Main hoist and Luffing winch will have 4 layers spooled on Lebus type grooving.

Client response: Accepted as per manufacturer requirement.

Rope shall be anchored outside the drum flanges.

Where nuts, bolts, screws, etc. are used for fixing the wire ropes, the prescribed torque shall be durably and clearly marked in the immediate vicinity.

Drum rotation indicators shall be provided, such that the crane operator is continuously informed of direction and speed of the hoist drum rotation.

The hoist and luff drums should be fitted with slack rope preventers.

Kenz Comment: Kenz uses a slack rope detection system (reactive), not a slack rope prevention system (proactive).

CSL comment: If slack rope is detected, the lifting action must be stopped after 5 seconds maximum under continuous detection (SLI system, encoder feed-back system).

2.2.8.2 **Winch Brakes (Hoists and Luff)**

Open gears shall not be used except for the final slew pinion drive to slewing

The Manufacturer shall provide independent full dynamic capacity secondary braking on the Non Drive End of the main and boom winch assemblies, directly on the winch drum. Fully enclosed brakes are preferred.

Comment KENZ: Both Main hoist and Luffing winch are provided with full dynamic capacity secondary brakes (included). Secondary brakes on aux hoist will be offered as an option. Is there a need for manriding?

Client response: Yes manriding is required as is the aux hoist secondary brake.

Response Kenz: Full size independent secondary brakes will be mounted on all winches

Fully detailed procedures are to be included in the maintenance manual for carrying out hydraulic and mechanical stall tests on all the winch brakes.

In the event of a platform power failure or engine failure, means of lowering the hook

and boom and also safely slewing the crane in a controlled manner shall be provided. Such a facility shall be suitably positioned to permit quick execution while affording the operator full view of the load line at all times. This device shall not be readily accessible by the driver under normal crane operating conditions. This must conform with EOS (emergency operation system) as detailed in EN13852-1 2013

2.2.8.3 Winch Speeds (Hoists and Luff)

The load hoist winch shall be capable of achieving the minimum speed to prevent re- impact of the load in a sea state as defined by EN13852-1 for ALL rated loads and ALL reeving configurations based.

In single line operation the hoisting speed shall be based on the minimum line speed for 6mtr SWH as stated in EN13852-1 (This calculates as 100m/min, however, it is

desirable that the replacement crane should have a minimum hoist rope speed of at least 120m/min with the rope reeved in single fall.

2.2.9 Slew Drive

The slew drives shall be capable of slewing the crane such that the hook can follow the deck motion of the supply boat deck at all rated lift conditions with half of maximum out reach and beyond.

Typically the slew machinery should be capable of rotating the crane at an average speed between 0.75 rev/min and 1.5 rev/min when measured over one complete revolution. It shall be capable of achieving a speed equivalent to this for any part of the revolution when considering the following simultaneously:

Comment KENZ: Slewing speed is according EN13852

Client response: Accepted.

- (a) Maximum load at maximum outreach.
- (b) Maximum wind speed effect on the side of both boom, boom appurtenances and load.
- (c) A crane out of true by 1° from

the

vertical.

Unless otherwise approved by the PURCHASER, the slew system shall feature twin (separated) drive units and final drive pinions. Each drive unit shall incorporate a 'fail safe' brake – preferably oil immersed disc type. Each slew drive unit and its brake shall be capable of driving and holding the crane independently for emergency recovery purposes at the design wind speeds and gradient of the slewing mounting.

Comment KENZ: The 3 slew drives are designed according EN13852 (1.3x operational brake force).

Client response: General comment in response - 3 slew drives should be considered for design to ensure smooth slewing

The slew braking system shall ensure that the braking forces are progressively applied in order to minimise the transmittal of shock loads to the cranes structure and to obviate any pendulum effect of the hook. Brakes shall be fully engaged with the load controller in neutral.

The MANUFACTURER shall advise the PURCHASER whether a torque limiting device, incorporated in the slew drive system is necessary for prevention of excessive side lead forces to the boom. If so, full details describing the device shall be included with the tender.

The slew system shall be fitted with encoders to allow slew sectors to be set up as required for any restricted areas.

The slew drive units shall have readily accessible oil, drains, oil level and grease lubrication points.

Fully detailed procedures are to be included in the maintenance manual for carrying out stall tests on the slew brakes.

2.2.10 **Slew Bearing and Fasteners**

2.2.10.1 **Slew Bearing**

The slewing shall be of ball or roller type and shall be suitable for continuous rotation.

The slewing will be such that failure of the primary load path elements does not result in the crane becoming detached at the slewing.

The slewing shall be designed in accordance with EN 13852-1 Annex E and

Annex H. The slewing shall be fully sealed and shall be provided with

readily accessible

lubrication points. The lubrication system shall be piped to a manifold where each

specific grease line can be used to grease each specific grease point. The gear race may be internally or externally cut. If cut internally, easy access to the gear race and pinion for lubrication shall be provided. If externally cut, the gear race and pinion shall be suitably guarded and shall be provided with a swing cover plate to permit easy lubrication.

Locations of the soft zones on each ring element shall be clearly marked

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on the slewing assembly.

Where the slew bearing is of triple row roller type, the Manufacturer shall supply a retention device which will retain the crane on its pedestal in the event of any cause of failure of the slewing.

Facilities shall be provided for insitu crack detection monitoring of the slew bearing raceways. In addition to this, the slew bearing shall be fitted with enhanced grease sampling facilities which will allow sampling of grease direct from the slew bearing raceways.

2.2.10.2 Slew Bearing Fasteners

The slewing fasteners shall be designed in accordance with EN 13852-1 Section 5.3.6 and Annex E4.

Through type mounting fasteners with fully rolled threads shall be fitted. Fastener threads shall not be subjected to bearing or shear forces.

The slew bearing fasteners should be fitted with Type II Rotabolts to permit an accurate load status check of each fastener after intervals of service.

Fasteners and nuts exposed to the environment shall be fully protected by grease filled rubberised slip over shrouds.

2.2.10.3 Slewing Mounting

Surfaces for mounting bolt heads, hard washers and nuts shall be machined square with the bolt holes and parallel with the slewing mounting faces. All bolts shall be readily accessible.

Means shall be provided to locate the slewing positively in relation to the crane machinery bed, and to ensure correct pitch line engagement of the final slew drive pinions with the gear race.

2.2.10.4 Alternatives

Alternative slewing arrangements may be proposed by the MANUFACTURER for consideration by the PURCHASER.

2.2.10.5 Jacking System (Optional)

The crane shall be supplied with an integral jacking system to allow the removal of the slewing.

Comment KENZ: This chapter is Not in Manufacturer scope. System is depending on platform landing area.

Client response: Understood.

The chassis shall be supplied with the suitable bracketry required for connection of the jacking system.

The jacking system, when in use must have suitable clearance to allow full removal of the slewing without removal of any of the jacking system components.

The jacking system shall be designed to take account of the C.O.G. location of the crane with the boom in the rest, along with the worst case wind loadings as specified in EN13852-1.

2.2.11 **Sheaves, Blocks and Hooks**

2.2.11.1 **Sheaves**

Sheaves shall have machined rope treads and shall run on fully sealed anti friction bearings. The treads shall have hardness qualities compatible with the rope as recommended by the rope Manufacturer.

The ratio of sheave diameter to rope diameter (rope centre basis) shall not be less than 19:1 for all sheaves, including the main hook block and sheaves used in conjunction with safe load indicators or other means of load sensing.

Sheaves shall be suitably arranged or guarded so that the rope cannot leave the sheave treads under any circumstances. The sheave guards, however, shall be designed to facilitate easy reeving of the hoist rope fitted with a thimble or a swaged eye termination. The rope fleet angle from sheaves shall not exceed 3°.

2.2.11.2 **Hooks**

The crane will be supplied with an overhaul ball (for the Aux hoist) and multi-fall hookblock (for the main hoist) to facilitate lifting 2/3/4 fall as applicable.

For the main hoist operation an overhaul ball with a BK type safety hook, BKD 26-8 shall be supplied which shall swivel on fully sealed anti friction bearings and be painted fluorescent orange.

Comment KENZ: Kenz will deliver a 4/2-fall Hook block for the main hoist and a single fall overhaul ball for the Aux. hoist, both acc. EN13852-1

For the main hoist (2/3/4 fall) will have a positive locking hook so it cannot inadvertently open during crane operations. All hook blocks shall be fitted with quick release rope guards to facilitate easy re-configuration of the main hoist reeving and be painted fluorescent orange.

All hook assemblies shall be proof load tested, the safe working load shall be clearly stamped and painted on the assembly.

Consideration shall be given for the permanent storage of the main hoist hookblock in a cradle on the boom whilst the auxiliary hoist is being utilised.

2.2.12 **Wire Ropes**

The wire ropes shall comply with section 5.3.10 of BS EN 13852-1. The sizes and construction of wire ropes shall take account of their ready availability internationally; specials or ropes of uncommon diameter and construction are not permitted.

For the load hoists, galvanised rope with low rotational properties and with a high resistance to both crushing and fatigue shall be supplied.

For the boom hoist system, the rope supplied shall be galvanised and shall be selected for high resistance to wear around sheaves, whilst maintaining high resistance to crushing due to multi layer spooling at the winch drum.

2.2.13 **Machinery House**

The machinery housing shall be manufactured from steel sheet not less than 3mm (0.118”) thick and be large enough to enable all routine and major maintenance work to be carried out in a hostile marine environment. If stitch welding is used, then a suitable fire-retardant sealant shall be applied to all seams after welding. Unless otherwise specified by the PURCHASER tail radius is not a limiting feature. Roof and other exposed surfaces shall be designed to be self-draining to prevent ‘standing’ water and ice pockets.

Sliding doors only shall be provided. All doors shall be fitted with heavy duty marine catches. Emergency man escape kick out panels shall be provided in all doors. There should be two access doors to the machinery house.

Comment KENZ: Machine house cannot be supplied with sliding doors this due to the A frame structure design, so heavy duty hinged doors will be designed

Client response: Understood – doors to be reviewed during build.

The underside of the machinery housing or bed shall be accessible for routine inspection and painting.

Kenz Comment: Due to the location and way of supporting the machinery house, its underside will not be accessible for routine inspection from the outside. **CSL comment:** CSL will review painting specification for this area.

See Action Log Item 8

The machinery housing shall feature ‘catch all’ collectors for gathering spent hydraulic oil, water or other fluids local to operating machinery. This shall have the capacity to contain the highest capacity of fluid contained in the machinery house, should a leak occur. The gathered fluids shall have the facility to be fully drained from the machinery

house. The ‘catch all’ system shall ensure that oil and oily water cannot spill down the machinery house sides. The system shall be storm drain sized where appropriate.

Side doors, roof or floor hatches shall be provided for the removal of the machinery items. These shall be served by the necessary MANUFACTURER supplied lifting points. They shall be fully weather tight. The equipment shall be laid out in a neat and orderly manner with the different utilities segregated where possible. The side panels shall be removable on both sides to ensure any major maintenance can be carried out inboard regardless of crane position.

Kenz Comment: The side panels of the machinery house are not removable. Though, all equipment installed into the machinery house can be removed in case of refurbishment.

Sufficient lifting points should be appropriately situated to allow any first line maintenance to any components heavier than 25kgs. Coverage should be provided for the complete machinery house area. All lifting points / runway beams are to be fully certified and stamped with the SWL.

Instrumentation shall be grouped into the various functions and be easily observed from the main access way.

Panel and cabinet doors shall open fully without completely obstructing the main access way.

Comment KENZ: Panel and cabinet doors can be opened fully but it will block the access way in the machinery house.

Client response: Due consideration to be applied during design to minimise obstruction

Pipework and cabling shall not lie across any access route. Either it shall be positioned under false floors or it shall be properly bridged to both protect it and minimise danger to personnel.

Equipment shall not be positioned to cause obstructions at head height.

Space shall be provided for one hand fire extinguisher of a type and size to be confirmed at order, adjacent to the main entrance door. There should also be sufficient space for the inclusion of a possible workbench or storage area for any tools which may be required.

Kenz comments: There is no room for a workbench in the machinery house as its dimensions are optimized for the present equipment. CSL comment: Accepted.

Automated louvres are to be fitted to the machinery house wall to allow a free intake of air over the engine. They should be activated upon operation of the crane.

Comment KENZ: Machinery house is not equipped with louvres. Diesel Engine cool unit is located on top machine house.

Client response: Accepted.

If a two level machinery house is proposed with the machinery on the upper deck and electrical equipment on the lower then the floor of the upper deck shall be fully plated or a drip tray fitted under the complete machinery train. It may be combined into the diesel engine drip tray if required.

2.2.14 **Drivers Cabin**

2.2.14.1 **General**

The drivers compartment shall be positioned forward of the machinery housing and to the "TO BE CONFIRMED" side of the boom (looking from rear of crane). The location

of the cab shall permit the driver full and clear lateral vision free from obstruction from the boom with the crane operating at maximum radius.

Comment KENZ: The drivers cabin is located at the left hand side of the crane.

Layout of the driver's compartment, including location and design of seat, controls, windows, instrument and other equipment, shall be to sound, recognised ergonomic principles and should be located in such a way that the personnel have means of safe escape. The free height inside the cabin shall not be less than 2m (6.56 ft).

The compartment shall provide adequate room for the crane operator and an assessor, with minimum cabin dimensions in accordance with European Standard EN 13852-1:2013

The compartment shall be a reinforced carbon steel, fully welded, construction manufactured from sheet steel not less than 3mm (0.118") thick and shall be supported on anti-vibration mountings. It shall be adequately braced to prevent swaying or vibration under the loads and conditions specified.

The exterior surfaces of the windows shall be accessible for cleaning, preferably from within the driver's compartment or via a walkway extended sufficiently along the side of the cab to allow access for easy cleaning of the windows without compromising the

operator's vision. This is also a requirement for access to the wipers for cleaning or replacement. The window frames/casements and all associated fittings shall be supplied in non-ferrous materials (not aluminium). Unless otherwise specified by the PURCHASER, windows shall be configured as follows:

- (i) Main forward window – fixed single piece glass fitted with protection bars which shall give minimum obstruction to the operators view.
- (ii) Roof window – fixed single piece glass fitted with adjustable sunblind/screen to give aerial vision of the load at minimum radius and to have suitable protective grill to give protection to the operator against falling objects.
- (iii) Forward floor window – If fitted, it should be protected by a grating arranged not to obstruct a free view to the operation area.
- (iv) Side window – top hinged, outward opening (adjustable) or alternatively, window may be fixed provided adjustable stainless steel ventilators are fitted.

Comment KENZ: Cabin is provided with a ventilator mounted in the cabin structure not in a window.

Client response: Accepted.

Kenz comments: The cabin will also be provided with ventilation openings.

The cabin windows shall be fitted with non-reflective adjustable sunblind's on all windows.

Comment KENZ: Window glass is secured in rubbers with stainless steel guards.

Client response: Accepted (Windows require to retain the forces as per EN 13852/ EN 13557).

The cab shall be fitted with an air conditioning unit suitable for the correct zoning requirements. It shall also provide efficient, controllable demisting and de-icing for the front, top and two major side windows. The system shall be capable of maintaining an inside temperature of 15-25°C whilst the crane is in use.

Kenz Comment: Air conditioning unit will be located at Main Frame level, at the external side of the cabin. Air conditioning unit of the Daiken EX type, with steel cover.

CSL comment: Accepted.

When not in use, heaters shall be provided to maintain a constant temperature of not less than 18°C and no more than 30°C

Space shall be provided for storage of a radio communication pack, public address speakers, life jacket and fire extinguisher supplied free issue by the PURCHASER.

Entry to the driver's compartment shall be through a door which shall be fitted with heavy duty marine catches and when closed, shall be weatherproof. It shall be provided with insulation sufficient to maintain the specified temperatures and noise levels. A kick out panel shall be provided in the door for emergency man escape.

All materials associated with the driver's compartment shall be fire retardant and shall not produce toxic gases when heated.

2.2.14.2 Access and Egress

Safe access and egress shall be provided to all parts of the crane for routine

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operations, routine inspection and maintenance and for the changeout of major equipment. Specifically, engine house shall be soundproof, weatherproof and shall provide a minimum of 750mm clearance around 3 sides of the engine.

Comment KENZ: Inside machine house min of 750 mm clearance cannot be fulfilled due to EX zone II C18 Cat engine.

Client response: Please confirm minimum clearance.

Response Kenz: The clearance changes depending on location around the engine from 520 mm to 1650 mm.

Trap doors shall not be used.

All flat access ways and areas shall be coated with non-slip paint or be of open serrated edge grill mesh, chequered plate is not permissible. Access ways shall be enclosed by steel handrails incorporating self-closing and latching gates.

Access ways shall be arranged so that exit or entry can be made with the crane in any position.

Provisions shall be made for the use of a safety harness along the crane boom for routine inspection and maintenance surveys.

2.2.14.3 Noise and Vibration

The noise levels shall be in accordance with EN13852-1

2.2.15 Electrical and Instrumentation

Scope

This section covers the electrical and instrument requirements for pedestal cranes.

All components and cabling shall be tagged with appropriate tag numbers submitted by the PURCHASER.

All equipment being referred to in specification requires the meet the following specification:

Boom Equipment:

All electrical equipment installed on the boom shall be suitable as a minimum for ATEX zone 2, Gas group IIA, Temperature Class T3

Machinery House / Cab:

All electrical equipment installed in the machinery house / cab shall be suitable as a minimum for ATEX zone 2, Gas group IIA, Temperature Class T3

Equipment that is required to remain energised in an emergency e.g emergency lighting shall be suitable for zone1 Gas group IIA, Temperature Class T3

ATEX inspection to be carried out by 3rd party as nominated or agreed with the PURCHASER.

Comment KENZ: Direct cost for 3rd party ATEX inspection will be paid by Purchaser.

Client response: Accepted.

Comment KENZ: Only Lighting with emergency battery backup will be suitable for zone 1 operation, all other electric equipment Gas group IIA, Temperature Class T3.

CSL to confirm ESD Philosophy in relation to the Kenz cranes.

See Action Log

Crane to be shutdown on ESD Level 6 only

General Requirements

Safety

For equipment deemed to be in a hazardous area the design and installation of electrical fittings, components and wiring shall comply with BS EN 60079-14 Code of Practice for Selection, Installation and Maintenance of Electrical Apparatus for Use in Potentially Explosive Atmospheres and BS EN 13852-1 Annex O Equipment for Use in a Hazardous Area.

All PLC and safety systems should be assessed as per BS EN 62061 and where applicable the minimum requirement should be SIL 2. (References also to BS EN 61508 1-7) Where the compliance with SIL may affect the process for any testing, a facility should be made available within the system for testing as may be required on a monthly, 3 monthly, 6 monthly and yearly routines.

Comment KENZ: Only possible with Kenz SLI not with Mipeg. SIL 2 limited to only PLC and electrical safety systems.

Client response: Accepted - Mipeg system is not suitable to meet specification Please confirm accuracy % for the Kenz system.

Response Kenz: Accuracy of Kenz SLI system is +/- 1.5%

Comment KENZ: Sil-2 is only required for the emergency stop circuit according to EN 13852-1:2013. SIL 2 is applicable to any safety related system and components, like SLI, emergency system, AOPS, MOPS.

Cabling

The MANUFACTURER shall supply and install all the electric cabling for connection of the various components within the crane.

Wiring and cables on the crane shall be EPR (ethylene propylene rubber) insulated, GSWB (galvanised steel wire braid) armour and HOFR (heat resisting, oil resisting and flame retardant) electrometric oversheath to BS 6883.

Cables shall be of the low smoke type and halogen free in accordance with BS EN 61034-2 and BS EN 60754-1:2014 respectively.

The minimum size of wiring conductors for lighting and power shall be 1.5mm² cross sectional area and have at least seven strands.

Comment KENZ: Internal wiring inside EX boxes will be min 0.70mm depending on loading

Client response: Accepted providing all engineering calculations have been carried out during design.

Cables shall be identified at each end, applying the cable number marked on the approved interconnection diagrams, with plastic cable markers. Cores of all cables are to be ferruled and numbered at each end in accordance with the approved wiring diagrams.

Conductor ends shall be fitted with crimped termination devices with insulated shanks.

Flameproof glands shall be used for all cable terminations on the boom.

Comment KENZ: For glands, HAWKE 501/453 and 421 series will be used.

CSL comments: CSL will come back on this by the end of week 02, 2016.

See Action Log

Client response: Accepted

Internal cabling should be supported using heavy duty stainless steel cable tray. External cabling shall be supported using heavy duty stainless steel cable tray.

Comment KENZ: Cable supports are integrated into machine house structure /main frame structure and boom structure The cabling supports are standard made of carbon steel which will be painted according crane paint specifications. Additional support if needed will be standard made of heavy duty galvanized cable tray (Brand is Ogland system). Additional supports cable trays in heavy duty stainless steel can be offered as an option. Internal and external cable trays in Stainless steel will be offered as option

Client response: Cable tray to be utilised.

CSL comment: CSL will indicate if stainless steel is preferred, end of week 02, 2016.

See Action Log

Client Response: Stainless steel tray to be used

Cables shall be strapped to tray work using insulated stainless steel cable ties.

Comment KENZ: When crane is shipped in modules, insulated stainless steel cable ties will be installed offshore.

Client response: Accepted that cable ties will be supplied by the manufacture for final build.

Power cables shall be suitably segregated from instrumentation cables to prevent electromagnetic interference.

Comment KENZ: Where possible. This is not always possible in tight areas.

Client response: This requires to be accepted by the manufacturer that any issues that may occur due to interference will be subject to manufacturer to complete the remedial works.

Response Kenz: Any issues that may occur due to interference will be solved by manufacturer.

Circuits and terminals operating at different voltage levels and/or performing different functions shall be segregated by an insulation barrier. Intrinsically safe circuits must be completely segregated and clearly identified.

Earthing

All enclosures and electrical equipment shall be bonded together to form a continuous low impedance path to earth via the earthing circuit of the collector column.

At least two brass M12 earthing bosses shall be provided on the crane pedestal for connections to the platform earthing system. A slip ring earth or other suitable means will be provided, rated for the maximum prospective fault level and lightning strike.

Comment KENZ: To withstand a lightning strike is not 100% possible. Earthing is capable of withstand the maximum fault level. Surge protection devices will be used to protect the electrical system.

Comment KENZ: Earthing bosses are not made of brass, but carbon steel. CSL comment: CSL will come back on this issue, end

of week 02, 2016. See Action Log
Accepted in principle, example of typical arrangement issued by
KENZ

Earthing points shall be protected against corrosion and designed to ensure that effective electrical and mechanical connections can be made.

All I.S. (Intrinsically Safe) equipment shall be connected to form a continuous earthing circuit which shall be completely separate from the platform earth. The PURCHASER shall be responsible for providing a 'clean' earth (if not already there) to the crane.

Electrical Equipment

General

The power supply to the existing crane is 240V Single Phase 30A. The power requirements required for replacement crane should be advised by the MANUFACTURER.

Platform 3 phase supply is 415V
(50Hz)

An Uninterrupted Power Supply (UPS) system should be provided on the crane to allow the crane operations to continue in the event of the loss of the platform power. In particular the UPS should be of a suitable rating to supply suitable power to allow the crane to be operated normally for a period of 30 minutes.

UPS will be isolated in the event of an ESD Shutdown

It shall be the responsibility of the MANUFACTURER to transform and distribute the power as required. The MANUFACTURER shall state in his bid the maximum full load current required for continuous operation or any intermittent operation where higher.

Collector Column

The MANUFACTURER shall provide a collector column unit for electrical supplies and communication circuits. The collector column shall be mounted in a readily accessible location to permit easy access for maintenance of the brush and ring gear.

The collector column shall be suited to full refurbishment in position or alternatively have a means of removal from the crane in event of failure.

The rings shall be rated to carry continuously 110% of the maximum indicated loads. The MANUFACTURER shall state in his bid the total number of rings, including spares, together with ratings.

Rings may be required to tie-in with the following services, Fire & Gas, PA, ESD, Radio and Alarms to be agreed/ confirmed by the PURCHASER.

Adequate segregation between differing voltages shall be provided. Adequate segregation shall be required between the platform earth and IS earth.

All incoming / outgoing circuits shall have suitable padlocking facilities in the open/ closed position.

Collector column (slip ring arrangement) confirmed as zone 1

Camera

A camera is to be fitted to the boom tip to allow clear vision of the load and hook (for both hoists). It shall comply with specific zoning of the boom and be mounted to gain easy access for necessary maintenance. It shall be free-swinging allowing a constant view of the load and / or hook regardless of radius.

The monitor shall be mounted in the cab within the peripheral vision of the operator. It should be protected from glare from the sun and the controls reachable from the operator's chair.

The system shall be capable of zooming in on its target and capable of operating clearly during night time or occasions when light is poor.

The preferred system would be from ORLACO and would have a recording facility to record around 2 days of lifting activity before over writing the hard disk.

Comment KENZ: Recordable can be offered as an option since this is not standard

Client response: Understood.

CSL comment: CSL will like to take the option of recordable system, end of week 02, 2016. To be re-checked against PO.

See Action Log

Existing PO included in this option

Aircraft Warning Lights

The crane shall be equipped with Aircraft warning lights on the boom every 10 meters and one on tip and also another on top of the 'A' frame / gantry apex with an illuminated windsock. The 'A' Frame aircraft warning light should be accessible without the requirement for scaffolding or ladder access. Each light shall provide the maximum arc of illumination possible. The preferred type of Navigation Lights would be Orga L85ex-R-254VAC type if suitable voltages are available.

Floodlights

Floodlights shall be ATEX category 3 (Zone 2) certified and provided to ensure adequate illumination of the platform deck working area and the suspended load at all boom positions. The floodlights shall provide sufficient lighting to allow for night-time operations.

The floodlights should be from the Chalmit Evolution 2 range (Latest LED technology to be reviewed and quoted) and be of high pressure sodium 400W type. Floodlights along the boom should be provided with dampened swinging jib brackets to allow optimum illumination, with safety chains being provided to tether the units to a fixed point on the boom. Junction boxes should also be fitted local to each floodlight to ensure simple isolations.

Comment KENZ: Chalmit Arran Ex n LED Floodlight 125kW will be offered.

Client response: Accepted.

All the luminaries shall be switched from the driver's cabin.

All the floodlights shall be located so as to be easily accessible for maintenance. Hinged floodlight brackets to allow them to be accessed may be quoted as an OPTION.

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General Lighting

General lighting shall be arranged to provide suitable luminance on all walkways and platforms.

Emergency Lighting

Emergency lighting shall be provided to illuminate the crane operators escape route, drivers cab, walkways and access ladders in the event of a normal supply failure.

These shall be 2 x 18W units with integral charger and battery pack sufficient for 90 minutes duration.

Where suitable, all lighting shall be fitted with Chalmit Protecta type 18W light fittings which are compatible with the BD platform stock.

Lighting and a switch shall be provided in the pedestal which will be fed from the platform power supplies to aid maintenance below the sliping when crane power isolation is required.

Comment KENZ: The pedestal adapter is only 1 metre height, so no lighting will be provided for it. The lighting provided inside the Main Frame (with battery back-up) is sufficient for the 1 meter pedestal height agreed.

CSL comment: this shall be revised should the pedestal adapter height be changed.
Pedestal adapter confirmed at 1m

Fire and Gas Panel

Heat, smoke and oil mist detection detectors shall be fitted in the machinery room of the crane. These detectors will be wired to a local panel within the operator's cabin which will provide the crane operator with a visual and audible alarm in the event of either of the detectors being tripped. There shall be the facility within the fire and gas panel to send one signal signal back to the platform control room in the event of any sensors being activated.

Instrumentation

General Requirements

Instrumentation in the drivers cab shall be suitably illuminated during night operation. Cabin instruments shall be fitted with non-reflective glass and be legible in strong sunlight.

All equipment shall be suitable for operation in the climatic conditions specified in this specification. Controls shall be clearly labelled, preferably with stainless steel labels, to show their respective functions.

The following controls shall be supplied as a minimum:

a) Controls – All in Driver

Compartment

Engine Start Key

Comment KENZ: Diesel to be started by foot pedal in machinery house

Client response: Accepted.

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CSL comment: Diesel engine start still to be initiated by turning the key in the cabin (to take the key out, the engine need to be stopped).

Kenz response: Confirmed.

Engine Stop
 Button Engine
 Speed Control
 Hoist Controller –
 RH
 Boom Hoist Controller)
 Combined LH
 Slew Controller)
 Windscreen Wipers and Washers
 Heating, Ventilating and Demisting Switches
 Lighting Switches
 Emergency Stop Button
 Boom Lower Override Selector - RH (No Load
 On Hook) Horn Button Warning
 Emergency Hoist Brake Release (for controlled lowering of hook load in event of
 prime mover or hydraulic system failure)
 Emergency Luff Brake Release (for controlled luffing in event of prime mover or
 hydraulic system failure)
 Emergency Load Release Button

The following indicators should be supplied (where applicable):

b) Indicators (Key: + in drivers compartment, \$ locally)

- + Safe Load Indication (refer also to 2.2.15.8)
- +/ \$ 316 Stainless Steel Radius Indicator (Mechanical) – visible in or from drivers compartment
- + Wind Speed Indicator
- + Hydraulic Oil Level Indicator
- + Fuel Level Gauge
- + Engine Oil Temperature Gauge
- + Engine Cooling Water Temperature Gauge
- + Fuel Pressure Gauge
- + Engine Speed Indicator (Tachometer)
- + or \$ System Air Pressure Gauge
- \$ Reservoir Air Pressure Gauge
- + Boost Oil Pressure Gauge
- + Control Oil Pressure Gauge
- + Luff Pressure Gauge
- + Hoist(s) Pressure Gauge(s)
- + Slew Pressure Gauge
- + and \$ Gross Overload / Overmoment Healthy Indicator
- + Hoist Line Motion Indicator
- \$ Filter Condition Indicator(s)
 Comment KENZ: filter indicators are mounted on the filter themselves.
- \$ Accumulator Charge Pressure Gauge
- + Rope Speed Indicator (refer also to 2.2.15.8)
- + Camera Monitor
- + Air Conditioning
- \$ Wind sock

Comment KENZ: Air system is NA. Most of the Indicators are captured in the KENZ crane control system/ all alarms are displayed in the HMI.

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Client response: Accepted.

The following warnings, alarms and cut-outs should be supplied (where applicable):

c) Warnings, Alarms and Cut Outs

Warning Horn – Located Externally
 Overload Horn – Located Externally
 GOP Horn – Located Externally

Note: All the horns should have a different tone and in accordance with normal platform sounds.

Engine Overspeed – Cut-Out Only
 Boom Out Overmoment – Cut-Out Only
 General Buzzer – Mipeg Only

Comment KENZ: Kenz SLI will be used instead.

GOP Buzzer

The following should to be visually and audibly annunciated in the driver's compartment

Boom Hoist Limit – Min. Radius)
 Boom Hoist Limit – Max. Radius)
 Load Hoist(s) Limit(s) – Overhoist) followed by cut out Load
 Hoist(s) Limit(s) – Overlower)
 High Water
 Temperature Low level
 Water
 High Engine Oil Temperature
 Low Engine Oil Pressure Low
 Level
 Engine Oil
 Low Level Hydraulic Oil
 Low Hydraulic Boost
 Pressure High Hydraulic Oil
 Temperature Hydraulic
 System Cavitation

Comment KENZ: Not required. Boost pressure applied to low pressure side of motor CSL comment: Agreed.

Low Fuel Level
 Slack Rope – Load Hoist
 Slack Rope – Whip Hoist
 Slack Rope
 – Luff Hoist
 Low Accumulator Charge
 Pressure Comment
 KENZ: Not applicable
 CSL comment: Agreed.
 Low Hydraulic Control Pressure Engine
 Overspeed Cut-out
 Boom Out Overmoment Cut-out
 Gross Overload / Overmoment System Activation

Note: All functional final limit alarms should be continuous in the cab until acknowledged by the operator.

Automatic Safe Load Indicator (ASLI)

The crane shall be provided with a load indication system which should be in accordance with BS 7262, Automatic Safe Load Indicators and EN13852-1. A Mipeg 2000R system is recommended. It shall display the following information:

Comment KENZ: MIPEG does not comply with EN13852 due to single component failure. Kenz will offer standard Kenz SLI.

Client response: Accepted.

- (a) Actual load on hook
- (b) Permissible load; related to preset wave height (sea state)
- (c) Percentage of actual load to permissible load for sea state selected
- (d) Operating hook radius
- (e) Wave height (sea state): set by operator
- (f) Number of rope falls: set by operator
- (g) Visual and audible alarm (in cab only) when load exceeds 90–97.5% of maximum permissible load for duty selected.
- (h) Visual and audible alarms (in cabin and externally) when load exceeds 102.5-110% of maximum permissible load for duty selected. Booming out shall be inhibited. All other crane functions shall be allowed to enable the driver to make the crane safe. Transient (impact) loads shall not be registered.
- (i) An overmoment alarm to perform as h) above but at a sensed overmoment value to be agreed with the PURCHASER.

Note: These alarm ranges of 90-97.5% and 102.5-110% are the ranges specified in BS 7262. The PURCHASER will indicate at time of order the actual settings required.

The measured loads shall be to an accuracy of +/-5% with a lower indicated figure of 0.5Te / 1Te.

The SLI shall have the capability of the four different sea states plus platform lift, plus special lift duties as defined in the proposal, being selected.

The crane operator shall be capable of setting these duties and the number of falls in use without leaving his seat.

A means shall be provided to allow the driver to check the correct operation of the

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system without leaving the cabin.

A fault in the SLI shall not inhibit the use of the crane.

The SLI shall include a rope speed indicator and associated display in the crane cab, to provide the crane operator with an accurate hook data (speed and position).

The MANUFACTURER shall indicate at this tender stage whether or not the proposed SLI system can interface with the recording system.

Data Recording System

A data logging system shall be included. The system shall be passive in operation, that is, supervisory only and shall not modify the crane controls in any way. It shall incorporate the facilities which enable the following modes of operation to be recorded:

- (a) Static Hook Load
- (b) Peak Dynamic Hook Load
- (c) Maximum Static Crane Moment
- (d) Peak Dynamic Crane Moment
- (e) Hook Radius of Lift
- (f) Hoist in use (Main or Whip)
- (g) Wave Height (as selected)
- (h) Number of Falls (as selected)
- (i) Day / Time
- (j) Duration of Lift
- (k) Boom Length (for telescopic cranes)

The onboard recording system shall be capable of storing data for a minimum of 2000 lifts. There shall also be an indicator for percentage of usable memory remaining plus a 'low' warning.

The complete system shall be capable of recording and holding data during a failure of the main power supplies to the crane.

The MANUFACTURER shall supply the equipment necessary to download the data from the recorder for analysis onshore. The PURCHASER at time of order will confirm how many of these units are required for each project.

If asked for by the PURCHASER, the MANUFACTURER shall also supply the software necessary to process the data into a form that is suitable for assessing slew bearing and fatigue lives.

This should be in the form of a table listing bands of percentage moment with number of occurrences in these bands. The bands shall be 0-20, 20-40, 40-60, 60-80, 80-100, 100-120 and more than 120% of maximum allowable overturning moment.

2.2.16 Safety Features

This section groups safety features from all the disciplines. Some have already been covered in detail in their respective sections but others are unique to this section. The MANUFACTURER shall not consider these features mentioned below to be the only ones required.

Cut-Outs / Limit Switches / Alarms on Crane Functions

The following cut-outs / limit switches should be provided together with visual / audible warnings. These cut-outs, if activated by electric signals, i.e. not direct mechanical, shall not depend on normal platform electrical supplies.

- (i) In the load hoist winch to prevent over hoisting or in the boom tip to prevent two blocking when this could be a problem due to load winch location.
- (ii) An alarm to warn the driver of the minimum rope turns on the load winch drum(s).
- (iii) In the luffing system prevent over hoisting. The cut-outs shall take the form of a ramp down switch together with two separate cut-outs. These cut-outs shall be positioned to prevent impact of the boom on the backstops under the most adverse conditions of luffing speed and wind. The backstops shall be of a shock absorbing type.
- (iv) If there is a boom angle sector between maximum rated outreach and stowage position then a stop shall be provided to prevent incursion into this sector. This shall be overridden by a key switch for boom stowage. The boom out motion shall include a ramp down function when approaching maximum radius.
- (v) In the luffing winch to prevent booming out into an overmoment situation.
- (vi) In the hoist and luffing systems to detect and prevent slack wire on the winch(es).
- (vii) Ramp downs should be included for load hoist when approaching the over hoist and over lower positions
- (viii) Slew Limits are not required to be supplied however to have the function built in would be beneficial, in case of future requirements.

Comment KENZ: As according to Chapter 2.2.9 Crane is provided with slewing envelope (Agreed - spec cod not clear - please confirm they are provided)

Client response: Accepted.

Note: All speed ramp down systems, either in boom hoist, load hoists or slew drive, shall be 'one way' only, i.e. on reversing direction of motion there shall be no automatic ramp up.

Shutdowns

Automatic shutdown shall be limited to those required for the protection of the installation, e.g. overspeed protection of the diesel engine due to gas ingestion.

Manual emergency shutdown buttons shall be provided in the following places:

- (i) In the drivers cabin
- (ii) On the machinery train, on either side
- (iii) On the bottom of the ladder attached to the crane.

These buttons shall be coloured red, surrounded by a yellow background and clearly identified and protected against the inadvertent use.

The diesel engine air inlet shut off system shall be fitted with a lever for manual actuation.

The diesel fuel supply shall be manually cut off.

Gross Overload / Overmoment Protection / Manual Overload Protection

The crane shall be equipped with an Automatic Overload Protection System (AOPS) and a Manual Overload Protection System (MOPS) as per the requirements of EN13852-1.

The percentage overmoment for load release shall be provided by the MANUFACTURER and approved by the PURCHASER.

The sensing system for the overmoment measurement shall be calculated from the Safe Load Indicating system.

The complete sensing / release system should be capable of being tested for correct functioning insitu without subjecting the crane to an actual overload.

In addition to the above automatic system the driver shall be able to select the controlled pay out mode manually by means of a yellow button in the control cab. This shall be suitably identified and protected from inadvertent use.

Likewise the driver shall have the capability of retrieving control of the crane once the overmoment has been relieved.

Both these systems shall be capable of functioning with the prime mover stationery and with loss of normal platform electrical supplies.

A fully detailed procedure for function testing the AOPS and MOPS is to be included in the maintenance manual. This function test should avoid the need to structurally overload the crane by means of a test curve.

Fail Safe Braking

Hoists –

Both load and boom hoist winches shall be provided with braking systems that automatically activate to prevent load and / or boom drop on loss of hydraulic pressure, e.g. on hose rupture. Slew

Drives –

Slewing systems shall have brakes that automatically apply on loss of hydraulic pressure.

Constant Tension System (CTS) / Wave Following System

The crane is to be quoted with a Constant Tensioning System as an option, which should be operated through the hoisting gear joystick by means a push button. This system will assist the crane operator carrying out supply boat lifts in a controlled and safe manner in higher sea states.

This shall be achieved by maintaining a constant tension in either the main or whip hoist when selected by the crane operator.

Driver Communications

Horn –

A horn shall be provided to enable the driver to give a warning of intended crane operations to the deck crew.

Escape

Escape Routes –

The crane driver and all other personnel who may be aboard the crane for maintenance or instruction shall be able to escape safely from the crane whatever the luff or slew positions the crane comes to rest in.

These escape routes shall be permanently identified, clear of obstructions, a minimum of 850mm in width and adequately illuminated by the emergency lighting.

Comment KENZ: Due to the tight area on crane escape cannot comply with 850 mm.

Client response: The minimum escape route dimensions should be confirmed for acceptance.

Response Kenz: Boom walkways = 600mm; Maintenance walkways = 600mm; Escape route cabin = 850mm

CSL comment: Agreed.

The choice of two methods shall be provided from the drivers cabin and the machinery house.

Saver Sets –

Space for these shall be provided in the driver's cabin. Life

Jackets –

Space for these shall be provided in the driver's cabin.

2.2.17 **Radio System**

Radio communications specifications will be supplied by the client for the MANUFACTURER to purchase and install. Also provision for hands free activation in the way off a button on joystick or foot pedal for the transmittal of conversations whilst utilising the radio will require to be installed.

Comment KENZ: Since the specifications are unknown, Kenz will offer standard Zone 2 radio with intergrated PA system as an option.

Client response: Understood – Purchaser to advise.

Kenz to provide specification of radio and speakers; CSL to confirm the radio frequencies to be used, by the end of January (week 05, 2016). CSL comment: Agreed.

See Action Log

2.2.18 **Failure Mode Chart**

The MANUFACTURER shall submit a chart showing the breaking limits of the cranes principal load carrying components together with the failure criteria as per EN13852-1.

Additionally, the chart shall indicate the Gross Overload / Overmoment system trigger point curve (where applicable) and relief valve settings for load hoist and luff system.

CSL comment: statement with regards relief valve settings above is incorrect as the relief valve is proportional to the load radius and falls.

2.2.19 **Marking**

The crane shall be clearly marked with MANUFACTURER's name, crane production or serial number and the maximum permissible safe working load for all configurations at two or more boom positions including extreme boom positions

A name plate shall be provided with the following:

- (a) MANUFACTURER's name
- (b) MANUFACTURER's Serial Number
- (c) Equipment names
- (d) Date of Production
- (e) The PURCHASER's equipment tag number
- (f) The PURCHASER's purchase order number
- (g) Equipment design data
- (h) CE Mark including ATEX designation (may be a separate data plate)
- (i) Independent Verification Body Stamp

3.0 **MANUFACTURE**

3.1 Materials / Welding / Painting / Assembly

3.1.1 Materials

Materials will be supplied as per requirements of EN13852-1.

3.1.2 Welding

The MANUFACTURER shall provide the PURCHASER with a list of qualified welding procedures to be used, identifying the welds to be made with each procedure.

Except as modified by this standard, all welding, weld procedure qualification, welder qualification and welding documentation shall be in accordance with the appropriate sections of ANSI / AWS D1.1 or BS EN ISO 15614-1:2014

Uniform preheating temperatures shall be established and maintained constant throughout the welding operation over a radius of at least 150mm (6") beyond all sides of the weld area.

Welder Qualification

All welders shall be qualified for the position in which they will be welding. The MANUFACTURER shall submit relevant welder and welding operator certificates as part of the documentation package

The Manufacturer shall assign each qualified welder a symbol and maintain a record of these symbols. The record shall be available to the PURCHASER at all times. Each welder shall identify his weld with his symbol, in paint or crayon.

Inspection and Testing

The inspection of weldments shall be generally in accordance with ANSI / AWS D1.1 or BS EN ISO 15614-1:2014. The techniques for radiography and ultrasonic inspection shall be in accordance with ANSI / AWS D1.1, Sections B and C. Magnetic particle inspection shall be in accordance with ASTM E 709. All techniques applicable to welding completed under BS EN ISO 15614-1:2004 shall be in accordance with section 7.3 of that document.

All inspection procedures shall be submitted to the PURCHASER for approval.

Acceptance standards for all inspection techniques shall be in accordance with ANSI / AWS D1.1 or BS EN ISO 15614-1:2004. All welds which have passed inspection but have minor defects shall be included in the databooks for future review by the PURCHASER in future years.

Extent of Examination

All welds shall be visually inspected. All fillet welds shall be subjected to 100% magnetic particle inspection.

On primary load carrying structures, all butt welds shall be 100% inspected by radiography or ultrasonic examination. In areas where joint configuration or material thickness preclude radiographic or ultrasonic examination, alternative inspection methods shall be proposed by the Manufacturer for approval by the PURCHASER. Tee butt welds shall be 100% ultrasonically examined. All butt welds on primary load

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carrying structures shall also be 100% inspected by magnetic particle inspection.

On secondary structures, all butt welds shall be a minimum of 10% inspected by radiography or ultrasonic examination.

All non-destructive testing (NDT) shall be carried out after a minimum of 48 hours following completion of welding. For post weld heat treated structures this does not apply, but NDT shall be carried out after post weld heat treatment.

Kenz comment: Welding and NDT procedures are updated to the latest norm. The document will be sent through VDRL to CSL for information.

[See Action Log](#)

[Welding and NDT procedure accepted by CSL](#)

3.1.3 **Painting**

PURCHASER paint specification STD-CSL-TC-CP-155 Revision 05 provides the paint specification for all the PURCHASERS equipment. The PURCHASER has specified system A2 from the afore mentioned paint standard.

The MANUFACTURER may submit a paint specification document to the PURCHASER for review.

All external surfaces shall be thoroughly cleaned and painted in accordance with the following general specification:

Blast to ISO

8501 Sa3

1ST Coat - TSA (125 – 175
microns) Steel Coat – Red oxide 2-pacl epoxy (25

microns)

Finish - Coat of Finish Epoxy (150

micron) Total DFT = 300 – 350 microns

Comment KENZ: Document STD-CSL-TC-CP-155 rev 5 is unknown and is not included in our offer. Kenz will offer standard for all external and internal surfaces:

- Blast to ISO SA 2.5
- 1 x Coat of Zinc Primer
- 2 x Coat of High Build Epoxy
- 1 x Coat of Finish Epoxy
- Total DFT = 300 microns
- Boom will be offered according requested paint specification.

Client response: Purchaser will provide final paint specification.

[Paint specification accepted by CSL](#)

Small third party items shall be painted by their Manufacturers to a suitable offshore paint system agreed with the PURCHASER before placing the sub-order.

Internal surfaces that are protected from the weather, e.g. cabin, machinery house, etc. shall be painted to similar principles to those above, but variations in number of coats and DFT will be agreed between PURCHASER and MANUFACTURER.

Mating faces of the slew bearing shall not be

Painted. Colours – External

Crane (Machinery House and Cab)	HOLD
'A' Frame	Colour TBC – (Refer to
CAP 437) (Top Section Red)	
Boom	GENERALLY RED AND WHITE CAP 437
Cabin Safety Grills, Window,	
Access Walkways	Colour TBC
Hooks and Blocks	Day-Glo Fluorescent

Orange Colours – Internal

Machinery House	Colour TBC
Drivers Cabin	Colour TBC

Areas of the crane walkway that are not directly on grating but utilised as a daily walkway shall be protected with non-slip coating.

3.1.4 **Assembly**

The crane is to be capable of being shipped in modular form, to facilitate installation offshore. The MANUFACTURERs attention is brought to the limiting maximum allowable weight of a maximum of 25Te

3.2 **Quality Assurance**

The PURCHASERS T&C will cover this section

3.3 **Inspection / Testing**

3.3.1 **General**

All equipment covered by this standard shall be subject to inspection at the MANUFACTURER's works and at the works of any sub-contractor, by the PURCHASER's engineers or by a consultant or agent acting on behalf of the PURCHASER.

The PURCHASER and/or his agent shall therefore be permitted access to the equipment at all reasonable times.

The above requirements shall be drawn to the attention of any sub-MANUFACTURER or sub-contractor and shall be made a condition of any sub-order or sub-contract.

The MANUFACTURER shall include in his proposal for the indirect costs associated with their activities, including labour costs (engineers and technicians) and materials. Estimated duration times for each of the tests are to be confirmed in the proposal.

The PURCHASER reserves the right to appoint a Resident Engineer to the MANUFACTURER's works. The MANUFACTURER shall include in his proposal for any indirect costs incurred, e.g. provision of office and communication facilities.

3.3.2 **Specific Inspection**

Certain tests and inspections shall be witnessed by the PURCHASER and/or his agent and shall be considered 'hold points' in the manufacture. All tests and inspections shall be listed and agreed on the Quality Control Plan.

The MANUFACTURER shall give the PURCHASER a minimum of five working days notice prior to both the 'hold points' and 'witness points'.

3.3.3 **Testing**

The crane shall be fully tested on a test stand at the MANUFACTURER's works or at another location agreed by the PURCHASER.

This testing shall be divided into pre-functional or system checking and functional performance testing.

In addition, a further truncated test programme shall be undertaken in the module yard and/or offshore once final erection has been completed.

Performance testing shall not proceed until the crane is complete and all safety features operational.

During the performance test all items of equipment shall operate satisfactorily without excessive bearing temperature rise, leakage, vibration or display of any other unfavourable conditions.

A continuous endurance test of not less than 12 hour shall be performed. The PURCHASER will have a representatives present for the duration of the test and requested access to operate the crane during the test. If the crane is considered by

Comment KENZ: 8 hours is standard. If the crane fails the test, test will be repeated for another 8 hours. Client requirements will be offered as an option.

Client response: Accepted 12hrs as an option

Kenz response: 12 hours endurance test will be performed.

the PURCHASER to contain in its design major previously unproven elements then the endurance shall be extended to 48 hours.

The MANUFACTURER shall submit a test programme and test procedure at least 8 weeks prior to the test date.

Comment KENZ: Kenz will submit Test programme and test procedure 6 weeks prior to the test date.

Client response: Accepted.

Functional tests shall be carried out on the crane and all associated equipment, including all instrumentation:

- Without load
- With the maximum permissible loads corresponding to maximum and minimum operating radii.

The MANUFACTURER will liase with the PURCHASER to ensure agreement on testing is reached at an early stage in the contract.

If it is necessary to dismantle any equipment during the test due to

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malfunction, the test shall be invalidated. The PURCHASER reserves the right to request the full test to be repeated after repair.

3.3.4 **Pre-Function / System Tests**

This will include but not necessarily be limited to the following:

- Calibration of all instruments, both contract and test
- Lubrication system checks
- Hydraulic system checks including cleanliness checks
- Pneumatic control system checks (if fitted)
- Electronic control system checks (if fitted)
- Electrical system tests to include insulation, earthing and continuity
- Communications equipment
- Fault warnings and shutdowns
- Limit switches
- Heating and ventilation
- Wipers, washers and demisters
- Calibration and tests of safety systems including SLI and GOP
- Lights
- Diesel engine function tests

3.3.5 **Function / Performance Tests**

- Noise and vibration
- Limits and controls
- Gross overload/overmoment systems including response measurements (if fitted)
- Emergency and safety systems including shutdowns / slack rope / constant tension
- Speed and response on all functions
- Brakes on all functions, both parking and emergency
- Overload
- Load/Radius
- Data logging

- Function and overload tests on maintenance aids
- Endurance test simulating vessel operations
Comment KENZ: Simulating vessel operations is not possible. Reaction speeds will be tested during Endurance test as far as practical.
Client response: Accepted that supply vessel simulation is not possible, however, reaction speeds etc as if operating a vessel are possible.
Kenz response: testing to be agreed on FAT document, which will be sent with VDRL to CSL.
- Final hydraulic cleanliness checks
- Hydraulic pressures
- Constant tension system
- Function test all crane motions to peak power. Two motions at maximum speed and three motions at reduced speed.

Note: The crane shall be tested in all contract reeving configurations.

The final inspection, both structural and mechanical, shall be carried out on conclusion of the above test programme.

On completion of all testing the PURCHASER may request that some on-site familiarisation training of operators be made available for resident crane operators, prior to disassembly of the crane. This is to be agreed in advance and planned into the testing and commissioning schedule if confirmed.

Comment KENZ: Familiarisation training of operators can be offered as an option.
Client response: Understood.

3.3.6 Installation & Commissioning Support

During installation and commissioning the PURCHASER will require the MANUFACTURER to provide engineering support.

The MANUFACTURER shall confirm the day rates of engineers, technicians, inspectors etc for both offshore and onshore working

3.4 Shipment / Preservation

3.4.1 Transport, Preservation and Handling

The MANUFACTURER shall ensure adequate protection to all steel work during any loading and transportation activities by providing adequate timber bearers during transportation and by the wrapping of lifting points.

The MANUFACTURER shall provide adequate and safe lifting slings during handling or lifting operations. All lifting slings/arrangements should comply with the 'UKOOA Guideline for Safe Packing and Handling of Cargo to and from Offshore Installations'.

Comment KENZ: Lifting slings and lift plan are not part of Kenz scope. If installation

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method is known Kenz can offer Lifting slings and lifting plan.

Client response: Understood.

Sub-assemblies, equipment and component parts of the structure shall be stored above the ground on pallets, timber blocking or other similar supports. All items shall be kept above the level of any standing water and be kept free from dirt, grease, paint and any other harmful treatments that, in the opinion of the MANUFACTURER, could affect its ability to perform its intended function.

Damage to any part before, during or after erection shall immediately be brought to the attention of the PURCHASER.

All sub-assemblies shall be transported by a method which does not induce large distortions or stresses. Lifting lugs and temporary bracing shall be placed with care to avoid damage.

Any coating damage during on and off loading, transportation, storage and handling to parts which have been metal sprayed, galvanised, painted or treated with other coatings, shall be repaired in accordance with an approved method.

Costs associated with delivery of the crane to a location in Humberside (specified by the PURCHASER), complete with sea fastenings, shall be included in the MANUFACTURER's proposal clearly stated as an additional costs option The sea fastenings will remain with the crane for transportation to the offshore location. Costs to include for all required/due duties and essential/necessary documentation.

3.4.2 **Minimum Preservation Requirements**

All exposed shafts, machined and polished surfaces shall be thoroughly cleaned, coated with a suitable corrosion inhibitor and suitably wrapped.

It should be noted that alkaline solvents must not be used to clean non-ferrous materials and should be used with caution on highly polished surfaces. It is essential to thoroughly flush out a suitable corrosion inhibitor before filling equipment with the service fluid.

Comment KENZ: Applicable for 6 months storage.

Client response: Understood.

(a) **Hydraulic Pumps and Motors**

Refill hydraulic system with the appropriate hydraulic oil with a 6% anti-corrosion additive and run the crane. Then drain down the system. Thoroughly blank off all vents and ports. The preferred method of preserving hydraulic fittings is with Dinitrol 4010 SB wax spray rather than with Denso tape.

Comment KENZ: KENZ advise is not to use 6% anticorrosion, this can lead to filter blockage. Kenz prefers Denso tape for preserving the hydraulic fittings.

Client response: Kenz to confirm the recommendation in the OMM. Dinitrol accepted.

(b) **Diesel Engine**

When engine is warm drain the normal lube oil and fill either with initial operation oil or

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a suitable corrosion inhibitor of the appropriate grade and run for about 30 min.

- Use suitable absorbent powder where required to prevent ingress of moisture.
- Introduce initial operation oil in fuel tank and cylinders as per MANUFACTURERS recommendations.
- The engine cooling system shall be filled with the correct corrosion inhibitor mix and run prior to shutdown of the crane. This shall prevent excessive corrosion issues which may occur in pipework/ radiator and associated components prior to crane installation.

(c) Gears and Couplings

Fill gearboxes with suitable corrosion inhibitor, and treat external gears and couplings with corrosion inhibitor.

(d) Pressure Vessels / Atmosphere Tanks

Pressure vessels and atmospheric tanks shall be drained, cleaned and preserved using moisture and corrosion inhibitors.

(e) Air Cooled Heat Exchangers

Clean, flush and use suitable corrosion and moisture inhibitor. Ensure the tubing bundle is covered.

(f) Bearings

- Rotating machinery within the pedestal crane, hoist or trolley system shall be preserved and protected.
- The slewing bearing shall be repacked with grease and both bearing bolting faces shall be well protected with a suitable corrosion inhibitor. The gear teeth shall be lubricated with the correct grease upon completion of testing. The complete assembly shall be wrapped with heavy duty plastic sheeting.

(g) Wire Ropes

Wire ropes shall be protected with a suitable corrosion inhibitor preservative.

(h) Deck / Boom Mounted Mechanical Equipment

Winches, sheaves, boom pivots, rams and ram attachment points, hook blocks, etc. shall be protected with a suitable corrosion inhibitor and suitably wrapped.

(i) Boom / 'A' Frame

Boom section and 'A' frame attachment points shall be protected with a suitable corrosion inhibitor and suitably sealed.

(j) Piping and Valves

Pipes and valves shall be flushed, and preserved in the same manner as the Hydraulic Pumps and Motors, (a).

(k) Slewing Flanges

The slew bearing mounting flanges, both sides, on the crane shall be well protected to a minimum standard with a suitable corrosion inhibitor.

Note: All preservation fluids shall be meticulously removed on all the bearing abutting faces before final installation.

(l) Control Panels and Electrical Items

Control panels and instruments shall be sealed to ensure they are watertight and a suitable desiccant (e.g. silica gel) placed inside.

All Ex'd' type equipment shall be protected with grease in accordance with BS EN 60079-14. All cable gland holes shall be fitted with suitable Ex stopping plugs (BASEEFA or equivalent approved for Ex'd' equipment).

Electrical wiring shall be terminated and adequately supported. No wire shall be left exposed.

3.4.3 Tagging of Equipment

Before dispatch, the MANUFACTURER shall mark on, or securely attach to the consignment, any special handling and/or storage instructions.

Each item of equipment shall be tagged with a stainless steel tag secured to the equipment with stainless steel wire. The Tag numbers shall be supplied by the PURCHASER and tabulated for future reference.

The MANUFACTURER shall comply with any additional and relevant instructions in order/enquiry.

Comment KENZ: Kenz will use standard tagging as described in technical specification
Client response: Purchaser to review the tagging and accepted prior to purchase of crane. Kenz comment: Kenz will produce a list of tagged equipment in Excel format and will send this document to CSL through VDRL for information.
[See Action Log](#)

All open ends of drains, vents, hydraulic flexible piping, instrument tubing and small bore piping connections shall be capped or plugged with metal caps or plugs, as applicable. Threaded caps and plugs shall be used for threaded connections. Grease fittings shall be protected with plastic caps.

3.4.4 Packaging for Transportation

The crane, boom sections and 'A' frame (if separate) shall be shipped on steel supports. These supports shall be robust enough to accompany these items offshore. They shall be complete enough for satisfactory transport without the need for additional packers. All weights shall be suitably marked in packaging.

- The slew bearing mounting flanges on the crane shall both be protected by either steel plates or 25mm thick plywood blanks securely bolted in place.
- The slew bearing should be crated, if transported separately.
- The driver's cabin shall be left unlocked but fully sealed and then boarded over all glazed areas using plywood (the keys shall be left inside the cabin and attached to the control console).

- The boom and 'A' frame sections shall have the attachment points securely protected from impact damage. The areas of sling attachment shall be adequately protected to prevent damage to the paint.
- The winches, motors and drum flanges shall be adequately protected from impact especially when a winch is mounted on the extremity of the crane.
- Items of loose equipment shall be suitably boxed for export with the lids securely fastened by nailing, screwing or strapping.
- Walkways, ladders, railing and platforms shall either be palletised or be strapped to steel supports as specified for the crane.
- Wooden containers shall be manufactured of flame retardant timber. Steel boxes and proprietary re-usable boxes are acceptable. All boxes shall contain a vapour barrier material. A list of contents in a waterproof enclosure shall be attached to the outside of the box, or equipment if on a pallet, and a duplicate list enclosed with the contents.

All fragile items such as control panels, instruments and small piping/tubing shall be adequately supported and glass faces covered with polythene and where unprotected, plywood which shall be at least 6mm thick.

When boxed or strapped to pallets for shipment, the equipment shall be adequately supported so as to prevent damage during transit and lifting.

If it is necessary to remove any item from the equipment (or equipment package) for shipment, they shall be tagged, boxed and labelled in accordance with the requirements stated above for the equipment.

All modules or lifts should be tagged as appropriate to facilitate assembly of the crane offshore. In particular, services such as pipework should be labelled to assist reconnection.

Comment KENZ: Packing is not part of scope and can be offered if transport modules are known. Please find enclosed crane modules < 25t incl transport frames if required. Typical transport frames will be offered as option.

Client response: Transport frame costs to be provided based on previous similar work scopes.

3.5 **Certification / Documentation**

Material Identification and Traceability

The MANUFACTURER and Sub-MANUFACTURERS shall have an effective system of numbering all replaceable parts. The number shall completely define the part, including the material of which it is made. For example, two items which are dimensionally identical but made from different material shall have different part numbers. All parts (except standard fasteners, gaskets and other small parts where it is not practical) shall be indelibly marked with the appropriate part number.

The MANUFACTURER/Sub-MANUFACTURER shall maintain an effective material control system to determine that all parts and ancillaries are manufactured from the correct materials. The materials used shall be in accordance with section 3.1.1 of this specification.

This system shall satisfy the following requirements:

- Material shall be checked on receipt by the MANUFACTURER against accompanying Certificates of Compliance or Manufacturers Certificates, for compliance with the specified requirements. Such certificates shall be retained by the MANUFACTURER and made available, on request, to the PURCHASERs engineer, agent or inspector.
- The grade of material shall be positively identified by marking or recording throughout manufacture.

Note: Certificates of Compliance and Manufacturers Certificates shall be as defined in BS EN 10204 (ISO 10474). Copies of Certificates are acceptable, provided they are signed and dated by a responsible person in the MANUFACTURERs inspection department certifying them as true copies.

Material / components used in the primary load path shall be 'traceable'. Such materials / components will be specified in the order.

For traceable / material / components, in addition to the above requirements, the MANUFACTURERs material control system shall satisfy the following requirements:

- Each traceable component shall be identified by a unique serial number. This number shall be indelibly marked on the component when it is first cast or formed from a piece of material. The material shall be traceable by means of indelible visible marking, back to an original billet cast, the chemical composition and physical properties of which have been confirmed by appropriate tests.
- The MANUFACTURERs inspector shall witness and document the transfer of material identification.
- Auditable records shall be maintained, to enable each 'traceable' component to be identified with particular chemical analysis and physical property tests.

The PURCHASER shall have the right to review, inspect and monitor the operations of the materials control systems.

Certificates

Test, inspection and approval certificates appropriate to the PURCHASER and statutory requirements shall include:

- (a) Crane
- (b) Hook
- (c) Snatch Blocks
- (d) Ropes c/w associated Sockets/ Wedge terminations
- (e) Special Tackle Including Lifting Beams
- (f) Pressure Vessels
- (g) All Electrical Items
- (h) Materials for main load bearing structural members, including bolting
- (i) Slewing and Fasteners
- (j) Diesel engine protection system

- (k) Crane Lifting Aids
- (l) Non-destructive testing reports, including radiography plates where applicable
- (m) Material certification as per BS EN 10204:2008

Documentation

Documentation required by the PURCHASER should be supplied as per the agreed MDR , master document register.

Initial Requirements – At the post contract stage, the Manufacturers shall supply the following:

- (a) High quality sectioned drawings of all assemblies and sub-assemblies, complete with parts schedule
- (b) Circuit diagrams, electrical, hydraulic and pneumatic (complete with pressure settings)
- (c) Layout drawings, electric, hydraulic and pneumatic
- (d) Material specification
- (e) Welding specification (qualified weld procedures and welders qualifications)
- (f) High quality fully dimensioned general arrangement drawings
- (g) Individual weights and centre of gravity locations (dimensioned vertically and horizontally) of each sub-assembly on the crane, together with the total weight and centre of gravity of the crane superstructure as a whole. The weights and centres of gravity of the sectionalised boom shall be shown separately from the crane superstructure.
- (h) Details of all sub-contracted orders.
Comment KENZ: Only major and unpriced.
Client response: Purchaser to confirm prior to purchase.
- (i) Independent Verification Body documentation, where applicable.
- (j) Priced schedules of recommended spares for commissioning, first major overhaul (to include pumps, motors, winches) and operating spares, as required by the PURCHASER.

Final Requirements

Prior to shipment, final copies of all the items listed plus workshop, maintenance and spares manuals shall be supplied.

A dossier shall also be provided, covering all items inspected and tested in accordance with the quality plan and including all test and approval certificates.

4.1 **LUBRICATION / MAINTENANCE**

4.2 **Lubrication**

Lubricants and hydraulic fluid of various suppliers shall be specified. The PURCHASER will advise of any particular preference.

Grease nipples shall, where possible, be grouped into manifolds. Each nipple on the manifold plate shall be identified by hard stamp on the plate or other permanent method. The batteries shall be accessible from the platforms or walkways on the crane.

Note: The lengths of tubing between nipple and grease application should not exceed 3m. Grease nipples should, where possible, be so positioned as to be protected from mechanical damage.

Nipples shall be one size throughout the machine and shall be of clip on design. A suitable grease gun shall be supplied for each crane of a type to be agreed by the PURCHASER.

Nipples and tubing shall be in stainless steel.

A lubrication chart engraved on a water/oil resistant material shall be provided in the machinery house. It shall display the following:

- (a) The location of the lubrication point
- (b) The grade / quality of lubricant to be used
- (c) The frequency of lubrication

4.3 **Maintenance**

All components that require regular monitoring or maintenance shall be easily accessible by maintenance personnel. The crane shall be designed such that all maintenance can be carried out with the minimum of special facilities.

All moving parts should be fitted with points for connecting equipment to allow vibration monitoring to be carried out as part of future maintenance.

The PURCHASERs and MANUFACTURERs attention is drawn to 'The Manual Handling Operations Regulations SI 1992, No. 2793' in assessing the requirements for handling items during maintenance operations.

4.4 **Lifting Aids**

A suitable maintenance davit shall be provided on the 'A' frame to remove the heaviest mechanical parts, greater than 25kg, which may need maintenance on the crane.

Hoist attachment points shall be provided on the crane for the maintenance of items of luffing equipment and winches.

Comment KENZ: A service crane for maintenance of luffing equipment and winches can be provided as an option.

Client response: Please also provide a plan view of the working range for the davits. The working range for the Davit for the winch equipment is approx. 3.7m. The Davit

for replacing sheaves has a range of 2m.

Hoist attachment points shall be provided for removing the slew motors from the machinery deck.

Comment KENZ: Hoist attachments points will be provided for removing the slew motors.

The machinery items, i.e. prime mover, gearbox and pumps and / or any components heavier than 25kgs, shall be provided with a runway / hoist system to allow complete removal from the crane. Coverage should be provided for the complete machinery house area. All lifting points / runway beams are to be fully certified and the SWL stamped.

The crane hoist systems shall be capable of moving all items requiring maintenance to and from the platform deck.

All lifting points, eyes and lugs shall be designed and proof tested and the weight of the hoist shall be included in the calculation.

A slew ring removal system shall be available.

Comment KENZ: Is not included since this is depending on platform laydown area.

Client response: Understood.

4.5

Special Tools

The MANUFACTURER shall supply any special tools required for installation and maintenance of the crane and all auxiliary systems. They shall come complete in a lockable tool vault which is suitable for either storage offshore or transport to and from the platform.

The MANUFACTURER shall provide a list and quote for these special tools in his tender on the basis of one set per platform.

Comment KENZ: No special tools other than commercial tools are required.

Client response: Understood.

4.6

Technical Manuals

General

Technical Manuals shall be provided and shall incorporate both the MANUFACTURER and Sub-MANUFACTURER data. Technical manuals shall be in accordance with EN 13852-1. In addition, they shall meet the requirements of this document and the approved MDR.

Electronic versions of the manual shall be provided by the MANUFACTURER as well as paper copies.

Paper copies of all relevant drawings shall be provided by the MANUFACTURER along with electronic copies of the manuals. format.

MANUFACTURERS shall submit the manual index to the PURCHASER prior to the manual being issued for review and approval.

The manual shall be divided into nine information categories (parts) as given below:

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Part 1	Leading Particulars (including data sheets)
Part 2	Installation
Part 3	Commissioning
Part 4	Operating
Part 5	Maintenance
Part 6	Parts Data
Part 7	Drawings
Part 8	Lubrication
Part 9	Fault Finding / Correction Procedures

Within the parts of the manual listed above, information shall be comprehensive and specific to the scope of supply with non-relevant information clearly edited out. Information required under Parts 7 to 9 is self evident and no further requirements are stated here. However, for other parts, details are given of the minimum information they shall contain.

Part 1 – Leading Particulars (Including Data Sheets)

They shall include all main characteristics of the equipment including sizes / weights / supply, requirements / environmental factors, loading limitations / performance and data / operating parameters, etc. Details of suppliers and UK agents shall be stated. A copy of the final issue of the appropriate equipment data sheets shall be included.

Comment KENZ: Only datasheets listed in VDRL will be provided

Client response: Purchaser to review datasheets in VDRL.

Part 2 – Installation

This shall contain sufficient information to enable correct initial installation. Contents shall include (as appropriate to the scope of supply) –

- Lifting, transportation, handling, unpacking and any special installation requirements.
- Method of installation including alignment, mounting/support details and use of special support equipment or tools.
- Ex works preservation status including handling/disposal instructions for any fluids or compounds used for preservation or inhibition.
- Details to enable connection of all utility services including any technique required for certified intrinsically safe equipment.

Part 3 – Commissioning

This shall contain sufficient information to enable correct commissioning and re-commissioning after major overhaul to be carried out. Contents shall include (as appropriate):

- Procedures for preparation for initial operation including flushing, cleaning, lubrication, introduction of any medium, etc.
- Pre-commissioning checks.
- Measures necessary to maintain equipment integrity between initial commissioning (which may be carried out onshore) and initial operation.

Part 4 – Operation

This shall include sufficient information and advice for operators unfamiliar with the equipment to functionally operate it in a safe and effective manner. Contents shall

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include:

- Operating procedures covering start up, operating, shutdown, emergency shutdown and fault conditions. Procedures shall include operational limitations, precautions and methods of operating control and recording devices.
- Diagrams identifying controls and adjustments.

Part 5 – Maintenance

This shall include sufficient detailed information on planned preventative maintenance procedures to support equipment. The section should also include a table for fault finding and diagnostics purposes. Contents shall include:

- Maintenance schedules indicating recommended minimum and maximum periods of implementation of routine tests and preventative maintenance, recommendations shall be based upon stated role of equipment i.e. whether in continuous use or intermittent as on an NNM platform.
- All routine maintenance and test procedures.
- Corrective maintenance procedures, including equipment removal, dismantling, overhaul, assembly replacement, repair, test and calibration. This information shall be supported by diagrams/drawings, in particular, where removal / replacement procedures are complicated, with positive location of control points, adjustment points, test points, etc.
- Specified cleaning methods and materials.
- Fits/clearances and tolerances (baseline and maximum).
- Details of access/lifting requirements including weights of all components requiring mechanical lifting/handling facilities for removal and replacement.
- List of tools required for maintenance, both standard and special, and diagrams of test rigs to be used.
- Safety precautions where necessary.

Part 6 – Parts Data

Unique reference numbers that specifically identify each part within the MANUFACTURERs organisation shall be stated on all arrangement drawings.

For items supplied by third parties ('Bought Out' items) such as bearings, seals, gaskets, couplings, electrical items etc the appropriate supplier part number shall be stated. These part numbers should enable the PURCHASER to procure replacement items direct from local suppliers.

Comment KENZ: All equipment is tagged with KENZ ID number. Purchaser can procure replacement items from Kenz Crane Services.

Client response: Purchaser to confirm prior to purchase.

A Hydraulic Hose Schedule shall be supplied within the manual, detailing hose types, hose sizes, hose lengths and details of the hose fittings on each end of the hose. The information is required in order to comply with 'UKOOA – Flexible Hose Management Guidelines'.

5.1 WARRANTY / SPARES

5.2 **Warranty**

This is to be covered by PURCHASER T&C's

5.3 **Spares**

The MANUFACTURER shall supply detailed parts schedules as part of the documentation requirements.

The MANUFACTURER shall complete priced schedules of recommended spares for commissioning, first major overhaul and operating spares. Obsolescence checks should be conducted by the MANUFACTURER to ensure all parts used on the crane are currently in production.

6.0 DEFINITIONS / GLOSSARY / ABBREVIATIONS

6.1 Definitions / Glossary / Abbreviations

Within the context of this specification the following words shall have the meanings stated:

'must / shall'	indicates a mandatory requirement
'should'	indicates a preferred course of action
'may'	indicates one acceptable course of action
'approval'	indicates agreement/sanction and shall be in writing only
PURCHASER	The organisation responsible who carry out the purchasing,
MANUFACTURER	The supplier of materials or equipment – not necessarily the Manufacturer
Manufacturer	The company responsible for the manufacture – not necessarily the MANUFACTURER
Consultant	A company awarded a contract by MANUFACTURER for the company to advise or give guidance on specific subjects. The Scope of Work may include instructions to act as an agent for Chevron (see Agent)
Sub-MANUFACTURER	A sub-supplier of equipment, materials or services to the MANUFACTURER. A sub-MANUFACTURER may in turn employ sub-sub-MANUFACTURERS for the provision of equipment, materials or services
Inspecting Authority	The body or organisation, contracted to verify that the equipment has been designed and constructed strictly in accordance with this Standard and any other requirements of the purchase order

7.1 GENERAL CONDITIONS OF CONTRACT

7.2 General Conditions of Contract

All WORK performed under this CONTRACT shall be carried out in strict accordance with the terms and conditions contained within the LOGIC General Conditions of Contract for Supply of Major Items of Plant and Equipment – Edition 2 – December 2005 (a copy of which is deemed to be in the possession of both COMPANY and CONTRACTOR), save only as modified or enhanced by Section II (b) hereof (Special Conditions of Contract).

7.2 Special Conditions of Contract

SECTION II - b) Special Conditions of Contract

The General Conditions of Contract contained in Section II - a) hereof shall be amended as follows:

1. DEFINITIONS

1.1 Delete Clause 1.1 and replace with the following wording:

“1.1 “AFFILIATE” shall mean any subsidiary or parent or holding company of any company or any other subsidiary of such parent or holding company. For the purpose of this definition “holding company” and “subsidiary” have the meanings given to those expressions in Section 1159 and Schedule 6 of the Companies Act 2006 and a company shall be treated, for the purposes only of the membership requirement contained in Sections 1159(1)(b) and (c) thereof, as a member of another company even if its shares in that other company are registered in the name of (a) another person (or its nominee), whether by way of security or in connection with the taking of security, or (b) its nominee.”

1.2 In line 1 delete “its” before “CO-VENTURERS”.

1.9 After “SUBCONTRACTORS” in line 1 insert the wording “and their subcontractors of any tier” and the second sentence is deleted..

1.11 Delete Clause 1.11 and replace with the following wording:

“1.11 “CO VENTURER” shall mean any other entity with whom the COMPANY or an AFFILIATE of the COMPANY is or may be from time to time a party to a joint operating agreement or unitisation agreement or similar agreement relating to the operations for which the WORK is being performed and the successors in interest of such CO VENTURER or the assignees of any interest of such CO-VENTURER”.

1.19 Delete Clause 1.19 and replace with the following wording:

1.19 “SUBCONTRACT” shall mean any contract between the CONTRACTOR and any party (other than the COMPANY), or between that party and any other party, for the performance of any part of the WORK or the supply of any materials or equipment relating to the WORK”.

1.20 The following is added at the end:

“For the avoidance of doubt, SUBCONTRACTORS includes without limitation suppliers, vendors and manufacturers.”

The following new Clauses are added after Clause 1.24:

“1.25 “APPROVAL/APPROVE/APPROVED” means authorisation in writing given by the COMPANY or COMPANY REPRESENTATIVE to the CONTRACTOR, including **DELIVERY ASSURED**”

subsequent written confirmation of previous verbal authorisation.

- 1.26 "CR POLICY" means the COMPANY's Corporate Responsibility Policy (Version No. 1.0 20/03/15) which can be accessed at <http://www.centrica.com/index.asp?pageid=1135>.
- 1.27 "CONTRACTOR'S PERSONNEL" means the CONTRACTOR'S and its SUBCONTRACTORS' employees, subcontracted personnel, agency personnel, consultants, self-employed personnel and other persons who are under the control or direction of or who have contractual relationships with the CONTRACTOR.
- 1.28 "FINAL DOCUMENTATION" means all documentation related to design, construction, engineering, procurement, fabrication, installation, commissioning and testing of materials and equipment and other parts of the WORK, such as drawings, test report manuals, as-built drawings, safety instructions, as-built dossier, operating manuals, certificates of inspection, video records of the WORK, the CONTRACTOR'S and SUBCONTRACTORS' documentation satisfactory to COMPANY (inclusive of all information necessary for identification of spare parts) and any other documents stipulated elsewhere in the CONTRACT.
- 1.29 "GROUP" means either the COMPANY GROUP or the CONTRACTOR GROUP, as the context so admits.
- 1.30 "JOINT OPERATIONS" means the sharing or joint utilisation of transportation services (including but not limited to helicopters, fixed wing aircraft, vessels and road transportation) and/or associated services by the COMPANY and OTHER OPERATORS GROUPS.
- 1.31 "OTHER OPERATORS GROUP" means other oil and gas exploration and production operators and their respective co-venturers, AFFILIATES, contractors and subcontractors who participate in JOINT OPERATIONS, together with their respective officers and employees (including agency personnel).
- 1.32 "PARTY(IES)" means the COMPANY and/or the CONTRACTOR, as the context so permits, and its successors and permitted assigns.
- 1.33 "PURCHASE ORDER" means the electronic document headed Purchase Order issued by the COMPANY to the CONTRACTOR in order to record the WORK into the COMPANY's accounting and payment system, and identifying if the WORK is being performed for an AFFILIATE in accordance with Clause 33.7. (The reference thereon to the terms and conditions being "Centrica Energy Exploration & Production's General Terms and Conditions for the supply of Goods and/or the performance of Services" shall be of nil effect. The terms and conditions of this CONTRACT shall take precedence and shall govern the WORK set out herein)."

4. CONTRACTOR'S GENERAL OBLIGATIONS

- 4.3 Delete Clause 4.3 and replace with the following wording:

"4.3 Except as may be expressly specified in the CONTRACT, the CONTRACTOR shall be responsible for the design of the PERMANENT WORK".

7. CONTRACTOR TO INFORM COMPANY/COMPANY TO INFORM CONTRACTOR

- 7.1 Replace the first sentence with:

"The CONTRACTOR shall be deemed to have checked the JOB SPECIFICATION and confirmed that there are no apparent errors, deficiencies, omissions, contradictions or ambiguities therein. Promptly upon receipt, the CONTRACTOR shall check the TECHNICAL INFORMATION to the standards of a first class contractor experienced in the nature of the WORK, and shall forthwith inform the COMPANY of any errors, deficiencies, omissions, contradictions or ambiguities

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discovered therein.”

8. ASSIGNMENT AND SUBCONTRACTING

8.2 Subcontracting

c) The second paragraph is deleted and replaced by:

“All SUBCONTRACTS shall expressly provide for assignment and novation of the SUBCONTRACT to COMPANY in the event that the COMPANY terminates the CONTRACT or any part of the WORK thereunder.”

The following clause is added after Clause 8.2(d):

“(e) Without prejudice to the provisions of Clause 28, the CONTRACTOR shall obtain from SUBCONTRACTORS such warranties as such SUBCONTRACTORS normally extend and such other warranties as are required from CONTRACTOR under the CONTRACT, with the objective that the terms and duration of such warranty shall correspond to the provisions of Clause 28. The CONTRACTOR shall obtain an undertaking from SUBCONTRACTORS that such warranties shall be for the benefit of the COMPANY and may be enforceable by the COMPANY or the CONTRACTOR. The CONTRACTOR shall give the COMPANY all reasonable assistance in enforcing such SUBCONTRACTOR's warranties to the extent that they may exceed the CONTRACTOR's own warranty obligations hereunder.”

9. CONTRACTOR PERSONNEL

9.5 The following is added at the end after “board and lodging”:

“survival training (where applicable), and protective and safety clothing, and generally all matters concerning its personnel, unless otherwise provided for in the CONTRACT”.

The following new Clause is added after Clause 9.8:

“9.9 Where the WORKSITE is offshore, the COMPANY shall at its own expense provide:

- (a) transport of the CONTRACTOR's personnel and equipment between the said offshore location and the COMPANY's helicopter base or quayside facility as appropriate.
- (b) the CONTRACTOR's personnel with survival suits to be worn during helicopter flights to and from any offshore location.
- (c) accommodation and messing to the CONTRACTOR's personnel whilst at said location.
- (d) access to the COMPANY's means of communications for the purpose of communicating with the CONTRACTOR's base office. Except in the case of emergency, however, the CONTRACTOR's personnel shall not be given access to the COMPANY's communications facilities for personal use unless with prior APPROVAL from the COMPANY REPRESENTATIVE.
- (e) in the event of the CONTRACTOR's personnel suffering injury or illness while offshore, medical assistance at the said location, transportation of medical assistance to and from the offshore location and of the incapacitated personnel to the mainland whereupon the CONTRACTOR shall assume responsibility for such personnel.”

11. PROGRAMME

11.3 The following is added after “shall” in line 1 :

“comply with the PROGRAMME and”.

The following new Clause is added after Clause 11.5:

“11.6 The CONTRACTOR is bound to commence performance of the WORK, continue and complete same in an expeditious manner in accordance with the SCHEDULE OF KEY DATE(s) and the PROGRAMME. The CONTRACTOR shall not assign to any other work a priority which affects or interferes with the due and timely performance of the WORK. Time shall be of the essence under this CONTRACT.

The sequence and timing of the activities appearing in a PROGRAMME shall not be modified unless the COMPANY APPROVES or requires such modification.”

13. INSPECTION AND TESTING

13.2 At the end of the first sentence in line 2 after ”in the CONTRACT” there is inserted:

“and all other such tests and inspections expected of a first class contractor experienced in the nature of the WORK”.

14. VARIATIONS

14.2 The following new Clauses are added after Clause 14.2(d):

“(e) The CONTRACTOR shall not be entitled to receive a VARIATION arising from:

(i) Any comments made by COMPANY where the Scope of WORK is not affected;

(ii) Inclement weather conditions or breakdown of plant and equipment; or

(iii) 'Design Evolution' which shall include, inter alia, the following items:

- incorporation of data provided by SUBCONTRACTORS;
- compliance with the requirements of the Certifying Authority, Marine Warranty Surveyor or any government body;
- re-work due to co-ordination with others under the control of the CONTRACTOR or internal co-ordination;
- changes necessitated by non-conformance of specified weights of CONTRACTOR supplied items;
- changes necessitated by non-conformance of equipment sizes of components supplied by the CONTRACTOR;
- engineering design or subsequent instruction and/or activity required to meet functional specification requirements.

(f) Any extension of time arising from a VARIATION shall be determined based on its effect on the critical path in the PROGRAMME after utilising any float”

16. SUSPENSION

16.8 Clause 16.8 is deleted in its entirety.

17. TERMS OF PAYMENT

17.6 Replace the last sentence with “Each invoice shall be accompanied by the completed MILESTONE CERTIFICATE, be in the name of the COMPANY or an AFFILIATE (as named in the “Invoice To” box in the PURCHASE ORDER), be marked for the attention of Accounts Payable and forwarded to the address set out under Clause 33.6 in Appendix 1 to Section 1 – Form of Agreement.”

The following new Clause is added after Clause 17.12:

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“17.13 The CONTRACTOR’s final invoice on completion of WORK shall not be due for payment until after the CONTRACTOR has executed a Final Account and Release Certificate in the form attached hereto as Appendix 1 to Section II(b) Special Conditions of Contract.”

18. TAXES AND TAX EXEMPTION CERTIFICATES

Clause 18.4 is deleted as worded and the following substituted:

“18.4 Where any of the WORK involves the performance of construction operations specified in Section 74(2) of the Finance Act 2004, the CONTRACTOR shall provide the COMPANY with:-

- (a) their full company name;
- (b) their unique taxpayer reference (UTR), and
- (c) their company registration number,

in accordance with Regulation 6 of the Income Tax (Construction Industry Scheme) Regulations 2005.

The COMPANY shall then use that information to verify with HM Revenue & Customs whether the CONTRACTOR is registered for gross payment, or for payment under deduction of tax, or is not registered under Chapter 3 of the Finance Act 2004.

Where at the due date for payment, the COMPANY has received verification that the CONTRACTOR is registered for gross payment, the COMPANY shall pay any invoiced amounts due to the CONTRACTOR without deduction.

Where at the due date for payment, the COMPANY has received verification that the CONTRACTOR is registered for payment under deduction of tax, the COMPANY will deduct tax at the rate applicable from the full payment due to the CONTRACTOR in respect of such construction operations, except for elements which are exempt from deduction under the terms of Finance Act 2004.

Where at the due date for payment, the COMPANY has been notified by HM Revenue & Customs that the CONTRACTOR is not registered under Chapter 3 of Finance Act 2004, the COMPANY, under prevailing legislation, is unable to make payment of any amounts which would otherwise be due to the CONTRACTOR in respect of such construction operations except for elements which are exempt from deduction under the terms of Finance Act 2004.”

18.5 In the line 1 “GROUP” is inserted after “COMPANY”.

18.6 After “COMPANY” in line 1 there is added “or any of its AFFILIATES”

22. INDEMNITIES

22.3 The following is added at the end:

“Notwithstanding the above, CONTRACTOR shall be responsible for any loss of or damage to the PERMANENT WORK;

- (i) during the performance or supervision by the CONTRACTOR of:
 - (a) any remedial work pursuant to the provisions of Clause 28;
 - (b) installation works onshore/offshore; *(if CONTRACTOR is performing the delivery and installation works (e.g. possibly onshore plant) then delete (b) since the HANDOVER CERTIFICATE would not be issued until completion of installation and therefore the risk is covered by the first paragraph of General Condition 22.3*

- (c) precommissioning onshore/offshore; or
- (d) commissioning onshore/offshore, and
- (ii) arising at any time to the extent caused by the COMPANY following any operating or maintenance manuals which have been negligently produced by the CONTRACTOR under the CONTRACT.”

22.5 Clause 22.5 is deleted and the following substituted:

“Notwithstanding the provisions of Clause 22.2(c) and except as provided by Clause 22.2(a) and 22.2(b), the CONTRACTOR shall save, indemnify, defend and hold harmless the COMPANY GROUP from and against any claim of whatsoever nature arising from pollution:

- (a) occurring on the premises of the CONTRACTOR GROUP or emanating from the property and equipment of the CONTRACTOR GROUP (including but not limited to marine vessels) arising from, relating to or in connection with the performance or non-performance of the CONTRACT, or
- (b) that otherwise results from performance of the WORK hereunder by CONTRACTOR GROUP, to the extent caused by the negligence or breach of duty (whether statutory or otherwise) of CONTRACTOR GROUP up to an amount of five million pounds sterling (£5,000,000) per occurrence.

22.6 In the second line delete “and 22.2(c)” and replace with “, 22.2(c), 22.5(b) and 22.8”.

The following new Clauses are added after Clause 22.7:

"22.8 Notwithstanding Clause 22.2(a), the CONTRACTOR shall be responsible for, and shall save, indemnify, defend and hold the COMPANY GROUP harmless up to an amount of five million pounds sterling (£5,000,000) per occurrence against, any claims, losses, damages, costs (including legal costs), expenses and liabilities in respect of loss of or damage to property of the COMPANY GROUP arising from or related to the performance or non-performance of the CONTRACT to the extent caused by the default, negligence or breach of duty (whether statutory or otherwise) of the CONTRACTOR GROUP.

22.9 For the purposes of JOINT OPERATIONS and without prejudice to the indemnities provided elsewhere under this CONTRACT, the indemnities provided by CONTRACTOR to the COMPANY GROUP under this Clause 22 and Clause 24 shall apply for the benefit of OTHER OPERATORS GROUPS.

22.10 The Indemnity provisions of this Clause 22 do not limit the CONTRACTOR GROUP's:

- (a) obligations to rectify or re-perform defective work in accordance with the terms of this CONTRACT;
- (b) responsibilities for remedying any other breach of this CONTRACT.”

23. INSURANCE BY CONTRACTOR

The following Clauses are added after Clause 23.4:

“23.5 The CONTRACTOR shall procure that the above insurances shall:

- (a) be primary coverage with respect to all other insurances; and
- (b) include a cross-liabilities clause (as regards General Third Party Liability and Protection and Indemnity insurance).

- 23.6 The insurance amounts set out above are minimum requirements and not limits of liability, and they are not to be construed as the COMPANY's consent to substitute its financial liability in excess of the amounts set forth except as otherwise agreed in the CONTRACT.
- 23.7 CONTRACTOR shall indemnify and hold harmless COMPANY GROUP from and against loss or damage arising out of any failure by CONTRACTOR GROUP to effect or maintain such insurances as CONTRACTOR is required to provide under this CONTRACT.
- 23.8 For the provision of JOINT OPERATIONS, all policies referred to in 23.2 shall be endorsed to provide that underwriters waive any rights of recourse, including in particular subrogation rights against OTHER OPERATORS GROUP”.

24. CONSEQUENTIAL LOSS

The following is added at the end:

“For the avoidance of doubt, it is hereby stated and agreed that incidental costs as referred to in Clause 28 are deemed not to be Consequential Loss for the purposes of this Clause 24.0.”

25. CONFIDENTIALITY

- 25.1(b)(i) The words “the CO-VENTURERS or its or their AFFILIATES” shall be deleted and replaced with the word “GROUP”.
- 25.2(b) The word “GROUP” shall be inserted after “COMPANY” in the last line.
- 25.2(e) The following is added at the end: “, provided that this exclusion shall not apply to any confidential or proprietary information relating to the COMPANY”.

27. HANDOVER AND COMPLETION

27.2 After “COMPANY” in line 3 where first occurring there is inserted:

“and that all required inspection and testing including, as applicable, Factory Acceptance Tests (FAT's) and Integration Tests have been successfully completed in accordance with the CONTRACT to COMPANY's satisfaction and the whole of the WORK has been completed (save only for the provision of the FINAL DOCUMENTATION to be provided by CONTRACTOR in accordance with the CONTRACT and any involvement by CONTRACTOR in works offshore),”.

The following is added at the end:

“Hand over of the PERMANENT WORK shall include all road or seafastening including skids, frames, containers, slings, shackles and the like, necessary for the safe and secure handling and transportation of the PERMANENT WORK to ensure COMPANY's receipt of the thereof free from damage, loss or deterioration and in accordance with the CONTRACT”.

27.3 The following is added at the end of Clause 27.3:

“The issuance of the COMPLETION CERTIFICATE shall not be due until completion of the CONTRACTOR's involvement in:

- (a) Installation works onshore/offshore; and/or
- (b) Precommissioning onshore/offshore; and /or
- (b) Commissioning offshore; and

- (d) receipt and APPROVAL by the COMPANY of the FINAL DOCUMENTATION to be provided by CONTRACTOR.”

28. DEFECTS CORRECTION

Clauses 28.1, 28.2 and 28.3 are deleted and replaced by the following:

“28.1 Design and Manufacture/Construction Warranty

28.1.1 It is recognised that the CONTRACTOR possesses a particularly high level of expertise, experience and technical know-how in relation to the specialist WORK which is the subject of the CONTRACT. The CONTRACTOR warrants and guarantees that:

- (i) The WORK shall be performed using the highest standards of professional skill, care, judgement, diligence and expedition according to safe and sound oil industry construction practice, all applicable codes and regulations and the provisions of the CONTRACT so that the WORK performed by it shall be in all respects adequate, accurate, efficient and fit for its purpose and will remain in its stable and intended state.
- (ii) The WORK supplied by it shall in all respects be suitable for the subsequent installation, commissioning and economic operation of the PERMANENT WORK in accordance with the requirements of the CONTRACT.

28.1.2 The CONTRACTOR warrants and guarantees that the WORK shall be free from any deficiencies or defects during the performance of the WORK and during a period of twenty four (24) months from the effective date of the COMPLETION CERTIFICATE or twelve (12) months from the date on which the PERMANENT WORK is placed in operation, whichever is the earlier (the WARRANTY PERIOD) and regardless of whether the same was performed or furnished by the CONTRACTOR or any of its SUBCONTRACTORS of any tier.

28.1.3 Notification shall be given to the CONTRACTOR by the COMPANY in writing of any such deficiencies or defects becoming apparent. The CONTRACTOR shall be permitted reasonable access to witness any tests or inspections undertaken by the COMPANY and to perform its own inspection, all costs related thereto being for the CONTRACTOR's account.

28.1.4 The CONTRACTOR shall forthwith commence and thereafter diligently proceed to perform such repair or replacement WORK to remedy such deficiencies and defects as notified by the COMPANY. Without limitation, the total cost thereof shall be for the CONTRACTOR's sole account and such costs shall be deemed to include all costs incurred by the CONTRACTOR in repairing or reperforming the defective or deficient WORK together with any incidental costs incurred by the COMPANY as a result thereof.

For the avoidance of doubt, in the event that any offshore removal, replacement and/or reinstallation and commissioning activities are necessitated as a result of such defect or deficiency, the CONTRACTOR shall provide all requisite technicians/supervisory personnel without cost to the COMPANY.

28.1.5 If the CONTRACTOR is unable or refuses to undertake or complete any repair or replacement which has been requested by the COMPANY in accordance with the provisions of this Clause 28.0, or if the COMPANY decides that the carrying out by the CONTRACTOR of work necessary to correct defects will be prejudicial to its interests, then the COMPANY may, without prejudice to any other rights and remedies which it may have under the CONTRACT, undertake the reperformance itself or have it undertaken by a third party and, in either instance, recover from the

CONTRACTOR all of the costs arising out of such reperformance together with any incidental costs incurred by the COMPANY as a result thereof.

- 28.1.6 The COMPANY shall be entitled to have such repair or replacement WORK performed by itself or by others in the case of emergency and the reasonable costs of such intervention (including the COMPANY'S incidental costs) shall be a debt due and recoverable from the CONTRACTOR.

28.2 Supervision Warranty

- 28.2.1 The CONTRACTOR shall, as part of the WORK to be performed, prepare procedures for the monitoring of and assist the COMPANY with:

- Any tests to be performed after delivery of the PERMANENT WORK;
- Installation works onshore/offshore;
- Precommissioning onshore/offshore;
- Commissioning offshore;
- Repair or maintenance work.

- 28.2.2 If so involved, the CONTRACTOR shall promptly report to the COMPANY any deficiencies observed by him during such operations and any failure of the CONTRACTOR to implement the aforesaid procedures as recommended by it or to promptly report any deficiency observed by it as a result of implementing such procedures shall be deemed to be a failure of the CONTRACTOR to meet its supervision obligations.

- 28.2.3 Should the CONTRACTOR'S supervision services be found to be defective, the CONTRACTOR shall furnish without charge to the COMPANY forthwith upon notification, such supervision services as are necessary to have the deficiencies remedied and the costs incurred by the COMPANY incurred as a result of said deficient services including any incidental costs shall be a debt due and recoverable from the CONTRACTOR.

- 28.2.4 This supervision warranty shall remain valid for the WARRANTY PERIOD.

28.3 General

- 28.3.1 In the event that any of the WORK is reperfomed, rectified or replaced by the CONTRACTOR under the provisions of this Clause 28, this Clause 28 shall apply to the portion so reperfomed, rectified or replaced. For any deficiencies or defects becoming apparent during the WARRANTY PERIOD, the WARRANTY PERIOD in respect of such reperfomed, rectified or replaced portion of the WORK shall be extended for a further two (2) years, commencing on the date upon which such reperformance, rectification or replacement was completed in accordance with the CONTRACT.

- 28.3.2 For the purposes of this Clause 28, incidental costs shall mean those costs (over and above the costs of reperforming the actual deficient or defective WORK), which are directly and unavoidably incurred by the COMPANY as a result of the CONTRACTOR'S failure to perform the WORK in accordance with the CONTRACT. Such costs shall include but not be limited to accommodation, catering, transportation, standby of personnel / equipment, mobilisation / demobilisation of personnel / equipment / materials etc (and to include like costs incurred by the COMPANY from the COMPANY'S other contractors).

- 28.3.3 The above warranties are not intended as a limitation but are in addition to all other express or implied warranties and guarantees set forth in the CONTRACT or at law.

The CONTRACTOR shall be liable for the full and satisfactory performance of the warranties set forth herein.

29. TERMINATION

29.3 In the third last line "under Clause 29.1(b) or 29.1(c)" is deleted.

29.5 In lines 3 - 4 "performed in accordance with the CONTRACT" is replaced by "completed and delivered in accordance with the CONTRACT prior to termination and any part of the WORK which upon termination the COMPANY, at its sole discretion, decides to accept delivery".

After "termination" in the last line there is inserted " or overpayments made".

29.6(b) After "completed" in the penultimate line there is inserted "and delivered prior to termination and any part of the WORK which upon termination the COMPANY, at its sole discretion, decides to accept delivery".

29.6(c) After "termination" in line 2 there is inserted "including, without limitation, any additional costs arising from the COMPANY having to obtain a replacement for all or part of the PERMANENT WORK,".

The following new Clause is added after Clause 29.7:

"28.8 In the event of termination the COMPANY shall issue a COMPLETION CERTIFICATE in respect of the WORK completed in accordance with the CONTRACT at the date of termination."

30. AUDIT AND STORAGE OF DOCUMENTS

30.1 In the first line delete "two years" and replace with "six (6) years".

32 BUSINESS ETHICS

Clause 32 is deleted as worded and the following substituted:

"32.1. BUSINESS PRINCIPLES AND ANTI-BRIBERY AND CORRUPTION POLICY

The CONTRACTOR confirms having received a copy of the COMPANY's Business Principles (or alternatively, taken notice of them at <http://www.centrica.com/index.asp?pageid=22>) and of the COMPANY's Anti-Bribery and Corruption Policy (or alternatively, taken notice of it at http://www.centrica.com/files/pdf/businessprinciples_anticorruption.pdf). The CONTRACTOR fully accepts that observance by the CONTRACTOR of the Business Principles and compliance by the CONTRACTOR with the Anti-Bribery and Corruption Policy when doing business for the COMPANY is a condition for the COMPANY and commits therefore not to violate any of the Business Principles or to fail to comply with the Anti-Bribery and Corruption Policy when performing the WORK.

Without prejudice to any other rights that the COMPANY may have, the COMPANY may terminate the CONTRACT immediately upon notice in writing should the CONTRACTOR violate the provisions of this clause.

32.2 MONITORING

The CONTRACTOR shall keep accurate books, accounts and records in connection with its obligations under Clauses 21.1 (Laws and Regulations) and 32.1 (Business Principles and Anti-Bribery and Corruption Policy) and the COMPANY shall have the right to review such books, accounts and records.

On request, the CONTRACTOR shall provide a certificate confirming that it has complied with its obligations under Clauses 21.1 (Laws and Regulations) and 32.1 (Business Principles and Anti-Bribery and Corruption Policy).

32.3. TRAINING

The CONTRACTOR shall ensure that CONTRACTOR and its SUBCONTRACTORS receive adequate training on their obligations under Clauses 21.1 (Laws and Regulations) and 32.1 (Business Principles and Anti-Bribery and Corruption Policy).

32.4. SUBCONTRACTORS

The CONTRACTOR shall ensure that any SUBCONTRACTOR performs WORK only:

- (a) following the satisfactory completion of proportionate, documented due diligence on such SUBCONTRACTOR; and
- (b) on the basis of a written contract which imposes on and secures from such person terms equivalent to those imposed on the CONTRACTOR in Clauses 21.1 (Laws and Regulations) 32.1 (Business Principles and Anti-Bribery and Corruption Policy), 32.2 (Monitoring), 32.3 (Training), 8.1/8.2 (Assignment and Subcontracting) and 32.4 (Subcontractors) (the "Relevant Terms"). The CONTRACTOR shall be responsible for the observance and performance by such persons of the Relevant Terms and shall be liable for any breach by such persons of any of the Relevant Terms."

33. **GENERAL LEGAL PROVISIONS**

33.5 Proper Law and Language

This Clause is deleted as worded and the following substituted:

"This CONTRACT, and any non contractual rights and obligations arising out of or in connection with it and its subject matter, shall be governed and construed in accordance with English law, and subject to the provisions of Clause 36, shall be subject to the exclusive jurisdiction of the English Courts.

The ruling language of the CONTRACT shall be the English Language."

33.7 Status of COMPANY

This Clause is deleted as worded and the following substituted:

"The COMPANY enters into the CONTRACT for itself and as agent for and on behalf of itself, CO-VENTURERS and its and their respective AFFILIATES. Without prejudice to the provisions of Clause 37 and notwithstanding the above:

- (a) the CONTRACTOR agrees to look only to the COMPANY for the due performance of the CONTRACT and nothing contained in the CONTRACT will impose any liability upon, or entitle the CONTRACTOR to commence any proceedings against any AFFILIATE or CO VENTURER other than the COMPANY; and
- (b) the COMPANY is entitled to enforce the CONTRACT on behalf of all AFFILIATES and CO-VENTURERS as well as for itself. For that purpose the COMPANY may commence proceedings in its own name to enforce all obligations and liabilities of the CONTRACTOR and to make any claim which any AFFILIATE or CO-VENTURER may have against the CONTRACTOR; and

- (c) All losses, damages, costs (including legal costs) and expenses recoverable by the COMPANY pursuant to the CONTRACT or otherwise shall include the losses, damages, costs (including legal costs) and expenses of the CO-VENTURERS and its and their respective AFFILIATES except that such losses, damages, costs (including legal costs) and expenses shall be subject to the same limitations or exclusions of liability as are applicable to the COMPANY or the CONTRACTOR under the CONTRACT.

The following new Clause is added after Clause 33.10:

“33.11 Agent for Service

- (a) The CONTRACTOR irrevocably appoints the person listed below as its agent for the service of proceedings in England and Wales in connection with this CONTRACT, and service upon such agent is deemed complete whether or not forwarded to or received by the CONTRACTOR.

CONTRACTOR’s agent for service: <insert name
<insert address

- (b) If any agent ceases to act, its principal must give notice in writing of the name and address of the new agent.

34. LIQUIDATED DAMAGES

34.2 The following is added at the end “and shall be paid forthwith upon demand by the COMPANY or may be deducted from any amounts otherwise owed by the COMPANY to the CONTRACTOR”.

The following new Clauses are added after Clause 38:

39. MUTUAL HOLD HARMLESS

It is the intention of the COMPANY that all companies with whom it contracts for the provision or work, services or goods relating to the exploration for and/or exploitation of hydrocarbons carried out on or in the area of United Kingdom Continental Shelf, (and their subcontractors of any tier), are signatories to the Industry Mutual Hold Harmless Deed or Deed of Adherence. The CONTRACTOR confirms that it is a signatory thereto and will remain so for the duration of the CONTRACT, and shall similarly ensure that its SUBCONTRACTORS performing work or providing services or goods offshore are signatories thereto.”

40. ULTIMATE PARENT COMPANY GUARANTEE

40.1 If so required by the COMPANY at any time upon written request, the CONTRACTOR shall procure and provide to the COMPANY by way of security for performance of the CONTRACTOR’S contractual obligations a fully executed parent company guarantee(s) in the form of the parent company guarantee attached hereto as Appendix 2 to Section II from the CONTRACTOR’s ultimate parent company (or another AFFILIATE of CONTRACTOR APPROVED at the sole discretion of the COMPANY). Such parent company guarantee(s) shall be provided to the COMPANY within thirty (30) days of receipt of the COMPANY’s written request and be effective from the EFFECTIVE DATE OF COMMENCEMENT OF THE CONTRACT. The provision of any such guarantee shall be at no cost to the COMPANY.

40.2 If the CONTRACTOR is a joint venture, each party to the joint venture shall procure from its ultimate parent company such guarantee in respect of the joint obligations of all those parties that constitute the CONTRACTOR.

- 40.3 If, having provided such guarantee, the ultimate parent company ceases to be the ultimate parent company of the CONTRACTOR, the CONTRACTOR shall procure that the guarantee is assumed by its new ultimate parent company or that such company provides a new guarantee to the COMPANY on the same terms.
- 40.4 If CONTRACTOR fails to provide a parent company guarantee in accordance with Clause 40.1 as required by COMPANY, COMPANY may either withhold all payments due to CONTRACTOR or may deduct a ten percent (10%) retention from each payment due to CONTRACTOR until CONTRACTOR provides the parent company guarantee.

41. CORPORATE RESPONSIBILITY POLICY

41.1 This Clause 41 and the CR POLICY:

- (a) set out the CONTRACTOR's obligations and the COMPANY's rights in respect of the CR POLICY; and
- (b) are without prejudice to the COMPANY's rights under Clause 30 Audit and Storage of Documents.

41.2 Throughout the term of the CONTRACT the CONTRACTOR shall:

- (a) comply with the CR POLICY;
- (b) allow the COMPANY, its auditors or other advisers (each an "Audit Agent") access to any of the CONTRACTOR's premises, personnel and relevant records (and take copies) as may be reasonably required in order to undertake verification of the CONTRACTOR's compliance with the CR POLICY;
- (c) provide the Audit Agents with all reasonable co-operation, access (including to personnel) and assistance in relation to each audit;
- (d) ensure that any agreement it has with SUBCONTRACTORS provide an equivalent level of protection to the section of the CR POLICY headed "Ensuring integrity in our business transactions", and shall use all reasonable endeavours to contract with its SUBCONTRACTORS on terms providing an equivalent level of protection for the other aspects of the CR POLICY;
- (e) upon request, provide the COMPANY with names and addresses of the SUBCONTRACTORS together with details of the services or goods they provide;
- (f) investigate its SUBCONTRACTORS' compliance with the contractual provisions referred to in Clause 41.2(d), and on request by the COMPANY provide to the COMPANY details of its findings. The frequency of such investigations will be established by the CONTRACTOR based on a risk assessment of the relevant SUBCONTRACTOR (which shall be at least once during the term of the SUBCONTRACT), save that the CONTRACTOR shall investigate a SUBCONTRACTOR's compliance with the CR POLICY if reasonably requested by the COMPANY.

41.3 The COMPANY shall provide at least five (5) working days' notice of its intention to conduct an audit, unless (i) a specific incident has been notified to the COMPANY, (which shall be identified to the CONTRACTOR) or (ii) the COMPANY has a genuine belief that the CONTRACTOR is failing to comply with the CR POLICY. In either situation, the COMPANY shall have the right to audit the CONTRACTOR without notice.

- 41.4 In the event that the CONTRACTOR fails to comply with Clause 41.2(f), the CONTRACTOR shall procure the right for the Audit Agent to be allowed access to SUBCONTRACTORS in order to verify compliance by such SUBCONTRACTORS with the contractual provisions referred to in Clause 41.2(d).
- 41.5 If the COMPANY identifies, through an audit or otherwise, any failure by the CONTRACTOR or any SUBCONTRACTOR to comply with the contractual provisions referred to in Clause 41.2(d), the CONTRACTOR will work with the COMPANY to agree a rectification plan. All costs associated with the preparation and implementation of the rectification plan shall be borne by the CONTRACTOR.
- 41.6 Subject always to Clause 41.7, if an appropriate rectification plan cannot be mutually agreed within a reasonable time or the CONTRACTOR fails within a reasonable time to carry out the rectification plan in accordance with its terms, this shall be deemed to be a material breach of the CONTRACT, giving rise to a right of termination by the COMPANY under Clause 29.1(b).
- 41.7 If there is a failure by the CONTRACTOR or any SUBCONTRACTOR to comply with the bribery and corruption aspects of the CR POLICY, then this will be deemed to be an irremediable material breach of the CONTRACT (without the need to work with the CONTRACTOR first to agree a rectification plan) and the COMPANY may terminate the CONTRACT (without liability) giving rise to a right of termination forthwith by the COMPANY under Clause 29.1(b) and Clause 29.2 shall have no application.
- 41.8 The COMPANY or its agents may at any time during the term of the CONTRACT require the CONTRACTOR to complete a CR Evaluation, at the CONTRACTOR's cost. The CONTRACTOR will complete such CR Evaluation within any time periods specified by the COMPANY or its agents.

The term "CR Evaluation" as used above means a corporate responsibility evaluation conducted by the COMPANY or its agents assessing the CONTRACTOR's performance against corporate responsibility criteria specified by the COMPANY or its agents from time to time.

- 41.9 If the CONTRACTOR fails the CR Evaluation (in the COMPANY's reasonable opinion), the CONTRACTOR will work with the COMPANY to agree a rectification plan. If an appropriate rectification plan cannot be mutually agreed or the CONTRACTOR fails within a reasonable time to carry out the rectification plan, the CONTRACTOR shall allow the COMPANY to carry out an audit and Clauses 41.2 to 41.7 shall apply.

42. TUPE

- 42.1 CONTRACTOR agrees to defend, indemnify and hold COMPANY GROUP harmless from and against any and all liabilities, damages, causes of action, claims or costs (including but not limited to all related legal costs and expenses) arising directly or indirectly under or as a result of the Transfer of Undertakings (Protection of Employment) Regulations 2006 ("TUPE") or any similar national or European legislation on the commencement, cessation or transfer of the provision of the WORK.
- 42.2 CONTRACTOR warrants that during the last 6 months of the term of the CONTRACT CONTRACTOR will not change any employees or personnel deployed to carry out the WORK or change all or any of their terms and conditions of employment or engagement without the prior written consent of COMPANY.

- 42.3 CONTRACTOR will during the last twelve months of the term of the CONTRACT in circumstances where it receives any claim by an employee or personnel of CONTRACTOR deployed in the carrying out of the WORK arising out of or in connection with the employee's contract of employment or engagement with CONTRACTOR notify COMPANY of the details of the claim within seven days of CONTRACTOR receiving intimation thereof.
- 42.4 CONTRACTOR will, whenever requested by COMPANY, within seven days of such request, provide to COMPANY such details of any employees or personnel of CONTRACTOR or SUBCONTRACTOR deployed in the carrying out of the WORK as may be required by COMPANY and will warrant that all information supplied pursuant to such request is accurate in every material respect.
- 42.5 CONTRACTOR will when requested by COMPANY or any prospective tenderer for any works in continuation of the WORK (or any part thereof) and of a similar nature to the WORK ("the NEW WORKS") identified by the COMPANY within seven days of such request, provide to any such prospective tenderer and to COMPANY such details of CONTRACTOR'S or SUBCONTRACTOR'S employees or personnel deployed in the carrying out of the WORK as may be required by COMPANY, or prospective tenderers. CONTRACTOR agrees that such details will include the estimated number of employees or personnel likely to transfer to the provider of the NEW WORKS, details of their lengths of service, salaries and benefit provision. CONTRACTOR agrees that any information supplied to COMPANY or any prospective tenderer pursuant to this provision or otherwise will be provided in compliance with the provisions of the Data Protection Act 1998 ("the DPA") and CONTRACTOR agrees that it will take all measures available to it to supply the information requested and, if necessary to avoid breach of the DPA, will provide the information in an anonymised format. CONTRACTOR warrants that any information supplied to COMPANY or any prospective tenderer pursuant to this provision or otherwise, for the purpose of enabling any prospective tenderer to prepare a bid for the provision of the NEW WORKS, shall be accurate in every material respect.
- 42.6 CONTRACTOR will in the event that it is not successful in re-tendering (or in the event of it not re-tendering) for the provision of the NEW WORKS at the expiry or non-renewal of the CONTRACT, it will nevertheless, liaise, consult and co-operate with any tenderers for the provision of the NEW WORKS in order to attempt to ascertain whether or not TUPE is likely to apply to the arrangements facilitating the change in the provider of the NEW WORKS and so as to facilitate a smooth handover in the change of provider of the NEW WORKS.
- 42.7 CONTRACTOR warrants that it will procure the inclusion of provisions set out in Clauses 42.1 – 42.6 above in any SUBCONTRACT arrangements that relate to the performance of any part of the WORK.

Clause 43 to be inserted where Work may be performed for CSL under the Contract.

43 Centrica Storage Limited and the Code of Conduct

- 43.1 The CONTRACTOR acknowledges that it is or may be required to provide WORK under this CONTRACT to Centrica Storage Limited and undertakes that in performing its obligations under this CONTRACT it shall observe and comply with the *Code of Conduct.
- 43.2 The CONTRACTOR acknowledges that it has been briefed by the COMPANY and warrants that it in turn has briefed CONTRACTOR's PERSONNEL involved in this CONTRACT with regard to their proper conduct in compliance with the Code of Conduct.

43.3. Where required in order to comply with the Code of Conduct, the CONTRACTOR undertakes that for the purposes of this CONTRACT the team that interfaces with Centrica Storage Limited will be physically separate from the team that interfaces with the COMPANY.

43.4 Failure by the CONTRACTOR to comply with the Code of Conduct constitutes a breach of this CONTRACT and the COMPANY may terminate this CONTRACT in accordance with Clause 29.1(b) Termination.

*"Code of Conduct" as referred to above means the Code of Conduct for Separation of Centrica Storage from the rest of the Centrica Group dated March 2012 and issued by Centrica plc (available from the COMPANY upon request)".

CLAUSE 44 TO BE INSERTED WHERE THE WORK INCLUDES PROCESSING PERSONAL DATA. *This should not be used where the contractor will be providing anything more than basic data processor services as a more detailed clause is needed if, for example, any of the following will take place: the contractor is undertaking specialist services relating specifically to the processing of personal data, such as customer profiling or matching; the personal data will be transferred outside the EEA; or Centrica is sharing personal data with a third party for that third party to use for its own purpose, e.g. selling a customer database.*

44 DATA PROTECTION

44.1 For the purposes of this clause:

44.1.1 the terms "**Data Controller**", "**Data Processor**", "**Data Subject**", "**Personal Data**" and "**Processing**" shall have the meaning given to those terms in the Data Protection Act 1998, and "**Process**" and "**Processed**" shall be construed accordingly;

44.1.2 "**Data Protection Laws**" means any law, statute, declaration, decree, directive, legislative enactment, order, ordinance, regulation, rule or other binding restriction (as amended, consolidated or re-enacted from time to time) which relates to the protection of individuals with regards to the Processing of Personal Data to which a party is subject, including the Data Protection Act 1998; and

44.1.3 "**Regulator**" means the UK Information Commissioner (including any successor or replacement).

44.2 To the extent that the CONTRACTOR is acting as Data Processor for and on behalf of the COMPANY in relation to Processing that it is carrying out arising out of, or in connection with, the provision of the WORK, it shall:

44.2.1 comply with the obligations imposed on the COMPANY by the seventh data protection principle in the Data Protection Act 1998, namely:

- (a) maintain technical and organisational security measures sufficient to comply at least with the obligations imposed on the COMPANY by the seventh data protection principle and take reasonable steps to ensure the reliability of any personnel of the CONTRACTOR who have access to Personal Data; and

- (b) only process Personal Data for and on behalf of the COMPANY for the purpose of performing the WORK and in accordance with this CONTRACT (and where necessary only on instructions from the COMPANY to ensure compliance with the Data Protection Laws:
- 44.2.2 not transfer any Personal Data outside the European Economic Area without the COMPANY's prior written consent and procuring compliance with the eighth data protection principle in the Data Protection Act 1998;
- 44.2.3 on expiry or termination of this CONTRACT, howsoever caused, the CONTRACTOR shall immediately cease Processing the Personal Data and, at the COMPANY's option or direction, arrange for the prompt and safe return and/or secure and permanent destruction of all Personal Data, together with all copies in its possession or control and, where requested by the COMPANY, certify that such destruction has taken place. The provisions of this Clause 0 shall survive termination of this CONTRACT;
- 44.2.4 promptly, and in any event within twenty-four (24) hours, notify the COMPANY about any actual or suspected breach of Clause 44.2.1 and shall at its own cost:
 - (a) implement any measures necessary to restore the security of compromised Person Data; and
 - (a) support the COMPANY to make any required notifications to the Regulator and affected Data Subjects.
- 44.3 The CONTRACTOR shall indemnify on demand and keep indemnified the COMPANY from and against any and all losses which the COMPANY may suffer or incur (directly or indirectly) in relation to the CONTRACTOR's failure to comply with its obligations under this Clause 44. Nothing in this CONTRACT shall exclude or limit the CONTRACTOR's liability under this Clause 44..

APPENDIX 1 – Codes

The Manufacturer shall ensure that all equipment provided shall achieve the operational and maintenance requirements for the specified design life and specified operating cycles.

Note that where United Kingdom regulations must be applied, the documents listed as “Legislative” must be complied with.

The latest editions, as of the Enquiry date, of the following Codes, Standards and Regulations are applicable and are to be used by Suppliers in their designs. Where, for example, British Standards have been replaced by European or International Standards (e.g. BS EN or ISO), the current version of these standards are to be used. Where “in-house” standards have either been developed or are based on recognised national, international or industry standards, these may be offered as an alternative for the approval of the PURCHASER.

Note: All standards stated in Italics have been superseded and have been included for cross reference purposes.

Note: In the event of any ambiguity between similar standards and/or legislations, the most stringent standard and/or legislation should be adhered to.

The crane shall comply with the Machinery Equipment Directive, 2006/42/EC and the extension to the Directive to cover “Mobile Machinery and Lifting Equipment”. The crane shall carry the required CE marking and information to this effect. This is also required under The Supply of Machinery Safety Regulations 2008, SI No. 1597.

Legislative Documents

Crane Codes to Which Reference May Be Made):

Lloyds Code for Lifting Appliances in a Marine Environment August 2013.
DNV Standard for Certification 2.22 – Lifting Appliances October 2011.
API Specification 2C 7th Edition March 2012, Errata March 2013. (Pedestals)

European Directives

CE Marking Directive 93/68/EEC.

Low Voltage Directive (LVD) 2006/95/EC (New version: LVD Directive 2014/35/EU).

ATEX Directive 94/9/EC – 4th Edition September 2012, Updated December 2013.

EMC directive 2014/30/EU.

Machinery Directive 2006/42/EC.

European Normalised Standards

BS EN 13001-1:2015 - Cranes. General design. General principles and requirements

BS EN ISO 13849-2 2012 - Safety of Machinery - Safety-related parts of control systems.

BS EN 61508- Parts 1 - 7:2010. Functional safety of electrical/ electronic/ programmable electronic safety-related systems.

BS EN 62061:2005+A1:2013. Safety of machinery. Functional safety of safety-related electrical, electronic and programmable electronic control systems.

BS EN 60079-14 2014 - Explosive Atmospheres Part 14 Electrical installations design, selection and erection.

BS EN 60079-17 2014 - Explosive Atmospheres Part 17 Electrical installations inspection and maintenance

BS EN 61131 - Programming languages

HSE Regulations

Health and Safety at Work etc Act 1974.

Electricity at Work Regulations 1989.

Lifting Operations Lifting Equipment Regulations 1998 (LOLER).

Provision and Use of Work Equipment Regulations 1998 (PUWER).

UK Standards

BS 7671:2008+A3:2015. Requirements for Electrical Installations. IET Wiring Regulations. IEE (IET) Recommendations for the Electrical and Electronic Equipment of Mobile and Fixed Offshore Installations

BS 6883:1999. Elastomer insulated cables for fixed wiring in ships and on mobile and fixed offshore units.

BS 7262:1990. Specification for automatic safe load indicators.

CAP 437 7th Edition Civil Aviation Authority Standards for Offshore Helicopter Landing Areas.

Other Guidance Documents

The "Blue Guide" on the Implementation of EU Product Rules – 2014.

HSG 212 - Technical guidance on the safe use of lifting equipment offshore.

Oil & Gas UK / Energy Institute – Guidelines for the Management of Flexible Hose Assemblies (2nd Edition – February 2011)

Energy Institute – Guidelines for the design, installation and management of small-bore tubing systems (2nd Edition – May 2013)

Pressure Equipment Directive (97/23/EC)

ASLI

BS 7262 Specification for Automatic Safe Load Indicators.

Manuals

BS EN 82079-1:2012 Preparation of instructions for use. Structuring, content and presentation. General principles and detailed requirements.

BS ISO 12478 Cranes. Maintenance Manual. General.

Manufacture

ANSI/AWS D1.1 Structural Welding Code – Steel.

BS EN ISO 15614-1:2004 Specification and Qualification of welding procedures for metallic materials – Welding procedure test

APPENDIX 2 – Existing MK100 Lifting Duties

LOAD RATINGS CHAR T
MAXIMUM ALLOWABLE LOADS
PEDESTAL MOUNTED MK 100 MARINE CRANE
J6.57m TUBULAR BOOM - cf LIST

WEIGHT OF HOOKS, HOOK BLOCKS, SLINGS AND ALL OTHER LOAD HANDLING DEVICES EXCEPT THE HOIST ROPE SHALL BE CONSIDERED PART OF THE LOAD

MAIN HOIST 3657 TUBULAR BOOM
 LOAD RATING SHOWN AT 0° LIST

LOAD RADIUS		BOOM ANGLE	REEVING			
			PLATFORM LIFTS	TE 2-J	SEASTATE 4	SEASTATE 6
FEET	METRES	DEGREES	LOAD KGS	LOAD ICGS	LOAD KGS	LOAD ICGS
10	9.144	78	2050	20450	16500	13500
35	10.668	76	20450	20450	16500	13500
40	11.718	74	20450	20450	16500	13500
45	12.764	71	20450	20450	16500	13500
50	13.810	69	20450	20450	16500	13500
55	14.856	66	20450	20450	16500	13500
60	15.902	63	20450	20450	16500	13500
65	16.948	61	20450	20450	16500	13500
70	18.000	58	20450	20450	16500	13500
75	19.052	55	20450	20450	16500	13500
80	20.104	52	20450	20450	16500	13500
85	21.156	49	20450	20450	16500	13500
90	22.208	46	20450	20450	16500	13500
95	23.260	43	20450	20450	16500	13500
100	24.312	40	20450	20450	16500	13500
105	25.364	37	20450	20450	16500	13500
110	26.416	34	20450	20450	16500	13500
115	27.468	31	20450	20450	16500	13500
120	28.520	28	20450	20450	16500	13500
125	29.572	25	20450	20450	16500	13500

WH HOIST TUBULAR BOOM

LOAD RATINGS SHOWN AT 0° LIST

Prepared by: [Signature] 7/77 f. I

Approved: [Signature]

LOAD RADIUS	BOOM ANGLE	PLATFORM LIFTS	SEASTATE 6
FEET	METRES	DEGREES	LOAD KGS / LOAD ICGS
9.144 TO 39.625	78° TO 0°	5440	5168

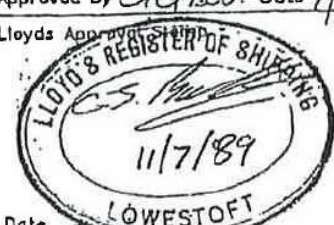
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LOAD RATINGS CHART
 MAXIMUM ALLOWABLE LOADS:
 PEDESTAL MOUNTED MK100 MARINE CRANE
 36.57m TUBULAR BOOM - Ø LIST

WEIGHT OF HOOKS, HOOK BLOCKS, SLINGS AND ALL OTHER LOAD HANDLING DEVICES EXCEPT THE HOIST ROPE SHALL BE CONSIDERED PART OF THE LOAD

MAIN HOIST 36.57 TUBULAR BOOM
 LOAD RATING SHOWN AT Ø LIST

LOAD RADIUS		BOOM ANGLE DEGREES	8 PART REEVING PLATFORM LIFTS	7 PART REEVING PLATFORM LIFTS	6 PART REEVING SEASTATE 1	5 PART REEVING SEASTATE 1	4 PART REEVING SEASTATE 1
FEET	METRES		LOAD KGS	LOAD KGS	LOAD KGS	LOAD KGS	LOAD KGS
30	9.144	78	56700	51000	45065	36705	28710
35	10.668	76	56700	51000			
40	12.192	74	56700	51000	45050	36705	28710
45	13.716	71	56700	51000			
50	15.240	69	52160	51000	43890	36705	28710
55	16.764	66	47630	47630			
60	18.288	63	43090	43090	40823	36010	28710
65	19.812	61	39460	39460			
70	21.336	58	35830	35830	34473	34473	28710
75	22.860	55	33110	33110			
80	24.384	52	30840	30840	29937	29937	28500
85	25.908	49	28580	28580			
90	27.432	46	26310	26310	25855	25855	25855
95	28.956	42	23590	23590			
100	30.480	39	20860	20860	20865	20865	20865
105	32.004	35	19050	19050			
110	33.528	30	17690	17690	17690	17690	17690
115	35.052	25	15880	15880			
120	36.576	18	14510	14510	14515	14515	14515
125	38.100	0	11340	11340	11340	11340	11340

Prepared by *[Signature]*
 Approved by *[Signature]* Date 7/7/89
 Lloyds Approved Stamp

 Date 11/7/89
 LOWESTOFT

APPENDIX 3 – Existing Pedestal

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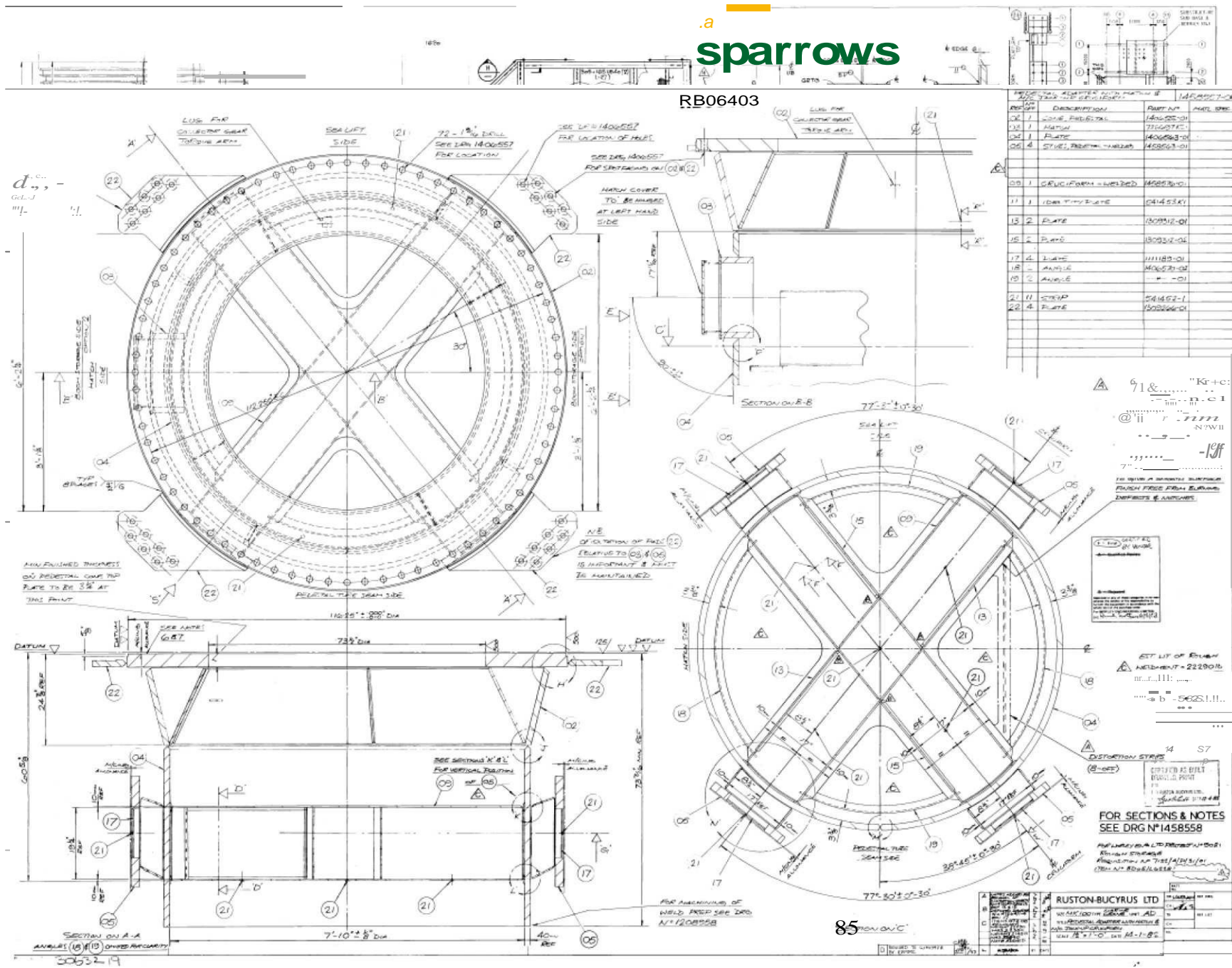
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DELIVERY ASSURED

sparrows

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SET UP OF BENCH
 ALIGNMENT = 22800
 DISTANCE STRIP
 (B-007)

FOR SECTIONS & NOTES
 SEE DRG N° 1458558

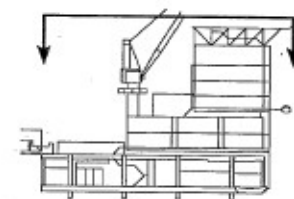
REV.	DESCRIPTION	DATE
A	ISSUED FOR CONSTRUCTION	10/10/88
B	ISSUED FOR CONSTRUCTION	10/10/88
C	ISSUED FOR CONSTRUCTION	10/10/88

RUSTON-BUCYRUS LTD
 1458558-01
 1458558-02
 1458558-03
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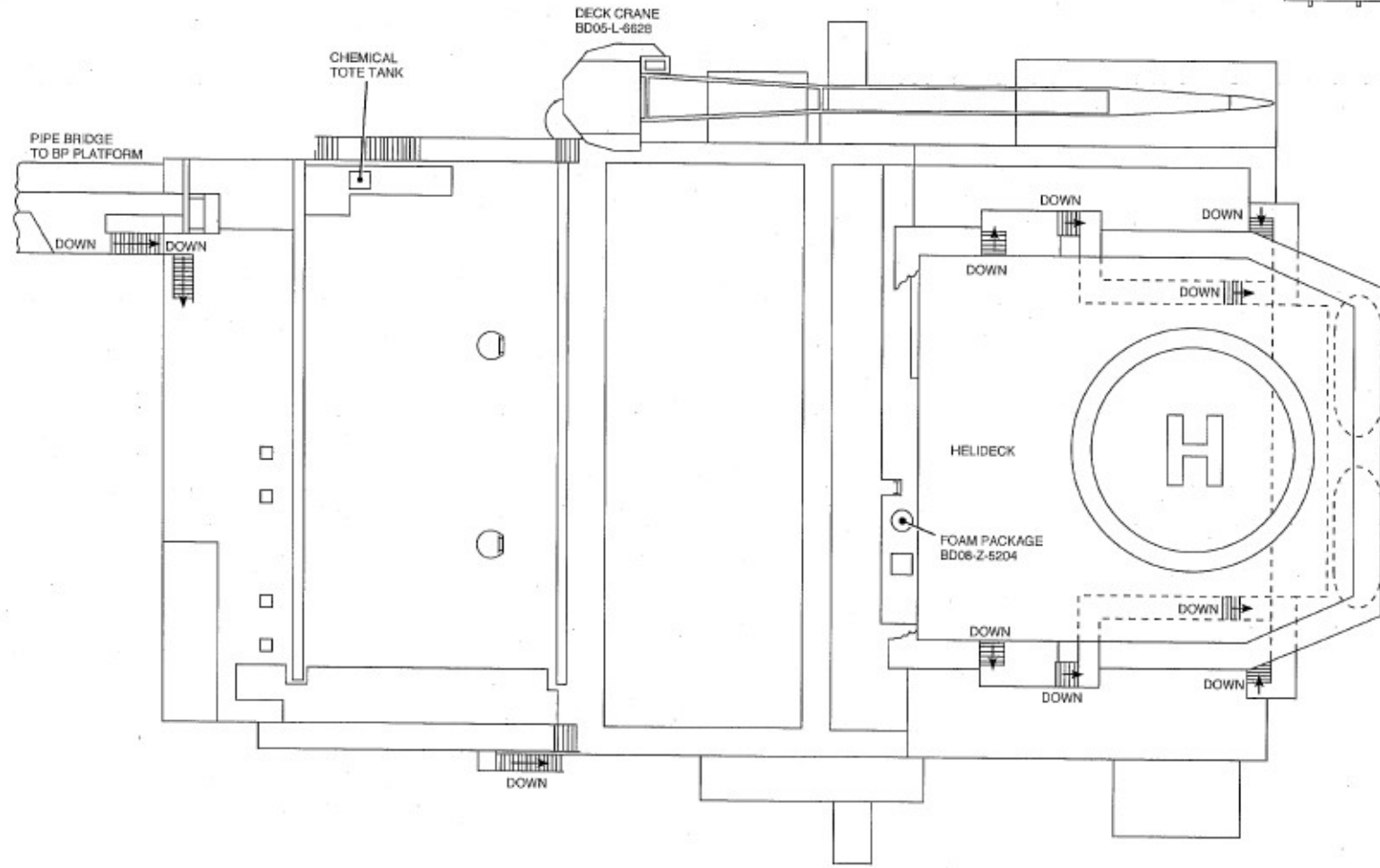
APPENDIX 4 – Platform Layout

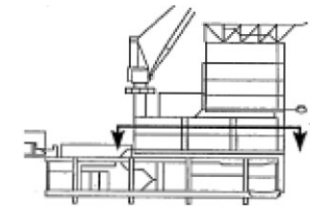
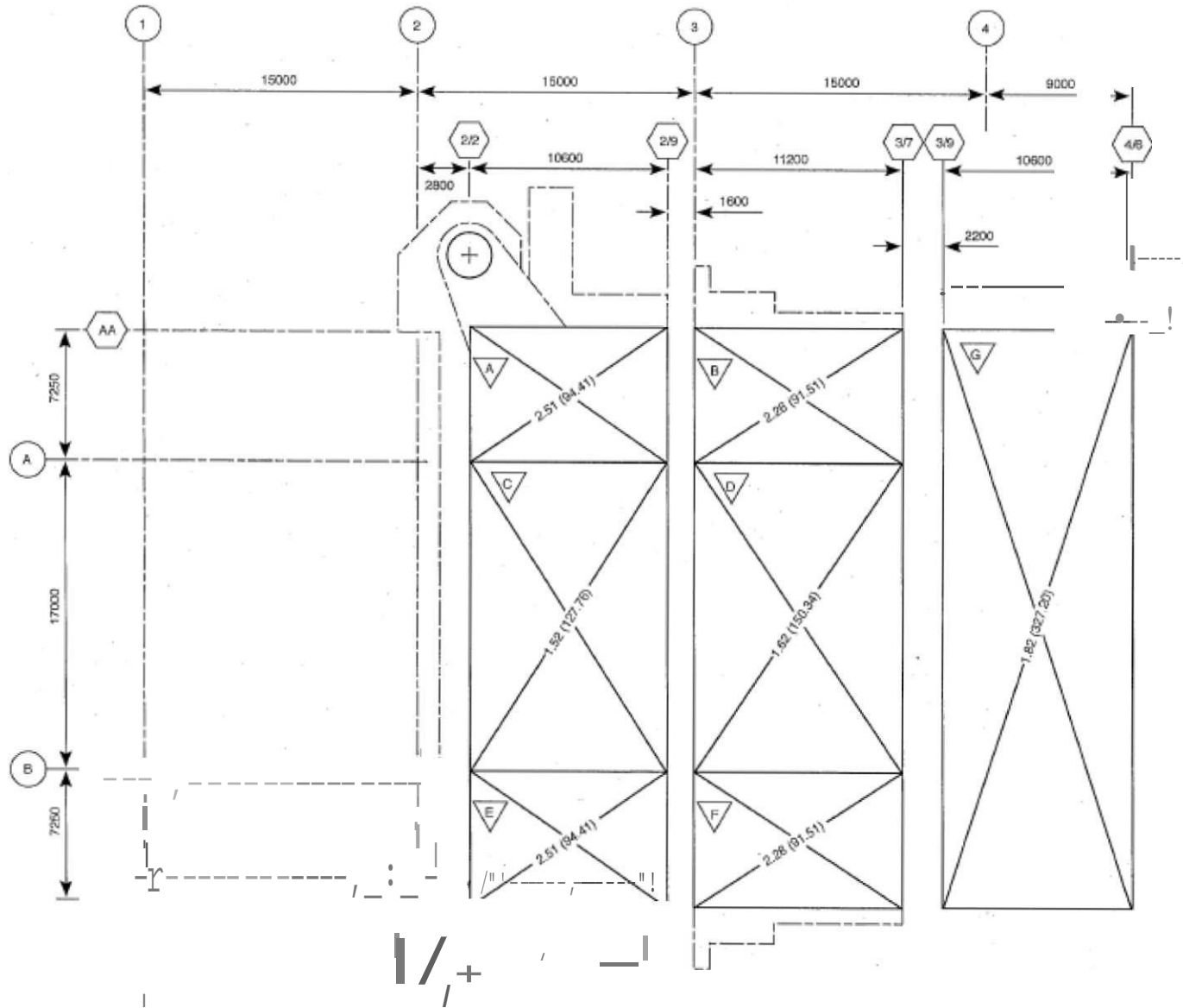
DELIVERY ASSURED

83



← PLATFORM NORTH





PLATFORM NORTH

KEY:
 000 DISTRIBUTION CAPACITY
 AEA, TONNES
 (000) TOTAL LAYDOWN CAPACITY
 FOR AREAS
 W' AREA REFERENCE

- NOTES,
- LAYDOWN CAPACITY VALUES BASED ON DECK BEAM STRENGTH, CAPACITY IS REDUCED TO 1/3 OF THE TILTED AU. LOADS ARE POSITIONED OVER THE SPAN WITH ONE DECK BEAM FOR SOME LOADS IT MAY BE NECESSARY TO USE SPREADER BEAMS TO ACHIEVE THE SPREADER BEAMS CANNOT BE USED TO DISTRIBUTE THE LOADS. ALLOWABLE CAPACITY IS REDUCED TO THE LESSER OF EITHER 0.5 OF THE DISTRIBUTED LAYDOWN CAPACITY OR THE AREA.
 - DECK LAYDOWN CAPACITY FOR AREAS ON THE PERMITTED LOADING STRENGTH REPORT 3224-ER-01 WHICH IS BEING REVIEWED AND ALSO UPON THE DISTRIBUTION OF SUCH LOADING BEING ASSESSED AS REPORT 327002 APR 1991.
 - DECK LAYDOWN CAPACITY VALUES SHOWN INCLUDE FOR NORMAL PERSONNEL LOADS HOWEVER, IN THE EVENT THAT SPECIFIC AREAS ARE SUBJECT TO SIGNIFICANT INCREASE IN PERSONNEL LOADS THE CAPACITY IS REDUCED.

AREA OF TOTAL CAPACITY FOR THE AREA IS SHOWN IN THE TABLE

- ALL LAYDOWN AREAS MUST BE CONSIDERED TO BE UNDER A LOAD CAPACITY OF 1.5 TONNES PER SQUARE METRE

0;rf---L 1J
 MOUULE (0006) MOUULE (BOOG) MODULE (8007) H/VE

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DELIVERY ASSURED

APPENDIX 5 – Deviation/ Clarifications Example Sheet



CRANE SPECIFICATION TECHNICAL DEVIATION LIST					
Dev No.	Specification Reference	Rev	Client Description	Comment/Deviation	Status
2.2.1	Boom	C1	Walkway	No Walkway shall be provided	Deviation
2.2.3	Chassis	C1	The chassis should incorporate interface points at suitably strong locations to allow the connection of a jacking system for slew bearing maintenance	Chassis will not include jacking points	Deviation

Please note: **Example sheet** for return clarification/ deviations



Comment Response Sheet

Client: Centrica Storage Limited
Project: Verification of FEED of BD Crane Replacement

Client Contract No: EAS/C/0601 / PO 4900003506
Transmittal No: C15062/016

Client reference:

CRS number: C004-12-002-04-05-001
Revision: 03

Status: Closed
CRS Date: 21 June 2016

Page: 1 of 6

Attention: Stephen Caley

Copied to:

SUBJECT Crane Functional Specification

DOCUMENT APPRAISAL STATUS SUMMARY

The document(s) below have been examined in accordance with the Work Instruction(s) referenced and are assigned the status code(s) indicated, subject to the following comment(s):

Document No.	Rev.	Title	Status
JU027297	C	Functional Specification for Diesel-Hydraulic Pedestal Crane for the Rough 47/3B BD Platform	A

COMMENT STATUS KEY ● = Closed Comment ◆ = Open Comment

APPRAISAL STATUS KEY

A = Approved/Accepted	R = Rejected, not acceptable
AC = Approved/Accepted with conditions	RI = Retained as supporting documentation for information only
H = Hold	S = Superseded
Q = Queries	I = Requested for Information only

FINAL ACCEPTANCE DEPENDS ON SATISFACTORY SURVEY AND TESTING

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Client: Centrica Storage Limited
Project: Verification of FEED of BD Crane Replacement
Client reference:

CRS number: C004-12-002-04-05-001
Revision: 03
Page: 2 of 6

DOCUMENT APPRAISAL DETAILS

Document No.	Rev.	Title	Status
JU027297	C	Functional Specification for Diesel-Hydraulic Pedestal Crane for the Rough 47/3B BD Platform	A

Work Instruction(s): C004-12-002-03-01-001 - FEED Design VWI

1. Fire & Safety Comments

- 1.1 ● This document has been examined for fire and safety aspects for compliance with the installations impacted Safety Critical Elements and associated Performance Standards.
(Comment by Keith Taylor)
- 1.2 ● It is noted that at the time of the creation of this document it has yet to be determined if the crane will be installed on the East or West side of the 47/3B platform. The suitability of the selected location will be verified as suitable by LR at a later date one decided taking into account the suitability of the structural elements, dropped object risks etc.
(Comment by Keith Taylor)
- 1.3 ● It is noted from Section 2.2.13 (Machinery House) that the following statement is made... *"Automated louvers are to be fitted to the machinery house wall to allow a free intake of air over the engine. They should be activated upon operation of the crane."* Clarification is requested as to this engine's air intakes location in relation to any defined hazardous areas where the crane may operating within.
(Comment by Keith Taylor)

Client response to CRS rev 01

**The engine's air intakes are located in a 'safe area'. (see enclosed drawing)
The specification of the machinery house and cab equipment for the new crane is to be suitable for ATEX, Zone 2 to cover any future changes to the platform layout and for equipment commonality with the BP crane. There is a strong chance we will want to purchase a new crane for the BP platform (the crane on the BP platform will be partly in a Zone 2 area)**



Comment CRS rev 02

The response and documentary evidence submitted has been examined and is considered to be acceptable for the specific applications identified without further comment.
(Comment by Keith Taylor)

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Client: Centrica Storage Limited
Project: Verification of FEED of BD Crane Replacement
Client reference:

CRS number: C004-12-002-04-05-001
Revision: 03
Page: 3 of 6

DOCUMENT APPRAISAL DETAILS

- 1.4 ● It is noted from Section 2.2.14 (Drivers Cabin) that the following statement is made...
"Space shall be provided for storage of a radio communication pack, public address speakers, life jacket and fire extinguisher supplied free issue by the PURCHASER."
Clarification is requested as to whether a Manual Alarm Call Point is provided in the crane cabin for the crane operator to initiate should he witness an event etc.
(Comment by Keith Taylor)

Client response to CRS rev 01

The provision of a manual call point in the crane cabin was not in the original proposal. We can see the benefit of having this so we are now looking into the feasibility of installing this facility.



Comment CRS rev 02

The response provided is noted however this items acceptance is put on 'Hold' pending the final decision of the provision of a manual alarm call point in the crane cabin.

(Comment by Keith Taylor)

Client response to CRS rev 02

There will be no manual alarm call points inside the crane cabs.

Following discussion and debate it is concluded that a call point in the cab would not provide any benefit as any witnessed incident could be reported directly to the control room via the radio.

If the crane operator was outside the cab, he/she would exit the crane location activating a manual call point on the way.

**There are existing call points located close to the crane exit routes.
(Steve Caley 20/06/16)**



Comment CRS rev 03

The response provided and rationale / justification is considered to be acceptable for the specific applications identified without further comment.

(Comment by Keith Taylor)

- 1.5 ● Further to the 'Query' above, clarification is also requested as to whether the crane cabin is provided with a donut descender device to facilitate quick escape evacuation during scenario involving escape and evacuation.
(Comment by Keith Taylor)

Client response to CRS rev 01

There is no intention to provide a donut descender device in the crane cabin.

FINAL ACCEPTANCE DEPENDS ON SATISFACTORY SURVEY AND TESTING

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Client: Centrica Storage Limited
Project: Verification of FEED of BD Crane Replacement
Client reference:

CRS number: C004-12-002-04-05-001
Revision: 03
Page: 4 of 6

DOCUMENT APPRAISAL DETAILS



Comment CRS rev 02

The response provided is noted and accepted on the basis that the client has fully assessed the risks and has concluded that escape can be performed within a suitable timeframe in line with the installations accepted Safety Case and associated Escape, Evacuation and Rescue Analysis.

(Comment by Keith Taylor)

1.6



It is noted from Section 2.2.15 (Electrical and Instrumentation) that heat, smoke and oil mist detection shall be fitted in the machinery room of the crane. Clarification is requested as to whether the crane's diesel engine is protected by any active fire protection equipment to facilitate extinguishing a fire should it arise.

(Comment by Keith Taylor)

Client response to CRS rev 01

There is no active fire extinguishing facility provided.

Should a fire be present in the machinery room this will be detected on a panel in the cabin. The operator will then shut down the crane and proceed to extinguish the fire with a hand fire extinguisher.



Comment CRS rev 02

The response provided is noted and accepted on the basis that the client has fully assessed the potential fire risks and has concluded that an active fire extinguishing facility is not required and that any credible fire can be handled by the crane operator utilising hand held fire extinguishers.

(Comment by Keith Taylor)

2. Lifting & Mechanical Handling Comments

2.1



Ref. p.1.3.2: We have noted that the crane design temperature has been established as -10°C. According to BS EN 13852-1 the crane operating T_o is normally 20°C below the design temperature, therefore T_o of -30°C should be adopted as a minimum required operating temperature for crane to be capable of continuous operation in a safe and efficient manner. However the T_o in the document is -20 deg C. Client comment is required.

(Comment by Mariusz Niedziolko)

Client response to CRS rev 01

EN 13852-1 specifies the design temperature is to be based on T_d of the lowest mean daily temperature (which in the case of Rough is 5.3 DegC taken as an average of 65 historical entries for indication purposes)

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Client: Centrica Storage Limited
Project: Verification of FEED of BD Crane Replacement
Client reference:

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DOCUMENT APPRAISAL DETAILS

EN 13852-1 specifies in section 3.19 that the “minimum operating temperature” “T_o” is the lowest operating temperature the crane can be operated without compromising the safety of the crane, and which, for the selection of steel materials is normally 20 DegC below the design temperature.

This would indicate a -14.7DegC minimum operating temperature in the case of Rough.

The specification has stated a “T_d” design temperature of -10 DegC and a minimum operating temperature “T_o” of -20 DegC which on both counts put the specification higher than our requirements.

Further to this, we referred to Lloyds Code of Lifting Appliances In a Marine Environment 2013 (CLAME) which states in section 2.25.3 that the minimum design temperature (MDT) is to be taken as 10 Deg C above the lowest temperature of operation. For worldwide service, the lowest temperature of operation is to be taken as -20DegC with corresponding MDT of -10DegC. CLAME was also referenced in the applicable codes.

In summary, both the cranes and the specification meets our requirements. Lloyds CLAME provides a general worldwide temperature range for design and operation.



Comment CRS rev 02

Noted. Comment closed.

(Comment by Mariusz Niedziolko)

2.2



Ref. p. 2.2.16 (i): We have noted that the two blocking prevention is mentioned. LR recommends that the crane will be equipped with an Anti Two-Block system with audible and visible alarms in the cab for the load hoist. The system shall prevent further upward movement of the load hoist and downward movement of the boom. However it is important that the opposite direction for each hoist will be still available for use without override intervention. LR recommends that no override is provided for the Anti Two-Block system. Stalling of the hoist drum is not acceptable. Client comment is required.

(Comment by Mariusz Niedziolko)

Client response to CRS rev 01

Visual and audible indication is covered on page 38

No override has been requested

EN13852-1 also covers this in section 5.8.4.2



Comment CRS rev 02

Noted. Comment closed.

(Comment by Mariusz Niedziolko)

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Comment Response Sheet

Client: Centrica Storage Limited
Project: Verification of FEED of BD Crane
Replacement

Client Contract No: EAS/C/0601 / PO 4900003506
Transmittal No: C15062/016

Client reference:

CRS number: C004-12-002-04-05-001
Revision: 03

Status: Closed
CRS Date: 21 June 2016

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In preparing this report, the undersigned surveyor is acting as an independent person in accordance with the applicable policy on conflict of interest.

Surveyor to Lloyd's
Register:

Keith Taylor/Mariusz Niedziolko

Co-ordinator /
Project Manager:

Kenny Nwana

Client Response
Prepared by:

Dated

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